NorCal Engineering

Soils and Geotechnical Consultants
10641 Humbolt Street Los Alamitos, CA 90720
(562) 799-9469 Fax (562) 799-9459

May 21, 2013 Project Number 16800-13

The Carson Companies
100 Bayview Circle
Newport Beach, California 92660

Attn: Paul R. McMahon, Jr. A.I.A.

RE: **Soil Infiltration Study** - Proposed Office/Warehouse Development - Located at the Northwest Corner of Agua Mansa Road and Hall Avenue, in the County of Riverside, California

Dear Mr. McMahon:

Pursuant to your request, this firm has performed a Soil Infiltration Study for the above referenced project. The purpose of this study is to evaluate the feasibility of an on-site drainage disposal system for the proposed development. The scope of work included the following: 1) site reconnaissance; 2) subsurface geotechnical exploration; 3) double ring infiltration testing; 4) engineering analysis of field and laboratory data; and 5) preparation of a report.

It is proposed to install a detention/infiltration basin to dispose of on-site water runoff. Preliminarily, the basin will be located at the western-most corner of the site along Hall Avenue and was assumed to be on the order of six to seven feet in depth.

Site Description

The irregular-shaped subject property is comprised of approximately 23.44 acres located at the northwesterly corner of Agua Mansa Road and Hall Avenue, as illustrated on Figure 1, Vicinity Map. The property is currently vacant and covered with sparse to heavy low vegetation growth. Scattered debris was also observed across the site from past dumping.

The site topography in the area of the planned basin is relatively flat. Topography on the eastern portion of the site undulates and steps up in elevation with total relief of the property on the order of 45 feet. Various reported water wells and an possible old and dry cistern, 13 feet in diameter and in excess of 60 feet in depth, are located in the eastern portion of the site, over 1,000 feet away from the planned retention/infiltration basin.

Field Exploration

The testing was conducted on March 11, 2013 and consisted of using the double ring infiltrometer at two (2) locations to determine the infiltration rate of the proposed retention/infiltration basin. The locations of the tests are shown on the attached Figure 2. These test locations were excavated by a backhoe to depths of 6 and 7 feet below existing ground surface (bgs). No caving occurred to the depths of these test excavations and no groundwater was encountered. Detailed description of the subsurface soils is shown on the attached test excavations logs in Appendix B.

In general, the test areas were found to be underlain by disturbed topsoils and native soils. The upper native soils consisted of brown silty SAND which was medium dense and damp. Increased clay content was noted with depth and clayey and sandy SILT was encountered at the test elevations. These soils were noted to be stiff and damp.

The depth of groundwater in the vicinity is expected to be 50 feet or greater. based on review of ground water maps of the Upper Santa Ana River Basin. (Carson and Matti, 1973-1979). . The exposed sidewalls of our test pits did not reveal any evidence (mottling, etc.) that groundwater had been near the surface. In addition, a deep boring was also placed on site pursuant to the completion of a Geotechnical Investigation by NorCal Engineering (report unpublished at this date). No groundwater was encountered to a depth of 51.5 feet in this boring.

Infiltration Test Procedure and Results

The infiltration test consisted of the double ring infiltration test per ASTM Method D 3385. The double ring infiltrometer method consists of driving two open cylinders, one inside the other, into the ground, partially filling the ring with water or other liquid, and then maintaining the liquid at a constant level. The volume of liquid added to the inner ring, to maintain the liquid level constant is the measure of the volume of liquid that infiltrates into the soil.

The volume infiltrated during timed intervals is converted to an incremental infiltration velocity, usually expressed in centimeters per hour or inches per hour and plotted verses elapsed time. The maximum-steady state or average incremental infiltration velocity, depending on the purpose/application of the test is equivalent to the infiltration rate.

Along the bottom of the infiltration test pits, dual infiltration rings were inserted 7 cm vertically into the soil by an impact-absorbing hammer. Guelph tubes, also referred to as bubblers were installed to maintain constant water level in each of the rings. Water levels were maintained at a constant level in both the inner ring and annular space between rings throughout the test, to prevent flow of water from one ring to the other.

The volume of liquid used during each measured time interval was converted into an incremental infiltration velocity of both the inner ring in the annular space using the following equations:

For the inner ring calculated as follows:

$Vir=\Delta Vir/(Air\Delta t)$

where:

Vir = inner ring incremental infiltration velocity, cm/hr

ΔVir = volume of water used during time interval to maintain constant head in the inner ring, cm^3

Air = internal area of the inner ting, cm^2

Δt = time interval, hr

The last reading obtained was used for design purposes in each of the basin. The testing data sheets are attached in Appendix B and summarized in the table below. These excavations were immediately backfilled with the excavated soils and compacted. The double ring infiltration results are shown in Appendix B.

