LGC GEO-ENVIRONMENTAL, INC.

Preliminary Infiltration Testing Investigation for the Proposed Single-Family Residential Development, Located at 800 N. Girard Street, City of Hemet, Riverside County, California

Dated: October 14, 2019
Project No. G18-1647-20

Prepared For:

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Subject: ***Preliminary Infiltration Testing Investigation for the Proposed Single-Family Residential Development, Located at 800 N. Girard Street, City of Hemet, Riverside County, California.***

1.0 INTRODUCTION

LGC Geo-Environmental, Inc. (LGC) is pleased to present this preliminary infiltration testing investigation for the proposed single-family residential development, located at 800 N. Girard Street, City of Hemet, Riverside County, California. The purpose of our study was to determine the vertical infiltration rates and physical characteristics of the subsurface soils in selected areas of proposed onsite storm water infiltration BMP devices within specific portions of the subject property.

2.0 PROPERTY LOCATION AND DESCRIPTION

The subject site is irregular in shape and is located on the northeast corner of E. Menlo Avenue and Park Avenue in the City of Hemet, Riverside County, California. The site is bounded on the north by residential development, on the west by Girard Street and residential development, on the south by E. Menlo Avenue and residential development, and east by Park Avenue. The general location and configuration of the site is shown on the Site Location Map (Figure 1).

The subject site has been previously graded and filled. Currently, it is a vacant lot with several concrete pads, a roadway, and various small structures. Vegetation growth is present on the subject site.

The topography of the site is slightly inclined with sheet drainage appearing to flow from east to west. The existing site elevations vary from approximately 1,637 feet above mean sea level (msl) near the northeast corner of the site, to approximately 1,607 msl at the northwest corner of the site.

3.0 PROPOSED CONSTRUCTION

The referenced "Preliminary Site Plan", prepared by Sikand Engineering Associates, indicates that the proposed single-family residential development will be comprised of 49 graded pads, associated roadways, one water quality detention basin, and landscape and hardscape areas. The development is proposed to be two family duplex dwelling units at this time.

4.0 SUBSURFACE EXPLORATION: INFILTRATION TESTING

4.1 Subsurface Exploration

Subsurface exploration of the subject site was performed on October 10, 2019 and consisted of advancing two (2) infiltration test borings. The borings were excavated within the proposed infiltration system location utilizing a hollow stem drill rig to a depth of 10 feet below existing grade. A third boring was excavated to a depth of 20 feet, to observe the depth to groundwater. These logs are presented in Appendix A. Earth materials encountered within the locations were classified in general accordance with the visual manual procedures of the Unified Soil Classification System (USCS). Logs of the infiltration borings are presented in Appendix A, and their approximate locations are depicted on the Infiltration Test Location Map (Plate 1).

Prior to the subsurface exploration work, an underground utilities clearance was obtained from Underground Service Alert of Southern California.

4.2 Infiltration Testing

On October 11, 2019, two (2) infiltration tests were conducted within the proposed area of the infiltration system. The infiltration test borings were labeled IB-1 through IB-2; and are depicted on the Infiltration Test Location Map (Plate 1). The tests were performed as per the referenced Riverside County Technical Guidance Manual for Onsite Wastewater Treatment Systems.

Once the required depth of 10 feet below existing surface was obtained, a 2-inch layer of 3/4 inch gravel was placed at the bottom of the borings and polyvinyl chloride pipe (PVC), with a nominal diameter of 3 inches, was inserted into the borings. The PVC pipe installed in the infiltration borings contained 0.375-inch diameter perforations only within the lower 2 feet to 3 feet. The annular space around the 2 feet to 3 feet perforated zone was backfilled with 3/4-inch gravel. The remaining portion annular space with solid pipe was backfilled with native soil. A pre-soak period was then conducted to allow the test holes to presaturate before beginning the infiltration test. At the beginning of the infiltration test, a sandy soils test was performed with two consecutive readings taken within 25 minutes, to measure a water drop of at least 6 inches. Upon completion of the sandy soils test, IB-1 readings were taken at 10-minute intervals for the entirety of the infiltration test and IB-2 readings were taken at 30-minute intervals for the entirety of the infiltration test, with the drop in water level being recorded at the end of each interval. Minor settlement of the backfill soils may occur over time.

