



GEO ENVIRON

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING CONSULTANTS, INC.

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Job No. 16-828P-2

October 28, 2016

Mr. Joseph Karaki
Western State Eng. & Construction, Inc.
4887 E. La Palma Street, Ste # 707
Anaheim, Ca 92807

Subject: Report of Testing for the Proposed Infiltration System, Proposed Commercial Development, 10598 Cedar Ave, Bloomington, San Bernardino County, California

Gentlemen

In accordance with your request, we have performed percolation testings to calculate infiltration rate for the the proposed infiltration system. The intent of this report is to evaluate the feasibility of the proposed system to be constructed at the subject site. Based on our review of the site plan, it appeared that the system will comply with the requirements as indicated in the referenced bulletin and guide lines provided by the County of Riverside.

The gross infiltration rate of the subsurface soils was found to be 1.9 inch per hour. The bottom of the proposed infiltration system is estimated to be within 5.0 feet below the existing natural grade. The calculation is attached herein.

SITE GEOLOGY & GROUNDWATER

The site is underlain by **alluvium consists of fine silty sand** slightly moist, and moderately dense. **Groundwater was not encountered** during this investigation. Groundwater is expected to be deep greater than 50 feet. A more detailed description of the earth materials encountered is presented on the log borings in Appendix 'B'.

PERCOLATION TESTING

A preliminary set of percolation tests were performed in order to determine the suitability of the surface soils as an absorb medium for seepage beds. Two (2) soil borings of 8 inches diameters were drilled to satisfy this investigation. The borings were drilled to depths of 6.0 feet below existing surface within the subject site to conduct percolation tests. One additional boring was drilled to depth of 50.0 feet below existing surface to determine depth to groundwater or any impervious layer.

The test hole was presaturated for at least 24 hours, due to the sandy nature of the subsurface soils. After the presaturation was completed, water level measurements were started. From a fixed reference point, the drop in water levels were measured over a 10 minute periods for an hour and fifty minutes. The drop that occurred during the final reading was used calculate the infiltration rate.

TEST RESULTS

The measured average infiltration rate of the subsurface soils was found to be 0.96 inches per hour using a Factor of safety of two (2).

CONCLUSION

1. The proposed infiltration system is suitable for the intended use, no adverse effects are anticipated.
2. We drilled to a depth of 15 feet below grade, and no groundwater was encountered. Therefore, the impact of the proposed infiltration system to ground water is nil
3. There will be a minim 10 feet horizontal and 1:1 (H:V) set back from the proposed building foundation and the expected zone of saturation of the infiltration system. The depth to groundwater is greater than 15 feet from the bottom of the infiltration pit. Therefore, no perched water conditions are expected, or adversely affect the structures.
5. The system will not be located near a retaining wall or basement wall.
6. The site is underlain with non expansive (sandy soils) soils for the most part and there will be no effect on infiltration behavior.
7. Since the proposed or existing structures will have adequate setbacks, therefore the susceptibility of hydro-consolidation from the proposed infiltration system will be very remote.
8. No ground settlements due to soil saturation from the proposed infiltration system are anticipated.

It is our opinion that the proposed infiltration system will be suitable for storm water infiltration. The system will not result in ground settlement that could affect structures, either or adjacent to the site. The infiltration of the storm water will not result in soil saturation that could affect retaining/ basement structures, if any.

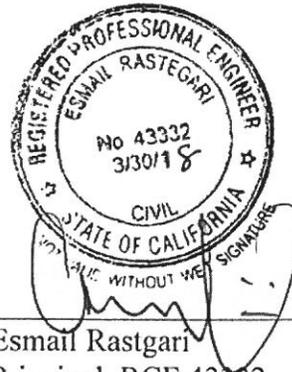
CLOSURE & LIMITATIONS

The findings, conclusions, and recommendations presented reflect our best estimate of subsurface conditions based on the data obtained from a limited subsurface exploration performed during the field study. The conclusions and recommendations are based on generally accepted geotechnical engineering principles and practices. No further warranties are implied nor made.