Test No.	Depth (feet bgs)	Soil Type	Infiltration Rate (cm/hr)	(in/hr)
T-1	6	clayey SILT	1.6	0.7
T-2	7	clayey, sandy SILT	2.0	0.8

Discussion of Results

The use of an on-site disposal system by means of a retention/infiltration basin appears to be geotechnically feasible for future development. Based upon the results of our testing, the clayey SILT sols encountered in the proposed on-site drainage disposal system area exhibit low infiltration rates. The infiltration rate of 0.7 in/hr may be used for design purposes. It is our opinion that the site is suitable for stormwater infiltration without increasing the potential of settlement of proposed and existing structures or adversely affecting retaining/basement walls located either on or adjacent to the subject site. In addition, the potential for hydro-consolidation and the susceptibility for any ground settlements are considered very low. All systems shall meet the California Regional Water Quality Control Board (CRWQCB) requirements.

Closure

The recommendations and conclusions contained in this report are based upon the soil conditions uncovered in our test excavations. No warranty of the soil condition between our excavations is implied. NorCal Engineering should be notified for possible further recommendations if unexpected to unfavorable conditions are encountered during construction phase. This firm should have the opportunity to review the final plans to verify that all our recommendations are incorporated.

This report and all conclusions are subject to the review of the controlling authorities for the project. Our representative should be present during the grading operations and construction phase to certify that such recommendations are complied within the field.

This geotechnical investigation has been conducted in a manner consistent with the level of care and skill exercised by members of our profession currently practicing under similar conditions in the Southern California area. All work was performed under the supervision of the Geotechnical Engineer. No other warranty, expressed or implied is made. No other warranty, expressed or implied is made.

We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

Respectfully submitted,
NORCAL ENGINEERING

Keith D. Tucker
Project Engineer
R.G.E. 841

Mark A. Burkholder
Project Manager

List of Appendices
(in order of appearance)