To acquire the vertical design infiltration test rates, the field percolation rates, which have vertical and sidewall infiltration, were reduced utilizing a reduction factor per the Porchet Method standard in order to get a vertical design infiltration rate. A reduction factor of 5.16 and 5.58 was applied to the field percolation rates for IB-1 and IB-2, respectively. The results of the percolation method infiltration tests are presented in the following table in section 5.3. The infiltration test data sheets are presented in Appendix A.

5.0 FINDINGS

5.1 Earth Materials

Based on our review of the data from the geotechnical investigation, and our current investigation of the proposed infiltration basin, the materials encountered to the depths explored include artificial fill and alluvium. A description of the earth material and soils encountered is described below:

Artificial Fill, Undocumented (Afu): Artificial fill was encountered on the site during our subsurface exploration and was observed at a depth approximately 1 foot to 5 feet below the surface, in all the borings. The artificial fill generally consists of silty sand and is various shades of brown. The material is damp to moist; and very fine to fine grained with some medium grains.

Alluvium (Qal): Alluvium was encountered below the topsoil, to an observed depth of about 20 feet below the surface. The alluvium is generally silty sand to sandy silt, and is characterized as being various shades of brown; moist; very fine to fine grained, with occasional medium grains; and slightly micaceous.

5.2 Groundwater

Groundwater was not encountered during exploratory drilling. A review of the California Department of Water Resources, Water Data Library online database indicates the presence of groundwater less than a mile away from the general site area as approximately 267 feet below the existing ground surface according to historical records at an elevation of approximately 1,588 above mean sea level (Well ID: Station 337574N1169698W001).

5.3 Infiltration Testing Results

The shallow infiltration testing rates for design considerations for the proposed infiltration system area which was tested are presented in the table below.

Infiltration Design Rates

TEST NO.	TEST LOCATION	TEST DEPTH (Feet)	INFILTRATION RATES		SOIL DESCRIPTION (USCS)
			FIELD PERCOLATION RATE (INCHES/HOUR)	DESIGN INFILTRATION RATE (INCHES/HOUR)	
IB-1	Infiltration Basin	10	40.50	7.85	SM
IB-2	Infiltration Basin	10	6.00	1.21	ML/SM

6.0 CONCLUSIONS AND RECOMMENDATIONS

Shallow infiltration testing for the proposed infiltration system indicates design rates of 7.85 inches/hour and 1.21 inches/hour, for IB-1 and IB-2, respectively, at a depth of 10 feet after applying reduction factors shown in the Table above, per the Porchet Method. The design rates representing the infiltration devices proposed to be installed, should be utilized for the proposed infiltration device location, as indicated on the Infiltration Test Location Map (Plate 1). An average composite design rate of **4.53 inches/hour** for the proposed infiltration basin represented by testing from infiltration test borings IB-1 and IB-2 can be utilized.

The proposed infiltration basin device should be placed at least five (5) feet horizontally away from or beyond a 1:1 (horizontal to vertical) projection from the base of any proposed or existing structures or walls, whichever is greater. Since the proposed infiltration basin device is within and/or adjacent to proposed roadways, parking areas and/or sidewalks (within five (5) feet) and may be up to approximately three (3) feet deep, any gravel backfill should be densified or any soil backfill should be compacted to at least 90% of the maximum dry density during placement. The project geologist or engineer should observe infiltration device excavations during trenching to verify the anticipated soil units and geotechnical conditions as well as observe, probe and/or test any densification or compaction of the infiltration trench and pit gravel and/or soil backfill.