This opportunity to be of service is appreciated. If you have any further questions regarding this matter, please contact our office at your earliest convenience.

Respectfully submitted,

Geo Environ Eng. Consultants, Inc.



Jabed Masud
President/ Associate Engineer

Esmail Rastgari
Principal, RCE 43332

JM/ER/gm

- Attachments:
Drawings
Boring Logs
Percolation Test Data

PERCOLATION TEST DATA SHEET

Date: 9/20/16 Project Name: *Proposed Commercial Development*
 Project No: 16-828P-2 Tested By: *F.M.*
 Depth to Test Hole (Dt) : 60 inch. USCS Soil Classification: *Fine Silty Sand (SM)*

Test Hole ID: B-1
 Test Hole Dimensions (inches/feet)
 Diameters: 8 inch. Rectangular:
 Sandy Soil Criteria Test *

Trial No.	Start Time	Stop Time	Time Interval (min)	Initial Depth to Water (inch)	Final Depth to water (inch)	Change in Water Level (inch)	Greater than or Equal to 6"? (Yes/No)
1	8 am	8:25	25	0	12.4	12.4	Y
2	8:30	9:00	30	12.4	24.3	11.9	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. Otherwise, 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	At Time Interval (min)	Di Initial Depth to Water(inch)	Df Final Depth to water (inch)	AD Change in Water Level (inch)	Percolation Rate (min./in)
1	9:15	9:25	10 minute	0	6.5	6.5	
2			10 minute	6.5	12.7	6.2	
3			10 minute	12.7	18.6	5.9	
4			10 minute	18.6	23.8	5.2	
5			10 minute	23.8	28.9	5.1	
6							

Comments: Minor caving occurred

Test Hole ID: B-2
 Test Hole Dimensions (inches/ feet)
 Diameters: 8 inch. Rectangular:

Sandy Soil Criteria Test *

Trial No.	Start Time	Stop Time	Time Interval (min)	Initial Depth to Water (inch)	Final Depth to water (inch)	Change in Water Level (inch)	Greater than or Equal to 6"? (Yes/No)
1	8 am	8:25	25	0	12.8	12.8	Y
2	8:30	9:00	30	12.8	24.9	12.1	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. Otherwise, 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	At Time Interval (min)	Di Initial Depth to Water (inch)	Df Final Depth to water (inch)	ΔD Change in Water Level (inch)	Percolation Rate (min./in)
1	9:15	9:25	10 minute	0	7.2	7.2	
2			10 minute	6.5	14.1	6.9	
3			10 minute	14.1	20.4	6.3	
4			10 minute	20.4	26.3	5.9	
5			10 minute	26.3	31.8	5.5	
6							

Comments: Minor caving occurred

CALCULATION OF INFILTRATION RATE

Test Hole: B-1

Time Interval: t (minute) = 10

Initial Depth to Water (inch), D_i = 28.9

Final Depth to Water (inch), D_f = 33.8

Total Depth of Test Hole (inch): D_t = 60

Test Hole Radius, r (inch) = 4

H_i , initial ht of water @ selected time interval

$$H_i = (D_t - D_i) = 60 - 28.9 = 31.1$$

H_f , final ht. Of water @ selected time interval

$$H_f = (D_t - D_f) = 60 - 33.8 = 26.2$$

$$\Delta H \text{ (change in ht. over the time interval)} = (H_i - H_f) = 31.1 - 26.2 = 4.9$$

H (avg): avg. head ht. over the time interval:

$$H \text{ (avg)} = (H_i + H_f) / 2 = (31.1 + 26.2) / 2 = 28.6$$

I_t = Test Infiltration Rate

$$I_t = \frac{\Delta H * 60 \text{ min/hr} * r}{t * (r + 2 * H \text{ (avg)})}$$

$$= \frac{(4.9) (60)(4)}{(10)(4+2 \times 28.6)}$$

$$= 1.92$$

I_t = tested infiltration rate, in/hr

ΔH = Change in Head over the time interval, inches

Δt = time interval, minutes

r = radius of test hole

H_{avg} = average head over the time interval, inches

PROJECT NO. 10-0207
 PROJECT ADDRESS: 10598 Cedar Ave, Bloomington
 DRILLING COMPANY: Doug Duxbury
 BORING DIA: 8 inch.
 DRILLING METHOD: H.S.A.
 SAMPLING METHOD: 140 IB/ 30 inch. drop
 LOGGED BY: J.M.

