

THE RANCH PLAN PLANNED COMMUNITY  
PLANNING AREAS 3 AND 4 RUNOFF MANAGEMENT PLAN

**Michael Baker**  
INTERNATIONAL

**TECHNICAL APPENDIX N**

**NMU Geotechnical Report**

THE RANCH PLAN PLANNED COMMUNITY  
PLANNING AREAS 3 AND 4 RUNOFF MANAGEMENT PLAN

**Michael Baker**  
INTERNATIONAL

**TECHNICAL APPENDIX N.1**

**NMU Geotechnical Report – August 6, 2014**



23241 Arroyo Vista  
Rancho Santa Margarita  
CA 92688

voice: 949.888.6513  
fax: 949.888.1380  
web: www.gmugeo.com

August 6, 2014

Mr. Jim Yates  
**RMV COMMUNITY DEVELOPMENT, LLC**  
P.O. Box 9  
San Juan Capistrano, CA 92693

GMU Project No. 14-001-00

Subject: Screening-Level Infiltration Testing Pertaining to Possible PA-3  
Infiltration Basin Locations, Planning Area 3, Rancho Mission Viejo

Dear Mr. Yates:

This report provides the results of preliminary infiltration testing for possible infiltration basin sites located along the southern and western project limits of the Rancho Mission Viejo Planning Area -3.

## **INFILTRATION TESTING**

GMU conducted nine infiltration tests on 7/8/14 through 7/10/14 (Plate1- Infiltration Testing Locations). The screening-level infiltration testing was generally conducted using the open pit falling head procedure for establishing infiltration rate in accordance with the Technical Guidance Document (TGD). The infiltration tests were conducted at depths approximately 4.5 feet to 7 feet below existing ground. The soils at the tested locations varied from silts, clays, and sands, with the sandiest soils existing along the southwestern edge of the PA-3 project limits, and siltier soils along the western and southeastern edge of the PA-3 project limits. The Logs of Test Pits are included in Appendix A of this report.

## **TEST RESULTS**

Infiltration test data is included in Appendix B of this report for TP-1 through TP-9. A minimum of three trials were conducted at each location and the average infiltration rate over the last trial was used to calculate the unadjusted (pre-factor of safety) infiltration rate. The table below summarizes the average infiltration rate for the last trial at each test location.

Mr. Jim Yates, **RMV COMMUNITY DEVELOPMENT, LLC**  
*Screening-Level Infiltration Testing for Possible PA-3 Infiltration Basin Locations*

<b>Location</b>	<b>Avg. Infiltration Rate for Last Trial (in/hr)</b>
TP-1	1.9
TP-2	4.8
TP-3	Infiltration too quick to run test, flow rate from hose at 20gal/min
TP-4	19.2
TP-5	8.2
TP-6	5.1
TP-7	4.0
TP-8	4.9
TP-9	No Infiltration

Appropriate safety factors should be applied to these unadjusted rates, especially since this is only considered screening-level testing and may not represent actual conditions at future basin locations/elevations. Additional design-level testing will be needed at a later date when the actual basin locations and elevations are known.

Please do not hesitate to call if you have any questions regarding this information.