7.0 PLAN REVIEWS AND CONSTRUCTION SERVICES

This report was prepared for the exclusive use of Mr. Shizao Zheng to assist the project civil engineer in the design of the proposed infiltration systems for the proposed development. It is recommended that LGC be engaged to review infiltration device plans, grading plans, foundation plans and the final infiltration design drawings and specifications prior to construction. This is to document that the recommendations contained in this report were properly interpreted and incorporated into the project plans and specifications from a geotechnical standpoint. Plans should be forwarded to the project geotechnical engineer and/or engineering geologist for LGC for review and comments, as deemed necessary. LGC's review of infiltration device plans, grading plans, foundation plans and the final infiltration design drawings and specifications may indicate that additional subsurface exploration, laboratory testing and analysis should be performed to address areas of concern. If LGC is not accorded the opportunity to review these documents, we cannot take responsibility for misinterpretation of our recommendations.
If the project plans change significantly (e.g., location and type of infiltration devices), LGC should be retained to review our original design recommendations and applicability to the revised construction. If conditions are encountered during construction that appears to be different from those indicated in this report, this office should be notified immediately. Design and construction revisions may be required.

The preliminary conclusions and recommendations provided in this report are based on review of previous geotechnical reports, infiltration testing, geologic field mapping, and geotechnical/geologic analyses to date. A representative of LGC should observe the interpolated subsurface conditions in the field during construction

We recommend that LGC be retained to provide geotechnical engineering services during future grading, infiltration device excavations, installation of infiltration materials, backfill of infiltration devices, or when an unusual soil condition is encountered at the site. This is to document compliance with the design, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to start of construction.

8.0 INVESTIGATION LIMITATIONS

This report is based upon information provided by the client and the project civil engineer, a limited number of subsurface excavations, field observations and percolation/infiltration tests to which we applied various methods of analysis and interpretation. The materials encountered and tested in the field on the project site are believed representative of the project area, and the conclusions and recommendations contained herein are presented on that basis. However, soil materials can vary in characteristics between points of exploration, both laterally and vertically, and those variations could affect the conclusions, recommendations, and performance of the proposed storm water infiltration device BMP systems. Fluctuations in the level of groundwater may occur due to variations in rainfall, irrigation, and the other factors not in evidence at the time measurements were made. If this occurs, the changed conditions must be evaluated by the project geotechnical engineer and engineering geologist and design(s) adjusted as required or alternate design(s) recommended.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the project engineer and incorporated into the plans, and the necessary steps are taken to see that the contractor and/or subcontractor properly implements the recommendations in the field.

The conclusions and opinions contained in this report are based on the results of the described geotechnical evaluations and represent our professional judgment. The findings, conclusions and recommendations contained in this report are to be considered tentative only and subject to confirmation by the undersigned during the construction process. Without this confirmation, this report is to be considered incomplete and LGC or the undersigned professionals assume no responsibility for its use.

The conclusions and opinions contained in this report are valid up to a period of 2 years from the date of this report. Changes in the conditions of a property can and do occur with the passage of time, whether they be because of natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate codes or standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, if any of the above mentioned situations occur, an update of this report should be completed.

This report has not been prepared for use by parties or projects other than those named or designed above. It may not contain sufficient information for other parties or other purposes.

The opportunity to be of service is appreciated. Should you have any questions regarding the content of this report, or should you require additional information, please do not hesitate to contact this office at your earliest convenience.
Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by engineers and geologists practicing in this or other localities. The contents of this report are professional opinions and as such, are not to be considered a guarantee or warranty.

The opportunity to be of service is appreciated. Should you have any questions regarding the content of this report, or should you require additional information, please do not hesitate to contact this office at your earliest convenience.

Respectfully submitted,

LGC Geo-Environmental, Inc.

Mark Bergmann CEG 1348
Certified Engineering Geologist/President

JJL/MB

Distribution: (2) Addressee

Attachments: Figure 1 – Site Location Map
Appendix A – Infiltration Boring Logs *(Rear of Text)*
Appendix B – Infiltration Test Results *(Rear of Text)*
Plate 1 – Infiltration Test Location Map *(Pocket Enclosure)*

FIGURE 1
SITE LOCATION MAP

Project Name	SIKAND
Project No.	G18-1647-20
Geol./ Eng.	MB
Scale	NOT TO SCALE
Date	OCTOBER 2019