TRENCH LOG: B-1

Depth (ft)	Samp	Blows per 12"	Mois	Dens	USCS	Symb	EARTH MATERIAL DESCRIPTION
2		28	5.2	99.8	SM		L.b. fine silty sand, slightly moist, mod. compacted
5		32	10.6	110.5	SM/ML		Lt. tan, fine sandy silt, mod. moist, dense
10		28	12.2	108.9	SM/ML		----- fine sandy silt, mod. moist, dense
15							
20							
25							
							END OF TRENCHING @ 15 FT. NO GROUNDWATER

 Std. Penetration Test
  California Ring
  Bulk Sample

PROJECT NO: 10-0201
 PROJECT ADDRESS: 10598 Cedar Ave, Bloomington
 DRILLING COMPANY: Doug Duxbury
 BORING DIA: 8 inch.
 DRILLING METHOD: H.S.A.
 SAMPLING METHOD: 140 IB/ 30 inch. drop
 LOGGED BY: J.M.

TRENCH LOG: B-2

Depth (ft)	Samp	Blows per 12"	Mois	Dens	USCS	Symb	EARTH MATERIAL DESCRIPTION
2		22	3.3	101.7	SM		L.b. fine silty sand, slightly moist, mod. compacted
5		28	9.8	107.8	SM/ML		Lt. tan, fine sandy silt, mod. moist, dense
10		33	11.3	105.3	SM/ML		----- fine sandy silt, mod. moist, dense
15							END OF TRENCHING @ 15 FT. NO GROUNDWATER
20							
25							

 Std. Penetration Test
  California Ring
  Bulk Sample

PROJECT NO. 10-0201
 PROJECT ADDRESS: 10598 Cedar Ave, Bloomington
 DRILLING COMPANY: Doug Duxbury
 BORING DIA: 8 inch.
 DRILLING METHOD: H.S.A.
 SAMPLING METHOD: 140 IB/ 30 inch. drop
 LOGGED BY: J.M.

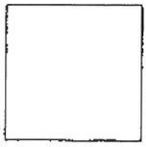
TRENCH LOG: B-3

Depth (ft)	Sampl	Blows per 12"	Mois	Dens	USCS	Symb	EARTH MATERIAL DESCRIPTION
2		20	4.9	103.6	SM		L.b. fine silty sand, slightly moist, mod. compacted
5		28	9.8	110.2	SM/ML		Lt. tan, fine sandy silt, mod. moist, dense
10							
15							
20							END OF TRENCHING @ 5 FT. NO GROUNDWATER
25							

 Std. Penetration Test
  California Ring
  Bulk Sample



DATE: 01/11/12
 BY: [Signature]
 CHECKED BY: [Signature]



PROJECT DATA
 ZONING: CC
 OVERLAYS: 60 (Flow Control), 61 (Signage), 62 (Land Use)
 AREA OF SITE: 1.8423 ACRES (1.209 ACRES BEFORE DEDICATION)
 BLDG METRICS:
 FRONT (EAST): 28'-0"
 FRONT (WEST): 130'-0"
 SIDE STREET (NORTH): 20'-0"
 SIDE (SOUTH): 50'-0"
 LANDSCAPE AREA: 1.6230 ACRES
 FLOOR AREA RATIO: 0.5 : 1
 MAXIMUM HEIGHT: 35'-0"
 MAXIMUM SETBACK: 35'-0"

AS-10
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VICINITY MAP

PROPOSED SITE PLAN
 SCALE: 1" = 30'-0"

