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November 25, 2019

Ms. Alexandra Calderon, REHS
County of San Bernardino
Department of Public Health
385 N. Arrowhead Avenue, 2nd Floor
San Bernardino, CA 92415

Subject: Soil Percolation Report for APNs No: 0573-101-07-0000
NE of Yates Well Road and I-15, Nipton, CA
LCI Report No: LP19174

Reference: Geotechnical Report for APNs 0573-101-07-0000, Nipton, prepared by Landmark Consultants, Inc., dated November 22, 2019.

Dear Ms. Calderon:

This report presents the findings of our November 2019 percolation study as a part of the geotechnical report for the proposed commercial project located on North-east of Yates Well Road and I-15, Nipton, County of San Bernardino, California. The project developer and parcel legal description follow:

Developer:
Timothy P. Herbst
5195 S. Las Vegas Blvd.
Las Vegas, NV 89119
Phone: (702) 798-6400

Owner:
Timothy P. Herbst

Legal Description: APN 0573-101-07-0000

Site Conditions

The project site is rectangular in plan view, is relatively flat-lying slopes gently to the south-east, and consists of approximately 23.5 acres, with the proposed development is limited to the southern portion of the site (approximately 5 acres). The site is bounded by Yates Wells Road to the south and Interstate 15 to the west.

The project site was previously used as business enterprise, with several mobile homes, old car storage areas and with some desert vegetation. There are no water courses, wells and rock outcropping observed. Existing microwave antenna complex is located in the south-east corner. Existing water well is located north of the proposed development, approximately 260 feet north of the proposed leach field areas. Adjacent properties are flat-lying and are approximately at the same elevation with this site.

The project site lies at an elevation of approximately 2,625 feet above mean sea level (MSL) in the Mojave Desert region of the California high desert. Annual rainfall in this arid region is variable from 2.2 to 6.5 inches per year with four months of average summertime temperatures above 90°F.

Field Exploration

Subsurface exploration was performed on October 4, 2019 using 2R Drilling of Ontario, California to advance four (4) borings to depths of 16.5 to 46.5 feet below existing ground surface, and four (4) percolation test borings to a depth of 4 feet below the existing ground surface. The borings were advanced with a truck-mounted, CME 75 drill rig using 8-inch diameter, hollow-stem, continuous-flight augers. The approximate boring locations were established in the field and plotted on the site map by sighting to discernible site features. The boring locations are shown on the Site and Exploration Plan (Plate A-2).

Subsurface Soils

Subsurface soils encountered during the field exploration conducted in October and November, 2019 consist of dry to moist, dominantly medium dense to very dense, interbedded silty sands (SM) and sandy silts (ML) to a depth of 46.5 feet, the maximum depth of exploration. The near surface soils are non-expansive in nature. The subsurface logs (Plates B-1 thru B-4) depict the stratigraphic relationships of the various soil types.

Groundwater

Groundwater was not encountered in the borings during the time of exploration. The well information collected near the subject site (Well 355347N1154114W001), has indicated that the ground water level ranges from elevation 2520 to 2521 (88 to 90 feet below the ground surfaces) in the last 50 years.

Percolation Tests

A total of four (4) percolation tests were conducted on November 6 and 7, 2019 at this site, as shown on Plate A-2. The percolation tests were performed to the San Bernardino County percolation report standard, as described in the "On-Site Waste Water Disposal System," published by the San Bernardino Department of Environmental Health.

The tests were performed using a 6-inch diameter, hand auger boreholes made to depth 4.0 feet below the existing ground surface. The test pits were filled with water (5 gallons bottle) and tests were performed the next day after two consecutive 30 minutes readings with more than 6 inches drop in the test holes. Based on these two readings the "sandy soil" test criteria were determined to exist at the site and six (6) 10-minute interval readings were taken for an hour period until a stabilized drop was recorded.

The test results indicate that the stabilized percolation rate (based on the average of the last 3 readings) in the soil ranges from 3.8 minute per inch to 4.1 minutes per inch, The fines content of the native sand is 20% to 36% passing the #200 (0.08 mm) sieve and 79% to 88% passing the #10 (2 mm) sieve (Plates C-1 thru C-3). The field test results are included in the Appendix D of this report.

