TECHNICAL MEMORANDUM

To:
Ms. Atheria Smith
Peralta Community College District
Facilities Planning and Development Manager
333 East Eighth Street
Oakland, California 94606

From:
Jeff Raines, PE (C51120), GE (2762), Terraphase
Kristen Stroud, PE (C90460), Terraphase

Date:
September 11, 2020

Project Number:
0034.011.002

Subject: Merritt College Horticulture Complex Percolation testing

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Terraphase Engineering Inc. (Terraphase) has prepared this technical memorandum summarizing percolation rates for the locations tested for the Peralta Community College District ("Client") at the Merritt College Horticulture Complex ("the Site"). The Site is located in the Oakland hills at 12500 Campus Drive, Oakland, California. The Site location and Facility are shown on Figure 1.

The purpose of the percolation testing was to provide input into the design of a bioswale at the complex to treat stormwater runoff prior to discharge.

Testing Method

The percolation tests were conducted by Terraphase in accordance with the United States Environmental Protection Agency (USEPA) falling head percolation test procedure (USEPA 1980). Two locations in the parking lot were chosen for the percolations test, one location along the east side of the parking lot and one in the north west portion of the parking lot (Figure 2). An asphalt corer was used to obtain access to the subsurface at each test hole. Three equally spaced percolation test holes were dug in each test location. We tested three locations in each potential bioswale area to account for variability within the testing area. Each percolation test hole was dug six inches in diameter to a minimum depth of 12 inches below asphalt and aggregate base, between 18 and 19 inches below ground surface. The sides of each test hole were scarified and two inches of gravel was placed in the bottom of each test hole to prevent scouring with the addition of water.

After constructing the test holes, water was added to each test hole for the soaking period. Holes were filled with 12 inches of water and water level was maintained for a minimum of four hours. After the four hours of monitoring soaking, very little drawdown was noted in each of the six test locations. Therefore, approximately 12 inches of water was left in each of the test locations overnight.

Prior to starting the tests, water levels were adjusted to 6 inches above the gravel. Immediately after the adjustment, water levels were measured from a fixed reference to the nearest 1/16 inch. After a one-

hour time interval the water level was re-measured and then brought back up to six inches above the gravel. Percolation testing field notes are attached to this memorandum.

Test Results

Percolation rates were calculated by dividing the magnitude of the water level drop by the time interval. To determine the percolation rate for the area, the rates from each test hole are averaged. The percolation rates for each testing location (measured in inches per hour [in/hour]) are in Table 1 below.

Table 1 – Percolation Rates

Test Location	Percolation Rate (in/hour)
1 – East side of parking lot	0.06
2 – North west portion of the parking lot	0.02

Low percolation rate was observed for each of the test holes with no observed change over the four-hour testing period for two out of the six test holes.

Conclusions

Low percolation rates were observed for both testing locations. If you have any questions or comments regarding this technical memorandum, please contact Jeff Raines at (510) 645-1853.

For Terraphase Engineering Inc.

Jeff Raines PE (C51120), GE (2762)
Principal Geotechnical Engineer

Attachments

Figure 1- Site Location
Figure 2 – Proposed Percolation Testing Areas
Attachment 1 – Falling Head Percolation Test Field Log

References

United States Environmental Protection Agency (USEPA), Office of Water Program Operations. 1980. Design Manual: Onsite Wastewater Treatment and Disposal Systems.