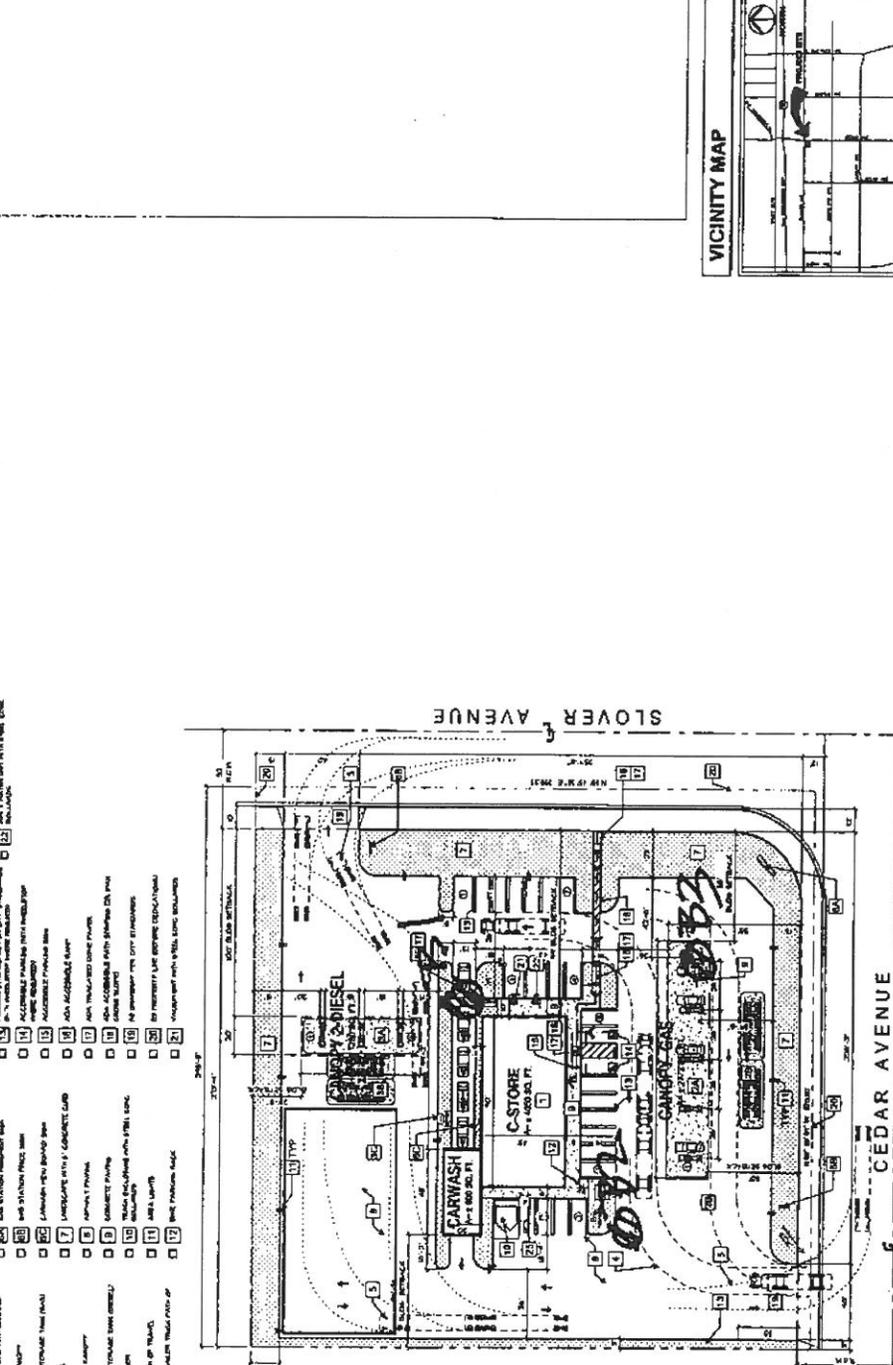
PARKING ANALYSIS

BUILDING DATA

PROJECT DATA

LEGEND

SITE KEY NOTES



- LEGEND**
- 1 NO. OF PARKING SPACES
 - 2 ACCESSIBLE PARKING
 - 3 PARKWAY LANE
 - 4 DRIVEWAY
 - 5 DRIVEWAY
 - 6 DRIVEWAY
 - 7 DRIVEWAY
 - 8 DRIVEWAY
 - 9 DRIVEWAY
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 - 50 DRIVEWAY