Recommendations/Conclusions

A. A maximum soil percolation rate of 3.8 minutes per inch (mpi), and the design rate of 0.83 sq-ft/gal/day may be used for leach field design. The leach lines shall be designed

with 18-inch soil cover with 12 inches of leach field rock below the leach lines and 2 inches of leach field rock above the leach lines.

B. Based on the data presented in the report and using the recommendations set forth, it is the judgment of this professional that there is sufficient area on the subject parcel to support on-site sewage disposal (leach field) that will meet the current standards of the Regional Water Quality Control Board.

C. The designed system shall be located at the depth of the tests performed (4 feet bgs).

D. The natural occurring body of minerals and organic matter at the proposed wastewater disposal area contain earthen materials having more than 79% of its volume composed of particles smaller than 2 mm (#10 sieve) in size and at least 20% of particles smaller than 0.08 mm (#200 sieve).

E. Based on the data presented in the report and the testing information accumulated, it is the judgment of this professional that the groundwater table will not encroach within the current allowable limit set forth by County and State requirements.

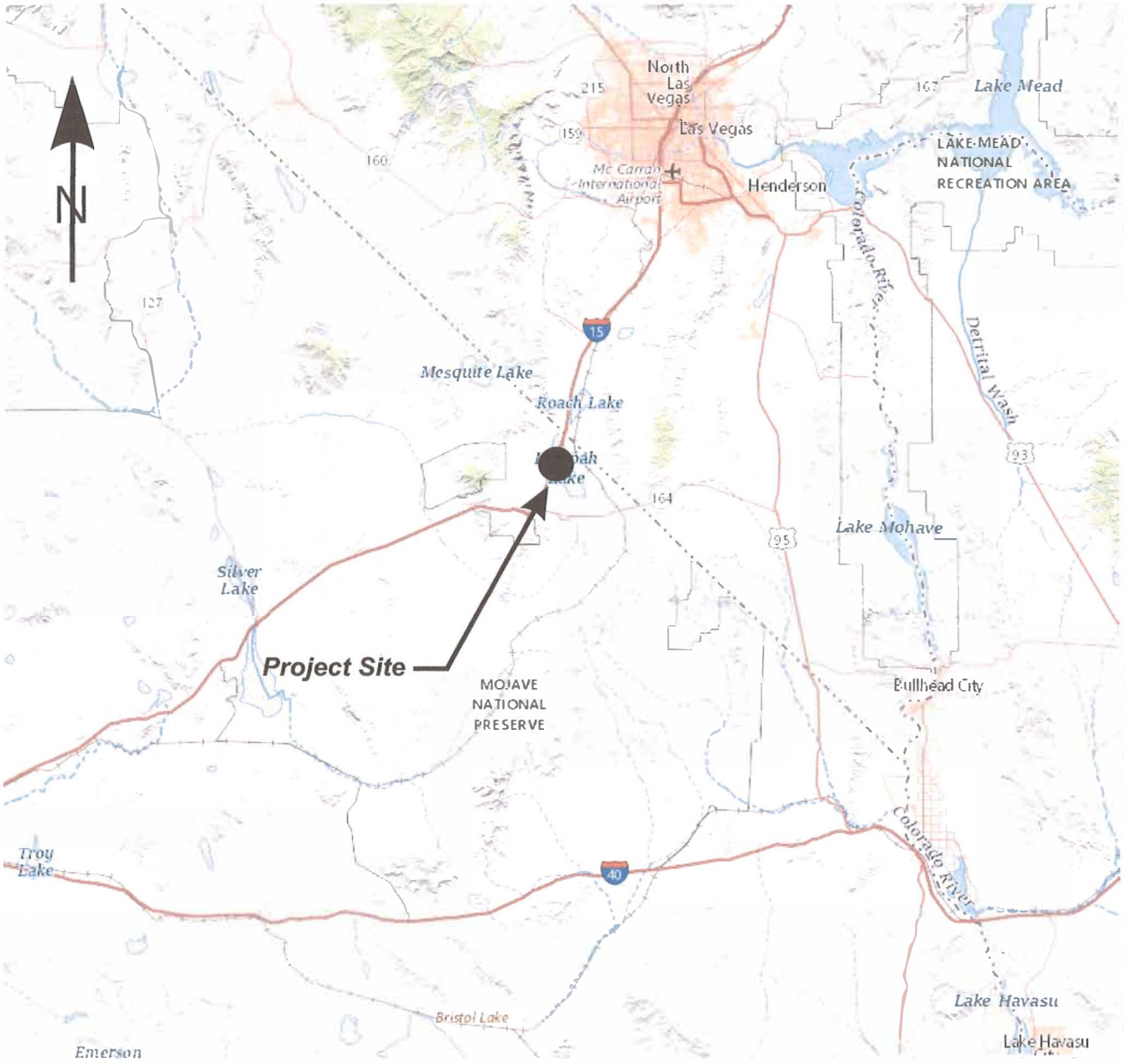
We appreciate the opportunity to provide our professional services. If you have any questions or comments regarding our findings, please call our office at (760) 360-0665.