Appendix A

Vicinity Map – Figure 1

Site Plan – Figure 2

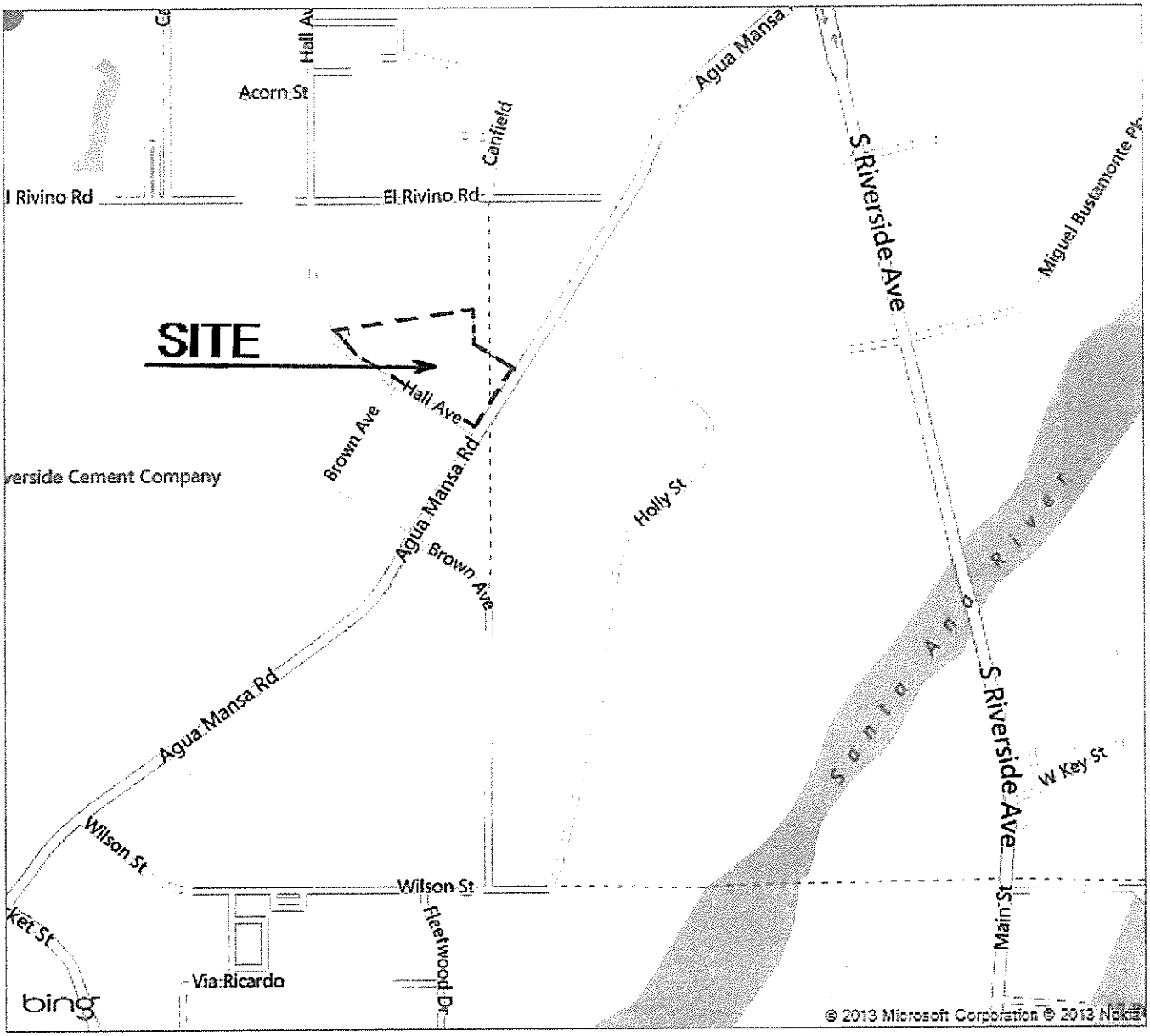
Appendix B

Log of Test Pits IT-1 and IT-2

Field Test Data

Calculations

Appendix A



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PROJECT 16800-13 | DATE MAY 2013

VICINITY MAP

FIGURE 1

0 120'

SCALE

IT-2

IT-1

WATER QUALITY BASIN

929.00FG

BUILDING AREA
434,516 SF

FLOOR SLOPED AT 0.5%

44 DOCK DOORS

56 DOCK DOORS

OFFICE AREA

OFFICE AREA

OFFICE AREA

1,014'

185'

HALL AVENUE

AGUA MANSA ROAD

RIVERSIDE COUNTY
SAN BERNARDINO COUNTY

ARDINO COUNTY
RIVERSIDE COUNTY

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PROJECT 16800-13 | DATE MAY 2013

LOCATIONS OF TEST EXCAVATIONS

FIGURE 2

Appendix B

MAJOR DIVISION			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL, SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINE (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

UNIFIED SOIL CLASSIFICATION SYSTEM

KEY:

- Indicates 2.5-inch Inside Diameter. Ring Sample.
- Indicates 2-inch OD Split Spoon Sample (SPT).
- Indicates Shelby Tube Sample.
- Indicates No Recovery.
- Indicates SPT with 140# Hammer 30 in. Drop.
- Indicates Bulk Sample.
- Indicates Small Bag Sample.
- Indicates Non-Standard
- Indicates Core Run.

COMPONENT PROPORTIONS

DESCRIPTIVE TERMS	RANGE OF PROPORTION
Trace	1 - 5%
Few	5 - 10%
Little	10 - 20%
Some	20 - 35%
And	35 - 50%

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5mm) to No. 200 (0.074mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074 mm)

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
DAMP	Some perceptible moisture; below optimum
MOIST	No visible water; near optimum moisture content
WET	Visible free water, usually soil is below water table.

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N -VALUE

COHESIONLESS SOILS		COHESIVE SOILS		
Density	N (blows/ft)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	Very Soft	0 to 2	< 250
Loose	4 to 10	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	Very Stiff	15 to 30	2000 - 4000
		Hard	over 30	> 4000

Log of Test Excavation IT-1

Project	The Carson Companies/County of Riverside
Date of Drilling: 5/11/13	Groundwater Depth: None Encountered
Drilling Method: Backhoe	
Hammer Weight:	Drop:

Depth (feet)	Geotechnical Description	Lith-ology	Samples: Type	Samples: Blow Counts	Laboratory: Moisture (%)	Laboratory: Dry Density (pcf)	Laboratory: % Passing 200 Sieve
	Surface Elevation Not Measured						
0	DISTURBED TOPSOILS Silty SAND with organics Light brown, loose, dry						
	NATURAL SOILS Silty SAND Light brown, medium dense, damp						
5	Sandy SILT with some clay Brown, medium stiff, damp						
	Clayey SILT Grey-brown, very stiff, damp						
	Boring completed at depth of 6'						
10							
15							
20							
25							
30							
35							

Log of Test Excavation IT-2

Project	The Carson Companies/County of Riverside
Date of Drilling: 5/11/13	Groundwater Depth: None Encountered
Drilling Method: Backhoe	
Hammer Weight:	Drop:

Depth (feet)	Geotechnical Description	Lith-ology	Samples: Type	Samples: Blow Counts	Laboratory: Moisture (%)	Laboratory: Dry Density (pcf)	Laboratory: % Passing 200 Sieve
	Surface Elevation Not Measured						
0	DISTURBED TOPSOILS Silty SAND with organics Light brown, loose, dry						
	NATURAL SOILS Silty SAND Light brown, medium dense, damp						
5	Sandy, clayey SILT Brown, medium stiff, damp						
	Boring completed at depth of 7'						
10							
15							
20							
25							
30							
35							

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SOILS AND GEOTECHNICAL CONSULTANTS
10641 HUMBOLT STREET LOS ALAMITOS, CA 90720
(562)799-9469 FAX (562)799-9459

Project: The Carson Companies
P.N.: 16800-13
Date: 5/11/2013

Test No.: 1
Depth: 6'
Tested By: J.S./P.L.