BUILDING DATA

BLDG. CATEGORY (NEW)	AREA	OCCUPANCY	TYPE OF CONST.	NUMBER OF STORY	PARKING PROVS.	FORMULA	BLDG. CATEGORY (NEW)	AREA	OCCUPANCY	TYPE OF CONST.	NUMBER OF STORY	PARKING PROVS.	FORMULA
BLDG. STORES (NEW)	1,4230 SF	M	V-D	1	23	1 PER 250 SF	BLDG. GARWASH (NEW)	2,000 SF	M	V-D	1	4	1 PER 500 SF
BLDG. STORES (EXIST)	1,4230 SF	M	V-D	1	23	1 PER 250 SF	BLDG. GARWASH (EXIST)	2,000 SF	M	V-D	1	4	1 PER 500 SF
TOTAL BLDG. AREA	2,8460 SF						TOTAL BLDG. AREA	2,8460 SF					

PARKING ANALYSIS

PARKING STANDARDS	TYPE	SIZE	REQUIRED	PROPOSED
REGULAR	8'-0" X 11'-0"	NA	NA	NA
PARALLEL	NA	NA	NA	NA
PERPENDICULAR	11'-0" X 11'-0" (MIN. ACCESSIBLE)	NA	NA	NA
LOADING	12'-0" X 30'-0"	NA	NA	NA
TOTAL PARKING SPACES			33	34

PROJECT DATA

ORIGINAL COMMERCIAL	REQUIRED	PROPOSED
FRONT (EAST)	28'-0"	28'-0"
FRONT (WEST)	130'-0"	130'-0"
SIDE STREET (NORTH)	20'-0"	20'-0"
SIDE (SOUTH)	50'-0"	50'-0"
LANDSCAPE AREA	1.6230 ACRES	1.6230 ACRES
FLOOR AREA RATIO	0.5 : 1	0.5 : 1
MAXIMUM HEIGHT	35'-0"	35'-0"
MAXIMUM SETBACK	35'-0"	35'-0"

SITE KEY NOTES

- 1 GARWASH (NEW) 2,000 SF
- 2 GARWASH (EXIST) 2,000 SF
- 3 GARWASH (EXIST) 2,000 SF
- 4 GARWASH (EXIST) 2,000 SF
- 5 GARWASH (EXIST) 2,000 SF
- 6 GARWASH (EXIST) 2,000 SF
- 7 GARWASH (EXIST) 2,000 SF
- 8 GARWASH (EXIST) 2,000 SF
- 9 GARWASH (EXIST) 2,000 SF
- 10 GARWASH (EXIST) 2,000 SF
- 11 GARWASH (EXIST) 2,000 SF
- 12 GARWASH (EXIST) 2,000 SF
- 13 GARWASH (EXIST) 2,000 SF
- 14 GARWASH (EXIST) 2,000 SF
- 15 GARWASH (EXIST) 2,000 SF
- 16 GARWASH (EXIST) 2,000 SF
- 17 GARWASH (EXIST) 2,000 SF
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- 46 GARWASH (EXIST) 2,000 SF
- 47 GARWASH (EXIST) 2,000 SF
- 48 GARWASH (EXIST) 2,000 SF
- 49 GARWASH (EXIST) 2,000 SF
- 50 GARWASH (EXIST) 2,000 SF

PROPOSED SITE PLAN
 SCALE: 1" = 30'-0"