Respectfully Submitted,
Landmark Consultants, Inc.

Greg M. Chandra, PE, M.ASCE
Principal Engineer

Attachments:
Appendix A: Vicinity and Site Maps
Appendix B: Subsurface Soil Log
Appendix C Particle Size Distribution (ASTM C136)
Appendix D: Soil Percolation Test Results

APPENDIX A



LANDMARK Geo-Engineers and Geologists Project No.: LP19174	Vicinity Map	Plate A- 1

Legend

Approximate Boring Location

Approximate Infiltration Test Location

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Project No.: LP19174

Site and Exploration Plan

Plate A-2

APPENDIX B

LOG OF BORING No. B-1

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
0					SILTY SAND (SM): Reddish brown to light brown, moist, very dense, fine to medium grained			Passing #200 = 35.5%
5			43			133.4	9.5	
10			95/7"				9.0	Passing #200 = 21.1%
15			97/11"		SANDY SILT (ML): Yellow brown, moist to very moist, medium dense to very dense, fine to medium grained	128.1	14.2	Passing #200 = 72.0%
								Passing #200 = 71.4%
20			19				15.8	
25			38			118.3	13.0	Passing #200 = 53.4%
30			18				17.4	
35			48		SILTY SAND (SM): Yellow brown to light brown, moist, dense, fine to medium grained, some caliche		5.5	Passing #200 = 20.0%
40			30				10.0	
45			30				6.3	Passing #200 = 23.1%
50								
55					Total Depth = 46.5' Groundwater not encountered at time of drilling Backfilled with excavated soil			
60								

DATE DRILLED: 10/04/19

LOGGED BY: L. Jackson

SURFACE ELEVATION: 2625'

TOTAL DEPTH: 46.5 Feet

TYPE OF BIT: Hollow Stem Auger

HAMMER WT.: 140 lbs.

DEPTH TO WATER: NA

DIAMETER: 8 in.

DROP: 30 in.

PROJECT NO. LP19174

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PLATE B-1

LOG OF BORING No. B-2

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
5			58		SILTY SAND (SM): Reddish brown to brown, moist, very dense, medium grained	128.5	10.1	Passing #200 = 43.9%
10			59				8.0	
15			45		SANDY SILT (ML): Lt. brown, moist, medium dense to dense, medium grained sand	111.6	16.0	Passing #200 = 81.7%
20			18				16.1	
25			80		SILTY SAND (SM): Lt. brown, damp to moist, very dense, medium grained	137.2	5.9	Passing #200 = 23.0%
30								
35								
40								
45								
50								
55					Total Depth = 26.5' Groundwater not encountered at time of drilling Backfilled with excavated soil			
60								

DATE DRILLED: 10/04/19
LOGGED BY: L. Jackson
SURFACE ELEVATION: 505'

TOTAL DEPTH: 26.5 Feet
TYPE OF BIT: Hollow Stem Auger
HAMMER WT.: 140 lbs.

DEPTH TO WATER: NA
DIAMETER: 8 in.
DROP: 30 in.