APPENDIX A

INFILTRATION BORING LOGS

Geotechnical Boring Log IB-1

Date: 10/10/19	**Project Name:** SIKAND	Page 1 of 1
Project Number: G18-1647-20	**Logged By:** JM	
Drilling Company: BAJA	**Type of Rig:** HOLLOW-STEM AUGER	
Drive Weight (lbs.): 140	**Drop (in.):** 30 **Hole Dia. (in.):** 8"	
Top of Hole Elevation (ft): 1,610'	**Hole Location:** SEE INFILTRATION TEST LOCATION MAP	

Elevation (MSL) and Depth (ft.)	Blow Count / 6"	Sample No.	Soil Graphic	Geologic / Group Symbol	DESCRIPTION	In-Situ Moist.(%)	Dry Density (pcf)	Standard Penetration Test SPT Depth	SPT N	CURVE 10 30 50	Type of Test
1610 / 0				Afu SM	**ARTIFICIAL FILL, UNDOCUMENTED** Silty SAND; light brown to brown, dry, very fine to medium grained with some coarse grains, slightly micaceous, roots and roothairs @ 1.0'; yellowish brown, damp to moist, very fine to fine grained with some medium grains						
1605 / 5				Qal SM	**ALLUVIUM** Silty SAND; dark yellow brown to orange brown, moist, very fine to fine grained with occasional medium grains, slightly micaceous						
1600 / 10					Total Depth: 10' No Groundwater						
1595 / 15											
1590 / 20											
1585 / 25											
1580 / 30											

Sample Legend

- SPT
- Ring Sample (CA modified)

LGC Geo-Environmental, Inc.

Geotechnical Boring Log IB-2

Date: 10/10/19	**Project Name:** SIKAND
Project Number: G18-1647-20	**Logged By:** JM
Drilling Company: BAJA	**Type of Rig:** HOLLOW STEM AUGER
Drive Weight (lbs.): 140	**Drop (in.):** 30 **Hole Dia. (in.):** 8"
Top of Hole Elevation (ft): 1,609'	**Hole Location:** SEE INFILTRATION TEST LOCATION MAP

Elevation (MSL) and Depth (ft.)	Blow Count / 6"	Sample No.	Soil Graphic	Geologic / Group Symbol	DESCRIPTION	In-Situ Moist. (%)	Dry Density (pcf)	Standard Penetration Test SPT Depth	SPT N	Standard Penetration Test CURVE 10 30 50	Type of Test
0 / 1605				Afu SM	**ARTIFICIAL FILL, UNDOCUMENTED** Silty SAND; light brown to brown, dry, very fine to medium grained with some coarse grains, slightly micaceous, roots and roothairs @ 1.0'; yellowish brown, damp to moist, very fine to fine grained with some medium grains						
5 / 1600				Qal SM-ML	**ALLUVIUM** Silty SAND/Sandy SILT; dark yellowish brown to orange brown, moist, very fine to fine grained, micaceous						
10 / 1595					Total Depth: '10 No Groundwater						
15 / 1590											
20 / 1585											
25 / 1580											
30											

Sample Legend

- SPT
- Ring Sample (CA modified)

LGC Geo-Environmental, Inc.

Geotechnical Boring Log IB-3

Date: 10/10/19	**Project Name:** SIKAND
Project Number: G18-1647-20	**Logged By:** JM
Drilling Company: BAJA	**Type of Rig:** HOLLOW STEM AUGER
Drive Weight (lbs.): 140	**Drop (in.):** 30 **Hole Dia. (in.):** 8"
Top of Hole Elevation (ft): 1,609.5	**Hole Location:** SEE INFILTRATION TEST LOCATION MAP

Elevation (MSL) and Depth (ft.)	Blow Count / 6"	Sample No.	Soil Graphic	Geologic / Group Symbol	DESCRIPTION	In-Situ Moist. (%)	Dry Density (pcf)	Standard Penetration Test SPT Depth	SPT N	Standard Penetration Test CURVE 10 30 50	Type of Test
1605 / 0				Afu SM	**ARTIFICIAL FILL, UNDOCUMENTED** Silty SAND; light brown to brown, dry, very fine to medium grained with some coarse grains, slightly micaceous, roots and roothairs @ 1.0'; yellowish brown, damp to moist, very fine to medium grained						
1600 / 5				Qal SM-ML	**ALLUVIUM** Silty SAND/Sandy SILT; orange brown to yellowish brown, moist, very fine to fine grained, micaceous						
1595 / 10											
1590 / 15											
1585 / 20					Total Depth: '20 No Groundwater						
1580 / 25											
30											