	Time (hr/min)	Change Time (min)	Cumulative Time (min)	Inner Ring Reading (cm)	Inner Ring Change (cm)	Inner Ring Flow (cc)	Inner Ring Inf Rate (cm/hr)	Inner Ring Inf Rate (ft/hr)
1	9:25			129.5				
	9:40	15	15	130.7	1.2		4.8	
2	9:40			130.7				
	9:55	15	30	131.8	1.1		4.4	
3	9:55			131.8				
	10:10	15	45	131.9	0.1		0.4	
4	10:10			131.9				
	10:25	15	60	132.4	0.5		2	
5	10:27			128.7				
	10:42	15	75	129.5	0.8		3.2	
6	10:42			129.5				
	10:57	15	90	129.9	0.4		1.6	
7	10:57			129.9				
	11:12	15	105	130.3	0.4		1.6	
8	11:12			130.3				
	11:27	15	120	130.8	0.5		2.0	
9	11:30			127.3				
	11:45	15	135	128.0	0.7		2.8	
10	11:45			128				
	12:00	15	150	128.4	0.4		1.6	
11	12:00			128.4				
	12:15	15	165	128.7	0.3		1.2	
12	12:15			128.7				
	12:30	15	180	129.1	0.4		1.6	

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10641 HUMBOLT STREET LOS ALAMITOS, CA 90720
(562)799-9469 FAX (562)799-9459

Project: The Carson Companies
P.N.: 16800-13
Date: 5/11/2013

Test No.: 2
Depth: 7'
Tested By: P.L.

	Time (hr/min)	Change Time (min)	Cumulative Time (min)	Inner Ring Reading (cm)	Inner Ring Change (cm)	Inner Ring Flow (cc)	Inner Ring Inf Rate (cm/hr)	Inner Ring Inf Rate (ft/hr)
1	12:47			130.5				
	1:02	15	15	132.2	1.7		6.8	
2	1:02			132.2				
	1:17	15	30	133.6	1.4		5.6	
3	1:17			133.6				
	1:32	15	45	135.0	1.4		5.6	
4	1:32			135.0				
	1:47	15	60	135.9	0.9		3.6	
5	1:47			131.3				
	2:02	15	75	132.2	0.9		3.6	
6	2:02			132.2				
	2:17	15	90	132.9	0.7		2.8	
7	2:17			132.9				
	2:32	15	105	133.5	0.6		2.4	
8	2:32			133.5				
	2:47	15	120	134.1	0.6		2.4	
9	2:47			130.3				
	3:02	15	135	131.0	0.7		2.8	
10	3:02			131.0				
	3:17	15	150	131.7	0.7		2.8	
11	3:17			131.7				
	3:32	15	165	132.2	0.5		2.0	
12	3:32			132.2				
	3:47	15	180	132.7	0.5		2.0	

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SOILS AND GEOTECHNICAL CONSULTANTS
10641 HUMBOLT STREET LOS ALAMITOS, CA 90720
(562)799-9469 FAX (562)799-9459

September 6, 2018 Project Number 16800-13

The Carson Companies
100 Bayview Circle
Newport Beach, California 92660

Attn: Dan Darnell

RE: ***Supplemental*** **Soil Infiltration Study** - Proposed Office/Warehouse Development - Located at the Northwest Corner of Agua Mansa Road and Hall Avenue, in the County of Riverside, California

Dear Mr. Darnell:
As requested, supplemental infiltration testing has been completed to further assess the site for stormwater capture/infiltration systems. Three additional test sites and depths were selected by Plotnik & Associates and supplement the earlier tests as detailed in our report dated May 21, 2013. Logs of the additional test pits are included in Appendix A.

1.0 INFILTRATION TESTING

The infiltration test consisted of the double ring infiltration test per ASTM Method D 3385. The double ring infiltrometer method consists of driving two open cylinders, one inside the other, into the ground, partially filling the ring with water, and then maintaining the liquid at a constant level. The volume of liquid added to the inner ring, to maintain the liquid level constant is the measure of the volume of liquid that infiltrates into the soil.

The volume infiltrated during timed intervals is converted to an incremental infiltration velocity, usually expressed in centimeters per hour or inches per hour and plotted verses elapsed time. The maximum-steady state or average incremental infiltration velocity, depending on the purpose/application of the test is equivalent to the infiltration rate.

Water levels were maintained at a constant level in both the inner ring and annular space between rings throughout the test, to prevent flow of water from one ring to the other.

The volume of liquid used during each measured time interval was converted into an incremental infiltration velocity of both the inner ring in the annular space using the following equations:

For the inner ring calculated as follows:

$Vir=\Delta Vir/(Air\Delta t)$

where:

Vir = inner ring incremental infiltration velocity, cm/hr

ΔVir = volume of water used during time interval to maintain constant head in the inner ring, cm^3

Air = internal area of the inner ring, cm^2

Δt = time interval, hr

An average of the final readings obtained was used for design purposes in each of the basins. The testing data sheets are attached in Appendix B and summarized below.