PROJECT NO. LP19174

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PLATE B-2

LOG OF BORING No. B-3

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
5			38		SILTY SAND (SM): Lt. brown to brown, moist, medium dense to very dense, medium grained, some caliche zones		6.3	Passing #200 = 20.0%
10			50/5"			116.3	6. 2	Passing #200 = 12.6%
15			38				7.0	
20			95/10"		caliche	114.6	8.8	Passing #200 = 25.3%
25								
30								
35								
40								
45								
50								
55					Total Depth = 21.5' Groundwater not encountered at time of drilling Backfilled with excavated soil			
60								

DATE DRILLED: 11/04/19
LOGGED BY: L. Jackson
SURFACE ELEVATION: 2625'

TOTAL DEPTH: 21.5 Feet
TYPE OF BIT: Hollow Stem Auger
HAMMER WT.: 140 lbs.

DEPTH TO WATER: NA
DIAMETER: 8 in.
DROP: 30 in.

PROJECT NO. LP19174

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PLATE B-3

LOG OF BORING No. B-4

SHEET 1 OF 1

DEPTH	FIELD: SAMPLE	FIELD: USCS CLASS.	FIELD: BLOW COUNT	FIELD: POCKET PEN. (tsf)	DESCRIPTION OF MATERIAL	LABORATORY: DRY DENSITY (pcf)	LABORATORY: MOISTURE CONTENT (% dry wt.)	LABORATORY: OTHER TESTS
5			50		SILTY SAND (SM): Reddish brown to Lt brown, damp, dense to very dense, medium grained	130.3	2.8	Passing #200 = 17.5%
10			77/8"				4.3	
15			99/11"		SANDY SILT (ML): Lt. brown, moist, very dense, fine grained sand	106.6	11.9	Passing #200 = 82.3%
20								
25								
30								
35								
40								
45								
50								
55					Total Depth = 16.5' Groundwater not encountered at time of drilling Backfilled with excavated soil			
60								

DATE DRILLED: 11/04/19

LOGGED BY: L. Jackson

SURFACE ELEVATION: 2625'

TOTAL DEPTH: 16.5 Feet

TYPE OF BIT: Hollow Stem Auger

HAMMER WT.: 140 lbs.

DEPTH TO WATER: NA

DIAMETER: 8 in.

DROP: 30 in.

PROJECT NO. LP19174

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PLATE B-4

DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS	SECONDARY DIVISIONS
Coarse grained soils More than half of material is larger that No. 200 sieve	Gravels	Clean gravels (less than 5% fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
	More than half of coarse fraction is larger than No. 4 sieve		GP	Poorly graded gravels, or gravel-sand mixtures, little or no fines
		Gravel with fines	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines
	Sands	Clean sands (less than 5% fines)	SW	Well graded sands, gravelly sands, little or no fines
	More than half of coarse fraction is smaller than No. 4 sieve		SP	Poorly graded sands or gravelly sands, little or no fines
		Sands with fines	SM	Silty sands, sand-silt mixtures, non-plastic fines
			SC	Clayey sands, sand-clay mixtures, plastic fines
Fine grained soils More than half of material is smaller than No. 200 sieve	Silts and clays		ML	Inorganic silts, clayey silts with slight plasticity
	Liquid limit is less than 50%		CL	Inorganic clays of low to medium plasticity, gravely, sandy, or lean clays
			OL	Organic silts and organic clays of low plasticity
	Silts and clays		MH	Inorganic silts, micaceous or diatomaceous silty soils, elastic silts
	Liquid limit is more than 50%		CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
Highly organic soils			PT	Peat and other highly organic soils

GRAIN SIZES

Silts and Clays	Sand			Gravel		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		
	200	40	10 4	3/4"	3"	12"	

US Standard Series Sieve — Clear Square Openings

Sands, Gravels, etc.	Blows/ft. *
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Clays & Plastic Silts	Strength **	Blows/ft. *
Very Soft	0-0.25	0-2
Soft	0.25-0.5	2-4
Firm	0.5-1.0	4-8
Stiff	1.0-2.0	8-16
Very Stiff	2.0-4.0	16-32
Hard	Over 4.0	Over 32

* Number of blows of 140 lb. hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 in. I.D.) split spoon (ASTM D1586).

** Unconfined compressive strength in tons/s.f. as determined by laboratory testing or approximated by the Standard Penetration Test (ASTM D1586), Pocket Penetrometer, Torvane, or visual observation.