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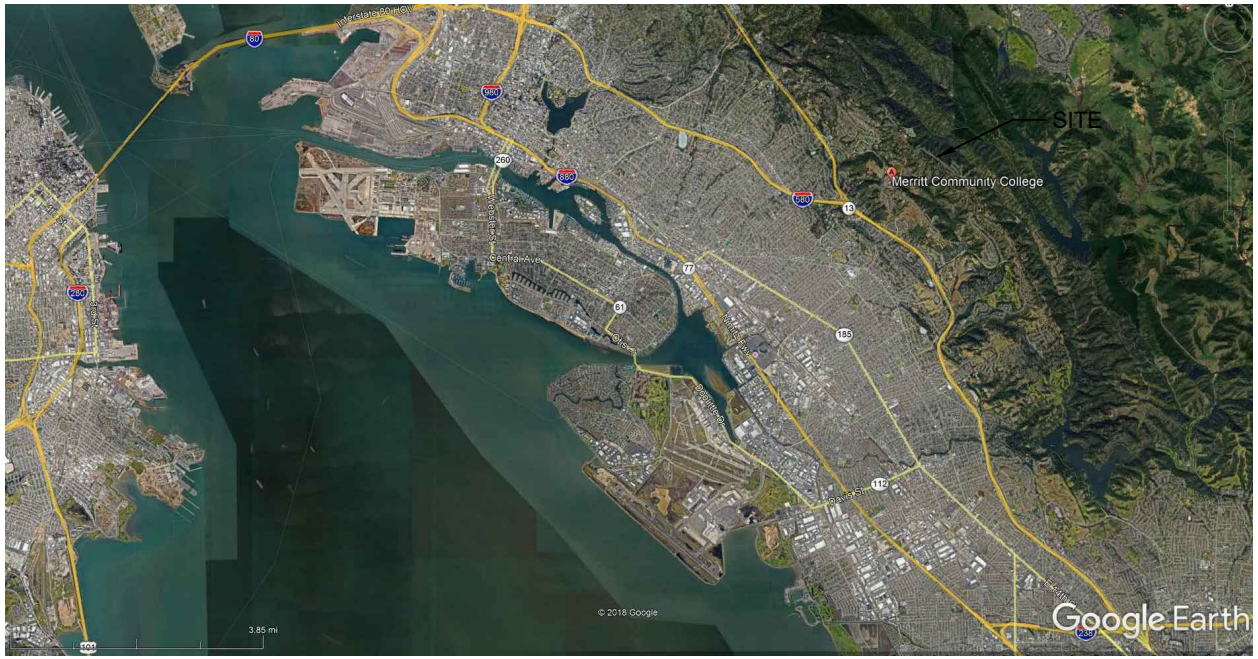

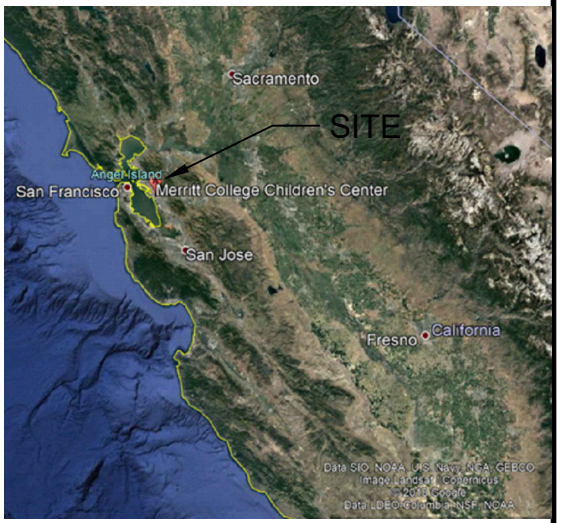

N

0 0.75 1.5 3

Approximate Scale in Miles

Source: Google Earth

SAFETY FIRST	CLIENT: PERALTA COMMUNITY COLLEGE DISTR	**SITE LOCATION**
terraphase engineering	PROJECT: HORTICULTURAL CENTER	
	PROJECT NUMBER: 0034.011.002	**Figure 1**

0 75 150 Feet

1 inch = 75 feet

N

Legend

Parcels

Imagery Source: Nearmap, May 4th, 2020

SAFETY FIRST

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CLIENT: Peralta Community College District

PROJECT: Merritt College Percolation Testing
12500 Campus Drive, Oakland, CA

PROJECT NUMBER: 0034.011.002

Site Map

FIGURE 2

File: N:\GIS\Prj\Merritt College Percolation Testing\MXDs\Figure 2 - Site Map.mxd 8/17/2020 Created by: BKO Checked by: CJ Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere

ATTACHMENT 1

FIELD FORMS

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Falling Head Percolation Field Log

Test ID:	Perc-1
Date:	8/27/20

Project Number:	0034.011.002
Site Location:	Merritt Horticultural Center

Measured By:	Kristen Stroud
Weather:	Foggy

Measured Diameter:	6”	inches
Gravel Thickness:	2”	inches

Monitored Soaking Period:	4	hours
Start Time for Soaking Period:	Date 8/26/20 Time 11:30	