The use of on-site disposal system by means of retention/infiltration basins appears to be geotechnically feasible for future development. The field infiltration rates given below may be utilized in the final basin design with a safety factor of 2.0 or greater.

Test No.*	Depth (feet bgs)	Soil Type	Infiltration Rate (cm/hr)	(in/hr)
IT-3	10.0	silty Sand	74	30
IT-4	10.0	silty Sand	49	20
IT-5	12.0	silty Sand	81	32

* Results for tests IT-1 and IT-2 included in previous report dated May 21, 2013.

Soils in all excavations at test elevations consisted of a medium dense silty Sand. It is our opinion that the soils in test excavations IT-3 to IT-5 are suitable for infiltration without increasing the potential of settlement of proposed and existing structures or adversely affecting retaining/basement walls located either on or adjacent to the subject site. In addition, the potential for hydro-consolidation and the susceptibility for any ground settlements are considered low. All systems shall meet the California Regional Water Quality Control Board (CRWQCB) requirements.

2.0 CLOSURE

The recommendations and conclusions contained in this supplemental report are based upon the soil conditions uncovered in our test excavations. No warranty of the soil condition between our excavations is implied. NorCal Engineering should be notified for possible further recommendations if unexpected to unfavorable conditions are encountered during construction phase. It is the responsibility of the owner to ensure that all information within this report is submitted to the Architect and appropriate Engineers for the project.

This firm should have the opportunity to review the final plans (72 hours for review required) to verify that all our recommendations are incorporated. This report and all conclusions are subject to the review of the controlling authorities for the project.

A preconstruction conference should be held between the developer, general contractor, grading contractor, city inspector, architect, and soil engineer to clarify any questions relating to the grading operations and subsequent construction. Our representative should be present during the grading operations and construction phase to certify that such recommendations are complied within the field.

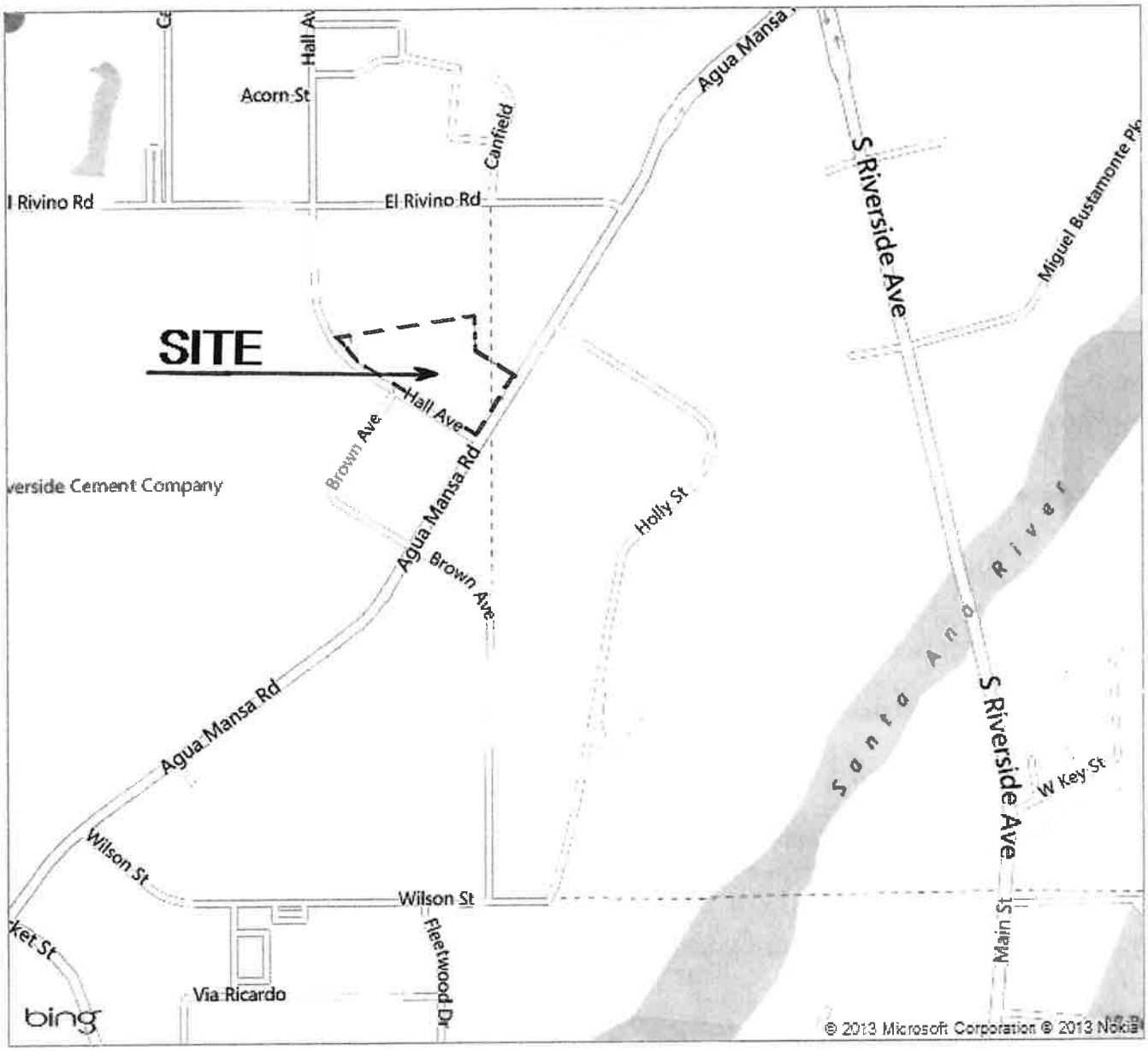
The testing described has been conducted in a manner consistent with the level of care and skill exercised by members of our profession currently practicing under similar conditions in the Southern California area. No other warranty, expressed or implied is made.