Type of Samples:

Ring Sample Standard Penetration Test Shelby Tube Bulk (Bag) Sample

Drilling Notes:

1. Sampling and Blow Counts
   - Ring Sampler - Number of blows per foot of a 140 lb. hammer falling 30 inches.
   - Standard Penetration Test - Number of blows per foot.
   - Shelby Tube - Three (3) inch nominal diameter tube hydraulically pushed.
2. P. P. = Pocket Penetrometer (tons/s.f.).
3. NR = No recovery.
4. GWT = Ground Water Table observed @ specified time.

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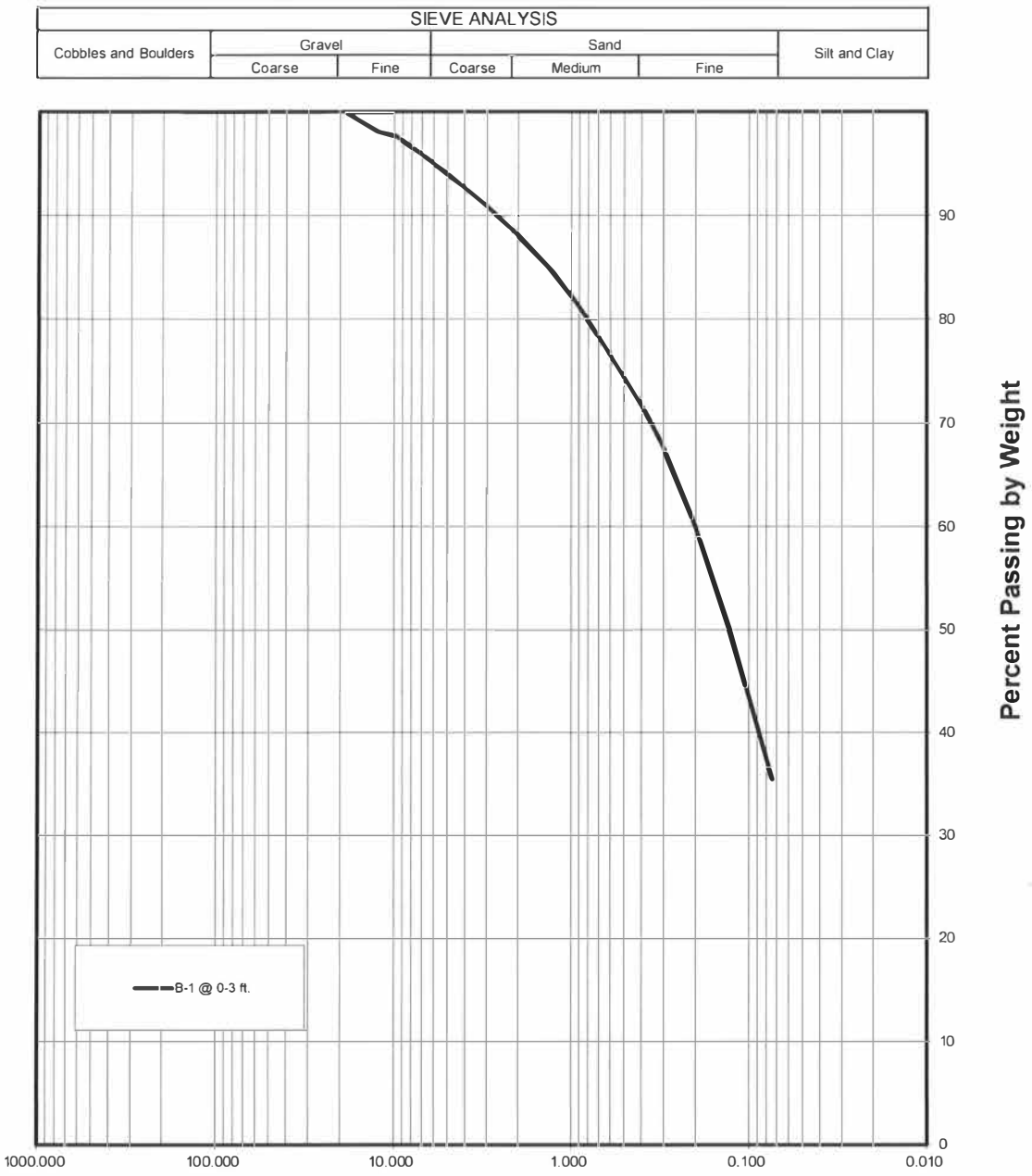
Project No. LP19174