Sample Legend

- SPT
- Ring Sample (CA modified)

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APPENDIX B

INFILTRATION TEST RESULTS

Project:	Sikand	Job No.:	G18-1647-20
Test Hole No.:	IB-1	Date Excavated:	10/10/2019
Depth of Test Hole:	10'	Soil Classification:	SM
Check for Sandy Soil Criteria By: JW		Date of Perc Test:	10/11/2019 Diameter: 8 inches

SANDY SOIL CRITERIA TEST

TIME	Time Interval (Minutes)	Initial Water Level (Inches)	Final Water Level (Inches)	Change In Water Level (Inches)
5:56 6:05	9	20	7.8	12.3
6:06 6:14	8	20	11.8	8.3

PRESOAK PERIOD

	Date	Time	Interval	Amount of Water Used
Start	10/10/19	5:45 AM		No Water Remaining
Stop	10/11/19			

TEST PERIOD

Time	Time Interval (min.)	Total Elasped Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change In Water Level (Inches)	Field Percolation Rate (minutes/inch)
6:16 6:26	10	10	20	11.25	8.75	1.14
6:27 6:37	10	21	20	11.75	8.25	1.21
6:38 6:48	10	32	20	12.25	7.75	1.29
6:49 6:59	10	43	20	13.13	6.88	1.45
7:00 7:10	10	54	20	13.25	6.75	1.48
7:11 7:21	10	65	20	13.25	6.75	1.48

Reduction Factor:	5.16
Design Infiltration Rate (in/hr):	7.85

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Project:	Sikand	Job No.:	G18-1647-20		
Test Hole No.:	IB-2	Date Excavated:	10/10/2019		
Depth of Test Hole:	10'	Soil Classification:	ML/SM		
Check for Sandy Soil Criteria By: JW		Date of Perc Test:	10/11/2019	Diameter:	8 inches