We appreciate this opportunity to be of service to you. If you have any further questions, please do not hesitate to contact the undersigned.

Respectfully submitted,
NORCAL ENGINEERING

Keith D. Tucker
Project Engineer
R.G.E. 841

Mark A. Burkholder
Project Manager



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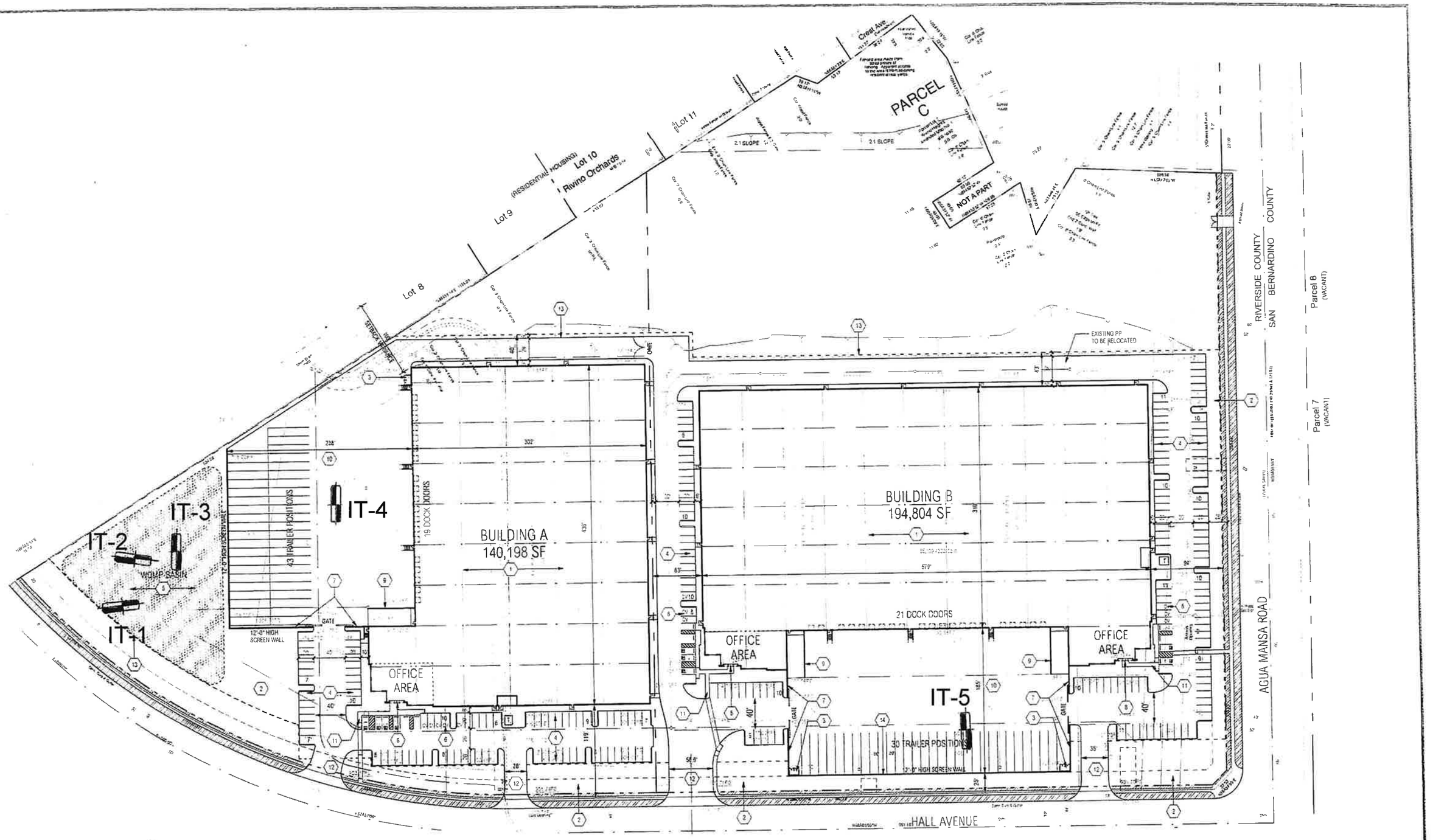
VICINITY MAP