Key to Logs

Plate
B-5

APPENDIX C



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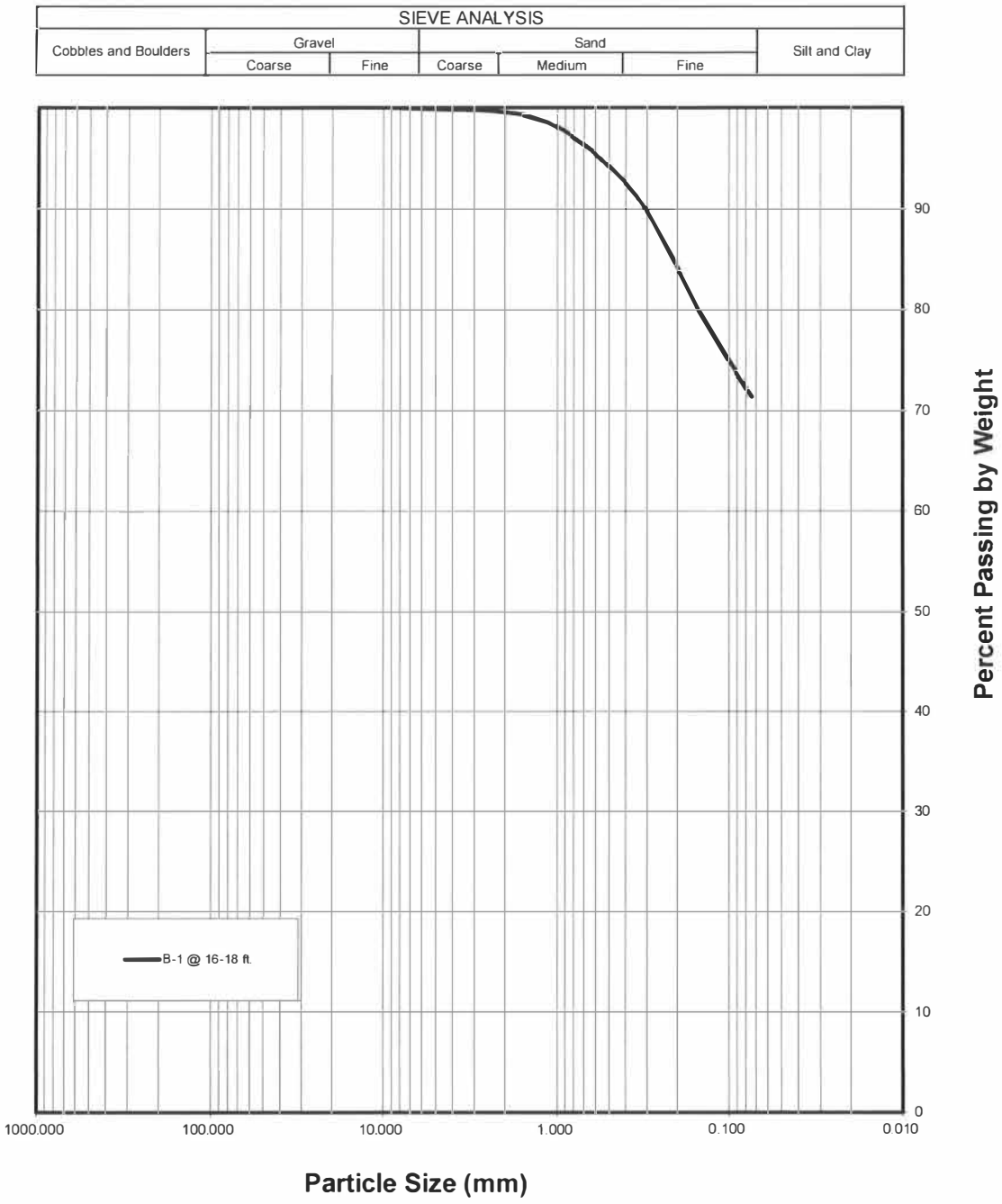
Project No.: LP19174