PARKING ANALYSIS

BUILDING DATA

PROJECT DATA

LEGEND

SITE KEY NOTES

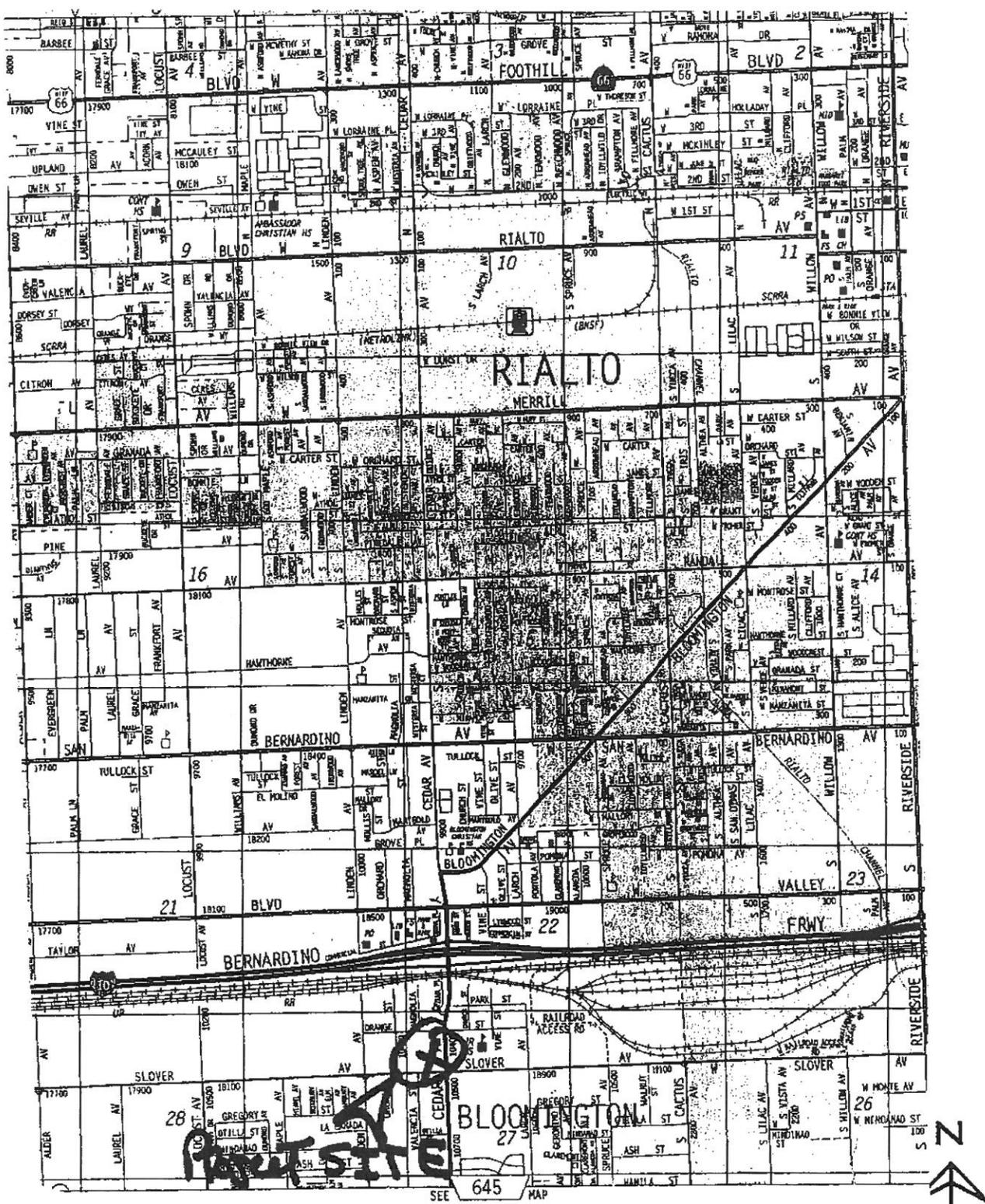
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VICINITY MAP

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SOIL BORING



SCALE: 1"=1/2 MILE

GEO ENVIRON
 ANAHEIM, CALIFORNIA

FIG. 1
SITE LOCATION MAP