PROJECT 16800-13	DATE SEPT 2018

FIGURE 1



IT-1 and IT-2 (2013 report)
IT-3 to IT-5 (2018 Supplemental report)

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PROJECT 16800-13 DATE 9/2018

LOCATIONS OF TEST EXCAVATIONS

FIGURE 2

APPENDIX A

The Carson Companies
16800-13

Log of Trench IT-3

Boring Location: NWC Agua Mansa & Hall, Riverside

Date of Drilling: 9/5/18 | **Groundwater Depth:** None Encountered

Drilling Method: Backhoe

Hammer Weight: | **Drop:**

Surface Elevation: Not Measured

Depth (feet)	Lith-ology	Material Description	Samples: Type	Samples: Blow Counts	Laboratory: Moisture	Laboratory: Dry Density	Laboratory: Fines Content %
0		FILL SOILS Silty SAND with rootlets Brown, loose, dry					
		NATURAL SOILS Silty SAND Brown, medium dense, dry to damp					
5		GWT not encountered					
10		Trench completed at depth of 10'					
15							
20							
25							
30							
35							

Date: 9/6/2018 File: C:\Superlog4\PROJECT\16800-13.log SuperLog CivilTech Software, USA www.civiltech.com

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The Carson Companies
16800-13

Log of Trench IT-4

Boring Location: NWC Agua Mansa & Hall, Riverside

Date of Drilling: 9/5/18 | **Groundwater Depth:** None Encountered

Drilling Method: Backhoe

Hammer Weight: | **Drop:**

Surface Elevation: Not Measured

Depth (feet)	Lith-ology	Material Description	Samples: Type	Samples: Blow Counts	Laboratory: Moisture	Laboratory: Dry Density	Laboratory: Fines Content %
0		FILL SOILS Silty SAND with occasional gravel and rootlets Brown, upper 8 inches loose to medium dense, dry					
		NATURAL SOILS Silty SAND Brown, medium dense, damp					
5		Sandy SILT Grey-brown, medium dense, damp					
10		Silty SAND Brown, medium dense, damp Trench completed at depth of 10'					
15							
20							
25							
30							
35							

GWT not encountered

SuperLog CiviliTech Software, USA www.civiltech.com File: C:\Superlog4\PROJECT\16800-13.log Date: 9/6/2018

NorCal Engineering

The Carson Companies
16800-13

Log of Trench IT-5

Boring Location: NWC Agua Mansa & Hall, Riverside

Date of Drilling: 9/5/18 | **Groundwater Depth:** None Encountered

Drilling Method: Backhoe

Hammer Weight: | **Drop:**

Surface Elevation: Not Measured

Depth (feet)	Lith-ology	Material Description	Samples: Type	Samples: Blow Counts	Laboratory: Moisture	Laboratory: Dry Density	Laboratory: Fines Content %
0		FILL SOILS Silty SAND with occasional gravel, some asphalt, plastic pipe pieces Brown, loose to medium dense, dry to damp					
5		NATURAL SOILS Sandy SILT to Silty SAND Brown, medium stiff to dense, damp					
10		Silty SAND Brown, medium dense, damp					
		Trench completed at depth of 12'					
15							
20							
25							
30							
35							

GWT not encountered

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APPENDIX B

NORCAL ENGINEERING

SOILS AND GEOTECHNICAL CONSULTANTS

Project: The Carson Companies
Project No: 16800-13
Date: 9/5/18
Test No. IT-3
Depth: 10'
Tested By: J.S.

	TIME (hr/min)	CHANGE TIME (min)	CUMULATIVE TIME (min)	INNER RING READING (cm)	INNER RING CHANGE	INNER RING FLOW (cc)	OUTER RING READING (cm)	OUTER RING CHANGE (cm)	OUTER RING FLOW (cc)	INNER RING INF RATE (cm/hr)	OUTER RING INF RATE (cm/hr)	INNER RING INF RATE (ft/hr)
1	8:53			98.2			43.0					
	8:56	3	3	103.6	5.4		49.6	6.6				
2	8:56			98.1			42.8					
	8:59	3	6	102.1	4.0		48.4	5.6				
3	8:59			98.4			41.7					
	9:02	3	9	102.0	3.6		47.0	5.3				
4	9:02			97.7			43.2					
	9:05	3	12	101.5	3.8		48.2	5.0				
5	9:05			99.4			42.5					
	9:08	3	15	103.0	3.6		48.0	5.5				
6	9:08			98.4			42.3					
	9:11	3	18	102.2	3.8		48.2	5.9				
7	9:11			98.4			42.8					
	9:14	3	21	102.1	3.7		48.0	5.2		74	104	
8	9:14			98.0			42.7					
	9:17	3	24	101.6	3.6		47.7	5.0		72	100	
9	9:17			98.4			43.1					
	9:20	3	27	102.2	3.8		48.1	5.0		76	100	
10	9:20			98.2			42.7					
	9:23	3	30	102.0	3.8		47.8	5.1		76	102	
11	9:23			97.9			43.0					
	9:26	3	33	101.4	3.5		48.2	5.2		70	104	
12	9:26			97.8			42.6					
	9:29	3	36	101.5	3.7		47.8	5.2		74	104	