Grain Size Analysis

Plate
C-1



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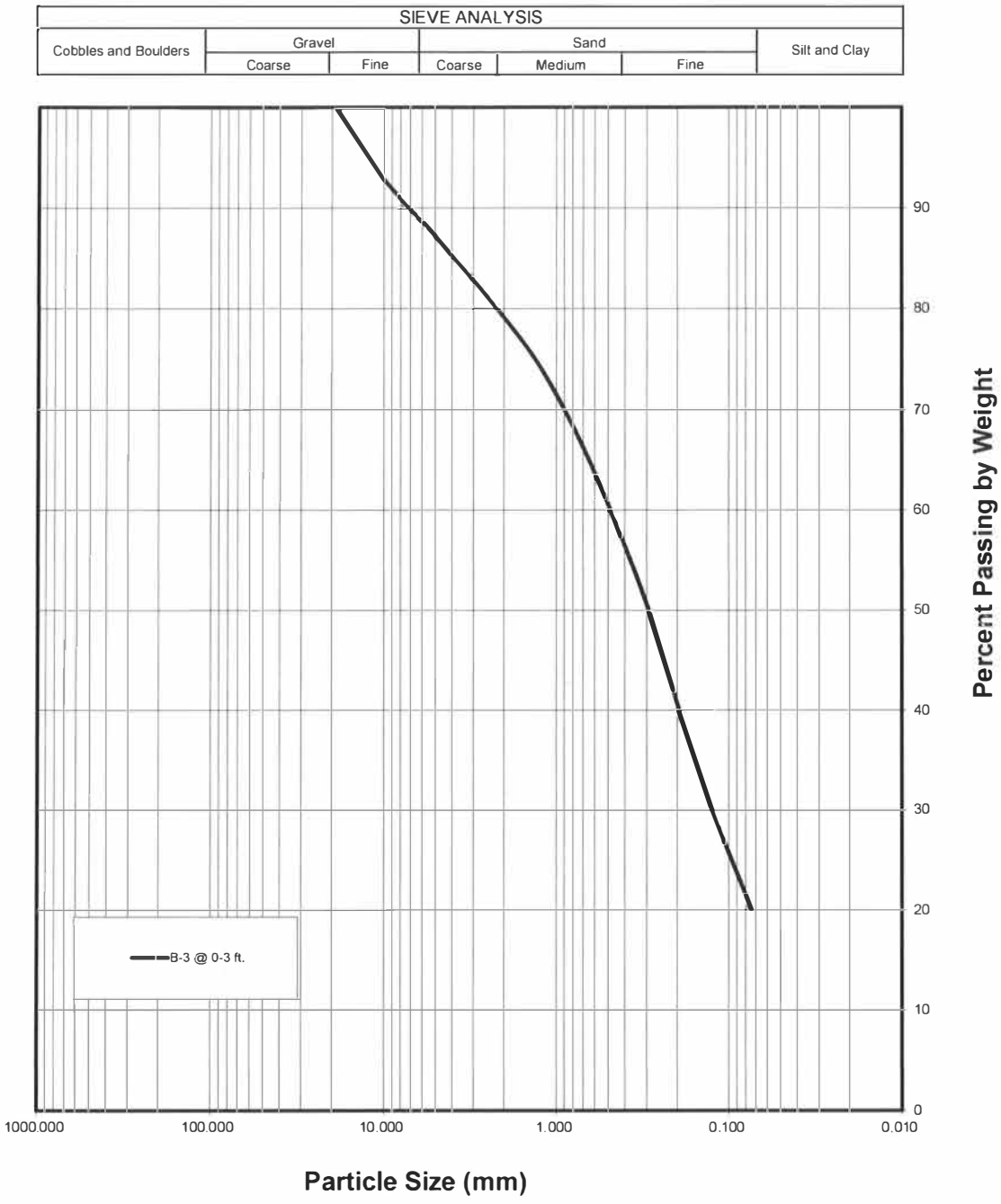
Project No.: LP19174