Testing Interval:	1	hours
Time Elapsed Since Soaking Period Began:	21	hours

Test Number:	A	
Measured Depth:	18	inches bgs
Depth to top of 12 inches of water (as measured from perc test device):	12	inches bgs
Depth to top of 8 inches of water (as measured from perc test device):	10	inches bgs

Time	Interval	Initial depth to water	Final Depth to Water	Change in Water Level	Percolation Rate
08:30	-	10 0/16	-	-	-
09:30	-	10 0/16	10 4/16	4/16	0.25
10:30	-	10 0/16	10 4/16	4/16	0.25
11:30	-	10 0/16	10 3/16	3/16	0.1875
12:30	-	10 0/16	10 3/16	3/16	0.1875

Test Number:	B	
Measured Depth:	18	inches bgs
Depth to top of 12 inches of water (as measured from perc test device):	12	inches bgs
Depth to top of 8 inches of water (as measured from perc test device):	10	inches bgs

Time	Interval	Initial depth to water	Final Depth to Water	Change in Water Level	Percolation Rate
08:32	-	10 0/16	-	-	-
09:32	-	10 0/16	10 0/16	-	-
10:32	-	10 0/16	10 0/16	-	-
11:32	-	10 0/16	10 1/16	1/16	0.0208
12:32	-	10 0/16	10 0/16	0/16	-

Test Number:	C	
Measured Depth:	18	inches bgs
Depth to top of 12 inches of water (as measured from perc test device):	12	inches bgs
Depth to top of 8 inches of water (as measured from perc test device):	10	inches bgs

Time	Interval	Initial depth to water	Final Depth to Water	Change in Water Level	Percolation Rate
08:34	-	10 0/16	-	-	-
09:34	-	10 0/16	10 0/16	-	-
10:34	-	10 0/16	10 1/16	1/16	0.0625
11:34	-	10 0/16	10 2/16	2/16	0.00125
12:34	-	10 0/16	10 2/16	2/16	0.00125

Stability parameter:	If clay soils are present then the test is run with 30min intervals until there are two constant percolation rates (minimum of three intervals). If sandy soils are present or 6in of water seeps away in less than 30min then the test is run with 10min intervals for a 1hr period and the last water level drop is used to calculate the percolation rate.

Average Percolation Rate:		in/min	-->	0.06 in/hr

Notes:

Percolation rate measured in inches/hour

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Falling Head Percolation Field Log

Test ID:	Perc-2
Date:	8/27/20

Project Number:	0034.011.002
Site Location:	Merritt Horticultural Center

Measured By:	Kristen Stroud
Weather:	Foggy

Measured Diameter:	6”	inches
Gravel Thickness:	2”	inches

Monitored Soaking Period:	4	hours
Start Time for Soaking Period:	Date 8/26/20 Time 11:30	

Testing Interval:	1	hours
Time Elapsed Since Soaking Period Began:	21	hours

Test Number:	A	
Measured Depth:	18	inches bgs
Depth to top of 12 inches of water (as measured from perc test device):	12	inches bgs
Depth to top of 8 inches of water (as measured from perc test device):	10	inches bgs

Time	Interval	Initial depth to water	Final Depth to Water	Change in Water Level	Percolation Rate
08:38	-	10 0/16	-	-	-
09:38	-	10 0/16	10 0/16	-	-
10:38	-	10 0/16	10 0/16	-	-
11:38	-	10 0/16	10 0/16	-	-
12:38	-	10 0/16	10 0/16	-	-

Test Number:	B	
Measured Depth:	19	inches bgs
Depth to top of 12 inches of water (as measured from perc test device):	13	inches bgs
Depth to top of 8 inches of water (as measured from perc test device):	11	inches bgs

Time	Interval	Initial depth to water	Final Depth to Water	Change in Water Level	Percolation Rate
08:40	-	11 0/16	-	-	-
09:40	-	11 0/16	11 0/16	-	-
10:40	-	11 0/16	11 0/16	-	-
11:40	-	11 0/16	11 0/16	-	-
12:40	-	11 0/16	11 0/16	-	-