Average = 74 / 102 cm/hr

NORCAL ENGINEERING

SOILS AND GEOTECHNICAL CONSULTANTS

Project: The Carson Companies
Project No: 16800-13
Date: 9/5/18
Test No. IT-4
Depth: 10'
Tested By: J.S.

	TIME (hr/min)	CHANGE TIME (min)	CUMULATIVE TIME (min)	INNER RING READING (cm)	INNER RING CHANGE	INNER RING FLOW (cc)	OUTER RING READING (cm)	OUTER RING CHANGE (cm)	OUTER RING FLOW (cc)	INNER RING INF RATE (cm/hr)	OUTER RING INF RATE (cm/hr)	INNER RING INF RATE (ft/hr)
1	11:10			99.2			44.1					
	11:20	10	10	107.8	8.6		53.0	8.9				
2	11:20			97.3			41.0					
	11:30	10	20	106.1	8.8		49.8	8.8				
3	11:30			97.8			39.9					
	11:40	10	30	106.3	8.5		49.3	9.4				
4	11:40			97.7			39.8					
	11:50	10	40	105.9	8.2		49.2	9.4				
5	11:50			98.0			40.0					
	12:00	10	50	106.1	8.1		49.2	9.2				
6	12:00			98.3			41.8					
	12:10	10	60	106.5	8.2		50.8	9.0				
7	12:10			98.4			40.7					
	12:20	10	70	106.5	8.1		50.3	9.6		48.6	57.6	
8	12:20			98.3			40.0					
	12:30	10	80	106.3	8.0		48.8	8.8		48	52.8	
9	12:30			97.7			39.9					
	12:40	10	90	106.2	8.5		49.0	9.1		51	54.6	
10	12:40			98.5			41.5					
	12:50	10	100	106.8	8.3		50.2	8.7		49.8	52.2	
11	12:50			98.5			42.0					
	1:00	10	110	106.6	8.1		50.5	8.5		48.6	51	
12	1:00			97.9			40.0					
	1:10	10	120	106.0	8.1		48.5	8.5		48.6	51	

Average = 49 / 53 cm/hr

NORCAL ENGINEERING

SOILS AND GEOTECHNICAL CONSULTANTS

Project: The Carson Companies
Project No: 16800-13
Date: 9/5/18
Test No. IT-5
Depth: 12'
Tested By: J.S.

	TIME (hr/min)	CHANGE TIME (min)	CUMULATIVE TIME (min)	INNER RING READING (cm)	INNER RING CHANGE	INNER RING FLOW (cc)	OUTER RING READING (cm)	OUTER RING CHANGE (cm)	OUTER RING FLOW (cc)	INNER RING INF RATE (cm/hr)	OUTER RING INF RATE (cm/hr)	INNER RING INF RATE (ft/hr)
1	2:05			98.4			41.3					
	2:10	5	5	105.9	7.5		51.4	10.1				
2	2:10			98.2			40.5					
	2:15	5	10	105.2	7.0		51.3	9.8				
3	2:15			99.5			49.6					
	2:20	5	15	106.3	6.8		52.8	8.8				
4	2:20			98.7			40.8					
	2:25	5	20	105.4	6.7		50.0	9.2				
5	2:25			98.3			41.2					
	2:30	5	25	104.7	6.4		50.3	9.1				
6	2:30			98.0			41.4					
	2:35	5	30	105.1	7.1		50.2	8.8				
7	2:35			98.2			42.5					
	2:40	5	35	105.0	6.2		51.3	8.8		81.6	105.6	
8	2:40			98.2			41.2					
	2:45	5	40	105.2	7.0		50.2	9.2		84	110.4	
9	2:45			97.6			42.5					
	2:50	5	45	104.5	6.9		51.3	9.5		82.8	114.0	
10	2:50			98.3			41.3					
	2:55	5	50	105.0	6.7		50.5	9.2		80.4	110.4	
11	2:55			98.5			40.9					
	3:00	5	55	105.1	6.6		49.5	8.6		79.2	103.2	
12	3:00			98.1			40.4					
	3:05	5	60	104.8	6.7		49.2	8.8		80.4	105.6	

Average = 81 / 108 cm/hr