Grain Size Analysis

Plate C-2



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Project No.: LP19174

Grain Size Analysis

Plate C-3

APPENDIX D

LANDMARK CONSULTANTS, INC

Project:	APN 0573-101-07-0000	Project No:	LP19174	Date:	11/07/19
Test Hole No:	P-1	Tested By:	Alex A		
Depth of Test Hole, D_T:	4'	USCS Soil Classification:			
Test Hole Dimensions (inches)			Length	Width	
Diameter (if round)=	6"	Sides (if rectangular)=			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	8:40	9:10	30.00	10.00	2.00	8.00	y
2	9:10	9:40	30.00	12.00	4.00	8.00	y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	9:42	9:52	10.00	12.00	9.00	3.00	3.33
2	9:52	10:02	10.00	10.00	7.00	3.00	3.33
3	10:02	10:12	10.00	12.00	9.50	2.50	4.00
4	10:12	10:22	10.00	11.00	8.50	2.50	4.00
5	10:22	10:32	10.00	12.00	9.50	2.50	4.00
6	10:32	10:42	10.00	11.00	8.50	2.50	4.00
7							
8							
9							
10							
11							
12							

COMMENTS: Average rate from the last 3 readings = 4 min/in

LANDMARK CONSULTANTS, INC

Project:	APN 0573-101-07-0000	Project No:	LP19174	Date:	11/07/19
Test Hole No:	P-2	Tested By:	Alex A		
Depth of Test Hole, D_T:	4'	USCS Soil Classification:			
Test Hole Dimensions (inches)			Length	Width	
Diameter (if round)=	6"	Sides (if rectangular)=			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	8:41	9:11	30.00	12.00	6.00	6.00	y
2	9:11	9:41	30.00	12.00	6.00	6.00	y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	9:43	9:53	10.00	12.00	9.00	3.00	3.33
2	9:53	10:03	10.00	12.00	9.00	3.00	3.33
3	10:03	10:13	10.00	12.00	9.50	2.50	4.00
4	10:13	10:23	10.00	12.00	9.50	2.50	4.00
5	10:23	10:33	10.00	11.00	8.00	3.00	3.33
6	10:33	10:43	10.00	12.00	9.00	3.00	3.33
7							
8							
9							
10							
11							
12							

COMMENTS: Average rate from the last 3 readings = 3.55 min/in

LANDMARK CONSULTANTS, INC

Project: APN 0573-101-07-0000		Project No:	LP19174	Date:	11/07/19
Test Hole No:	P-3	Tested By:	Alex A		
Depth of Test Hole, D_T:	4'	USCS Soil Classification:			
Test Hole Dimensions (inches)			Length	Width	
Diameter (if round)=	6"	Sides (if rectangular)=			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	10:44	11:14	30.00	12.00	4.00	8.00	y
2	11:14	11:44	30.00	12.00	4.00	8.00	y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	11:45	11:55	10.00	12.00	8.00	4.00	2.50
2	11:55	12:05	10.00	12.00	9.00	3.00	3.33
3	12:05	12:15	10.00	11.00	8.00	3.00	3.33
4	12:15	12:25	10.00	12.00	9.00	3.00	3.33
5	12:25	12:35	10.00	12.00	9.50	2.50	4.00
6	12:35	12:45	10.00	11.00	9.00	2.00	5.00
7							
8							
9							
10							
11							
12							

COMMENTS: Average rate fro the last 3 readings = 4.11 min/in

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Project No.: LP19174

Percolation Test Results

Plate D-3

LANDMARK CONSULTANTS, INC

Project:	APN 0573-101-07-0000	Project No:	LP19174	Date:	11/07/19
Test Hole No:	P-4	Tested By:	Alex A		
Depth of Test Hole, D_T:	4'	USCS Soil Classification:			
Test Hole Dimensions (inches)			Length	Width	
Diameter (if round)=	6"	Sides (if rectangular)=			

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Change in Water Level (in.)	Greater than or Equal to 6"? (y/n)
1	10:46	11:16	30.00	12.00	4.00	8.00	y
2	11:16	11:46	30.00	12.00	5.00	7.00	y

*If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Other wise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25".

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (min./in.)
1	11:47	11:57	10.00	12.00	9.00	3.00	3.33
2	11:57	12:07	10.00	12.00	8.50	3.50	2.86
3	12:07	12:17	10.00	11.00	8.00	3.00	3.33
4	12:17	12:27	10.00	12.00	9.00	3.00	3.33
5	12:27	12:37	10.00	11.00	8.50	2.50	4.00
6	12:37	12:47	10.00	12.00	9.50	2.50	4.00
7							
8							
9							
10							
11							
12							

COMMENTS: Average rate from the last 3 readings = 3.78 min/in