SANDY SOIL CRITERIA TEST

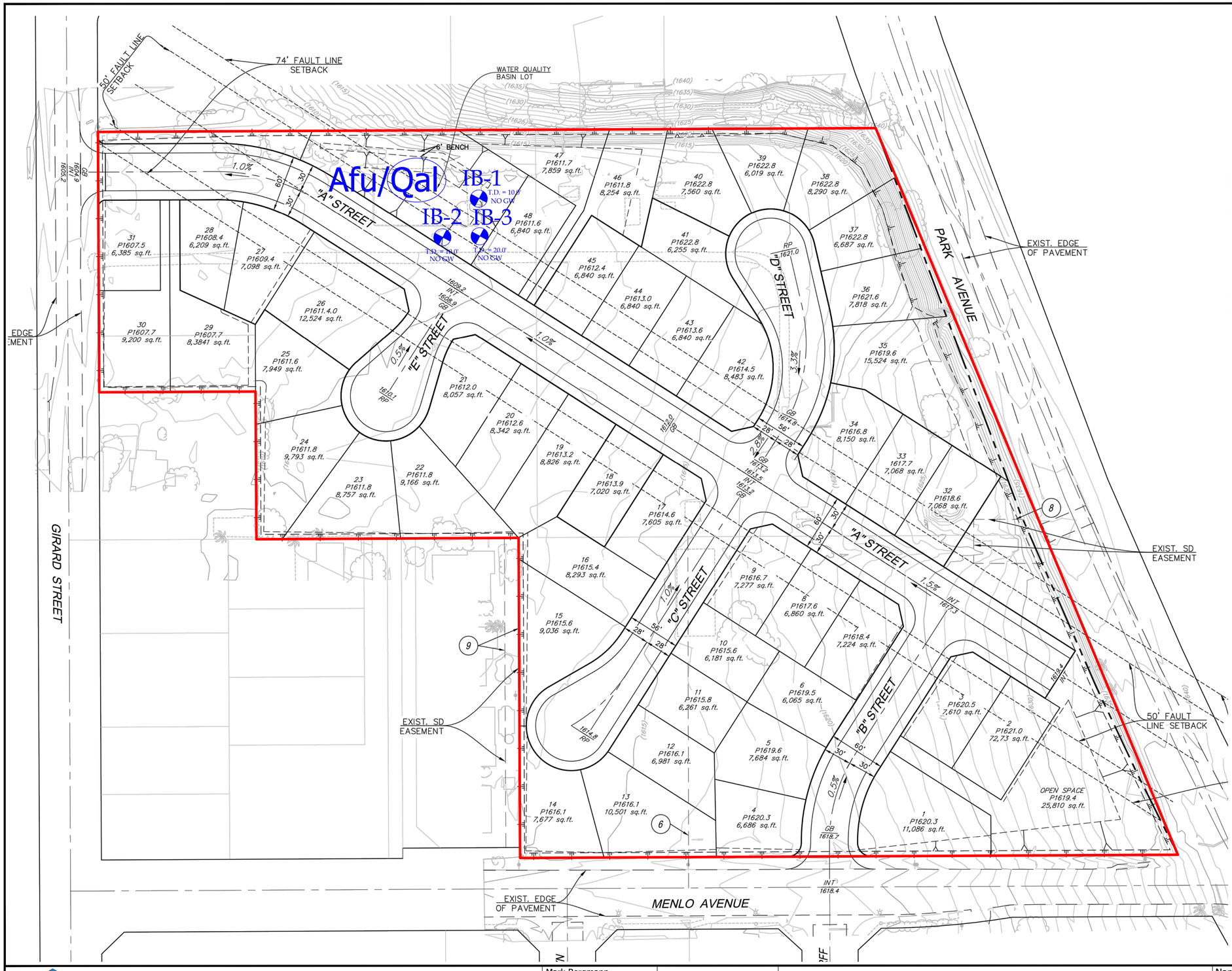
TIME	Time Interval (Minutes)	Initial Water Level (Inches)	Final Water Level (Inches)	Change In Water Level (Inches)
6:00	25	20	15.3	4.8
6:25				

PRESOAK PERIOD

	Date	Time	Interval	Amount of Water Used
Start	10/10/2019	5:40 AM		No Water Remaining
Stop	10/11/2019			

TEST PERIOD

Time	Time Interval (min.)	Total Elasped Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change In Water Level (Inches)	Field Percolation Rate (minutes/inch)
6:00	30	30	20	14.25	5.75	5.22
6:30						
6:31	30	61	20	16.13	3.88	7.74
7:01						
7:02	30	92	20	16.00	4.00	7.50
7:32						
7:33	30	123	20	16.25	3.75	8.00
8:03						
8:04	30	154	20	16.50	3.50	8.57
8:34						
8:35	30	185	20	16.63	3.38	8.89
9:05						
9:06	30	216	20	16.75	3.25	9.23
9:36						
9:37	30	247	20	16.88	3.13	9.60
10:07						
10:08	30	278	20	16.88	3.13	9.60
10:38						
10:39	30	309	20	17.00	3.00	10.00
11:09						
11:10	30	340	20	17.00	3.00	10.00
11:40						
11:41	30	371	20	17.00	3.00	10.00
12:11						
					Reduction Factor:	5.58
					Design Infiltration Rate (in/hr):	1.21



LEGEND
(Locations are Approximate)

Geologic Earth Units

Qal - Quaternary Alluvium

Qts - Bautista Formation

Symbols

- Limits of This Report

IB-3
T.D. = 20.0'
NO GW
- Infiltration Boring Location

0 50' 100'

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Mark Bergmann
Engineering Geologist

INFILTRATION TEST LOCATION MAP

800 North Girard Street
City of Hemet, County of Riverside, State of California

Name:	Sikand
Project No.	G18-1647-20
Client:	Shizao Zheng
Scale:	1" = 50'
Date:	October 2019
Reference:	Sikand Engineering, Preliminary Site Plan, Scale 1"=60'
Plate No.	1 OF 1