Test Number:	C	
Measured Depth:	19	inches bgs
Depth to top of 12 inches of water (as measured from perc test device):	13	inches bgs
Depth to top of 8 inches of water (as measured from perc test device):	11	inches bgs

Time	Interval	Initial depth to water	Final Depth to Water	Change in Water Level	Percolation Rate
08:42	-	11 0/16	-	-	-
09:42	-	11 0/16	11 1/16	1/16	0.0625
10:42	-	11 0/16	11 1/16	1/16	0.0625
11:42	-	11 0/16	11 0/16	0/16	-
12:42	-	11 0/16	11 0/16	1/16	0.0625

Stability parameter:	If clay soils are present then the test is run with 30min intervals until there are two constant percolation rates (minimum of three intervals). If sandy soils are present or 6in of water seeps away in less than 30min then the test is run with 10min intervals for a 1hr period and the last water level drop is used to calculate the percolation rate.

Average Percolation Rate:		in/min	-->	0.02 in/hr

Notes:

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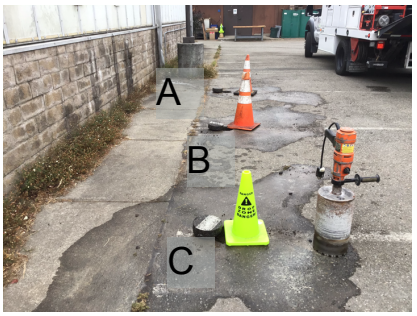
Daily Field Log

Date: 08.27.20	**Day of the Week:** Thursday	**Logged by:** EKela Autry
Project Name: Merritt Hort Center	**Project Number:** 0034.011.0001	
Site Location / Address: 12500 Campus Drive, Oakland CA		
Weather Conditions: Overcast	**Start Time:** 0700	**Stop Time:** 1600
Personnel present on site: Justin (Del Secco), Kristen S. (TEI), EKela A. (TEI), Ryan G. (TEI)		

Time	Notes
0700	On site. Safety tailgate, photo taken by Ryan to confirm. Coring for P1 begins in east corner of parking lot. Cores are about 3” thick.

Soil is compact and tough. Holes labeled A-C from north to south.

Daily Field Log Cont'd:

Time	Notes
0751	Coring begins for P2 on north side of building, a couple feet north of greenhouse structure. Holes sub-labeled A-C from west to east.
	     
0820	Del Secco finishes report and hands it off to Kristen. Offsite.
0930	Left site to retrieve more buckets.
1015	Return to site and continue digging to 18”. Kristen and Ryan have completed 4 holes so far.
1104	All 6 holes have been dug to 18” and shaped on the sides.

Daily Field Log Cont'd:

Time	Notes
1120	P1 holes at 18” depth and with 2” of gravel at the bottom.

1138	P2 A-C filled with 2” gravel. About to be filled with water.

Daily Field Log Cont'd:

Time	Notes
1120-1535	Soaking period begins. Every 30 minutes the holes at P1 and P2 are measured from the ground surface to the top of the water to see how far the water has fallen from 6" bgs. The results of this 4 hour soaking periods can be viewed on the following page. Start times Perc 1A: 1120 Perc 1B: 1125 Perc 1C: 1130 Perc 2C: 1140 Perc 2B: 1142 Perc 2A: 1144
1600	 All holes covered at the end of the day and cones and triangles left in front of them. Offsite.

Daily Field Log Cont'd:

Time	Notes					
Soak period	P1			P2		
	A	B	C	A	B	C
1305	7.75” bgs	8.75” bgs	7” bgs	6” bgs	6.75” bgs	8” bgs
1335	7.25” bgs	7.75” bgs	7” bgs	6.25” bgs	6.25” bgs	6.625” bgs
1405	7.5” bgs	8.25” bgs	6.625” bgs	6.25” bgs	6.25” bgs	6.5” bgs
1435	7.75” bgs	7.75” bgs	6.5” bgs	6” bgs	6.5” bgs	6.5” bgs
1505	7.625” bgs	7.75” bgs	6.5” bgs	6” bgs	6” bgs	6.25” bgs
1535	7” bgs	7.5” bgs	6.5” bgs	6” bgs	6.75” bgs	6.25” bgs