Respectfully submitted,

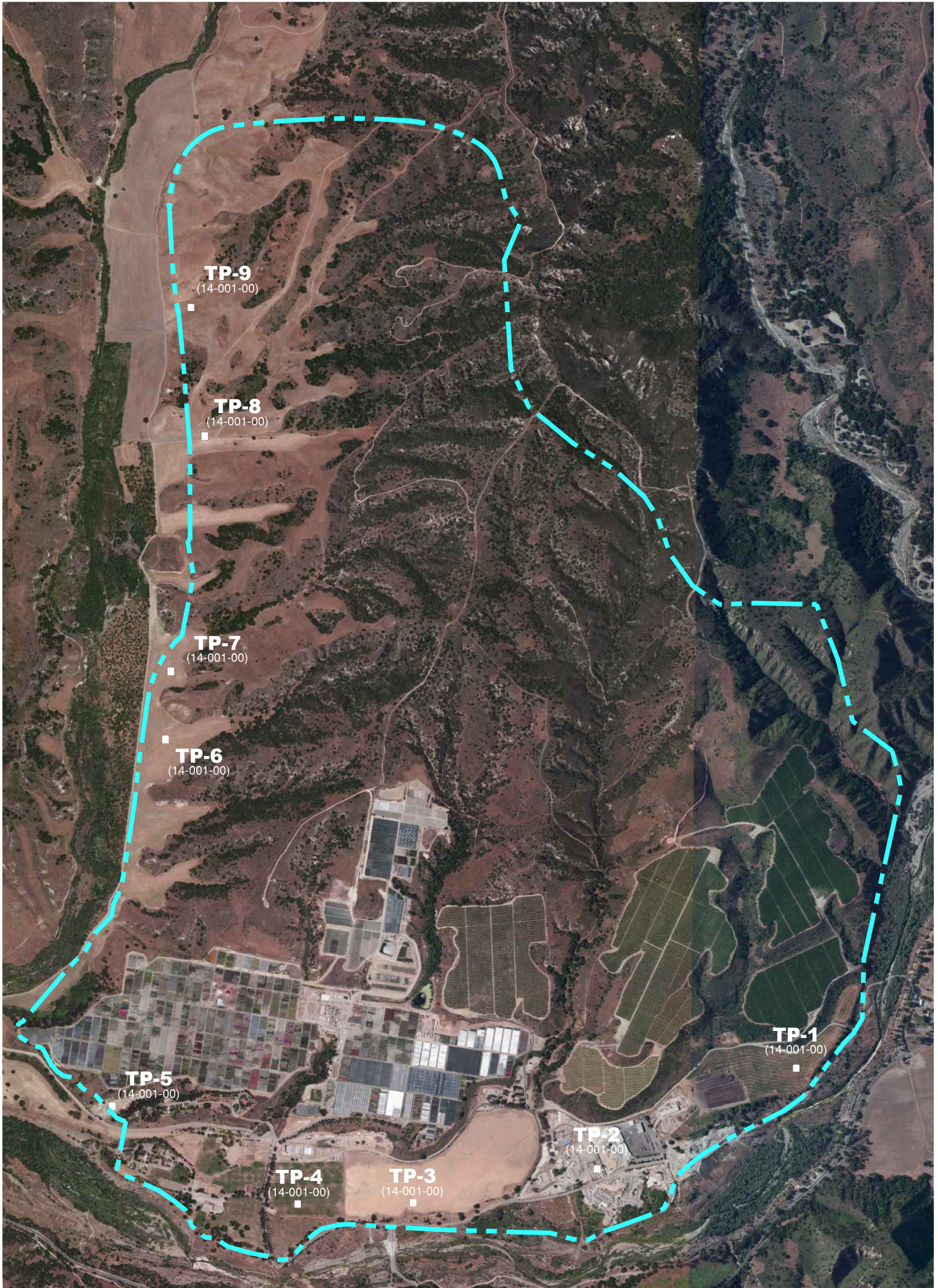
**GMU GEOTECHNICAL, INC.**



Aron Taylor, M.S., PG, CEG 2455  
Vice President, Principal Engineering Geologist

cc: RBF Consulting (1 PDF copy)  
Attn: Mr. Daniel Apt

/14-001-00 (8-6-14)\_ Infiltration



## Infiltration Test Location Map



Date: August 1, 2014

Project No.: 14-001-00

Plate  
1

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# APPENDIX A

## Geotechnical Exploration Procedures and Logs

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## APPENDIX A-1

### GMU GEOTECHNICAL EXPLORATION PROCEDURES AND LOGS

Our exploration at the subject site consisted of nine test pits. The estimated locations of the explorations are shown on Plate (1) – Infiltration Testing Locations. Our drill holes were logged by a Certified Engineering Geologist and the logs of each test pit are contained in this Appendix A, and the Legend to Logs is presented as Plate A-1 and A-2.

The geologic and engineering field descriptions and classifications that appear on these logs are prepared according to Corps of Engineers and Bureau of Reclamation standards. Major soil classifications are prepared according to the Unified Soil Classification System as modified by ASTM Standard No. 2487. Since the descriptions and classifications that appear on the Log of Test Pits are intended to be that which most accurately describe a given interval of a test pit (frequently an interval of several feet), discrepancies do occur in the Unified Soil Classification System nomenclature between that interval and a particular sample in that interval. For example, an 8-foot-thick interval in a log may be identified as silty sand (SM) while one sample taken within the interval may have individually been identified as sandy silt (ML). This discrepancy is frequently allowed to remain to emphasize the occurrence of local textural variations in the interval.

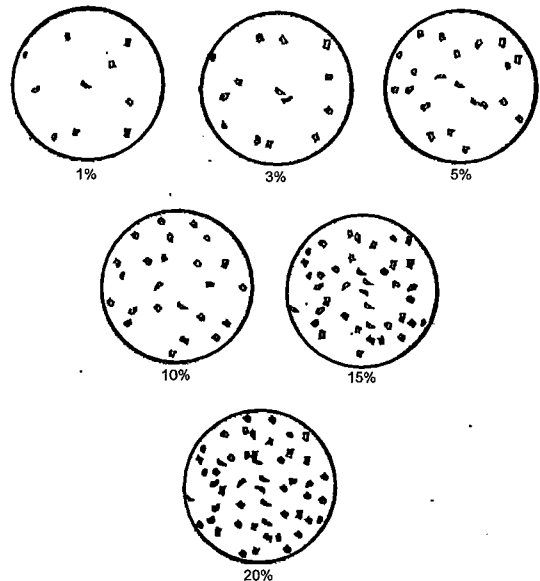
MAJOR DIVISIONS		Group Letter	Symbol	TYPICAL NAMES
<b>COARSE-GRAINED SOILS</b> More Than 50% Retained On No.200 Sieve  Based on The Material Passing The 3-Inch (75mm) Sieve.  Reference: ASTM Standard D2487	<b>GRAVELS</b> 50% or More of Coarse Fraction Retained on No.4 Sieve	Clean Gravels	GW	Well Graded Gravels and Gravel-Sand Mixtures, Little or No Fines.
			GP	Poorly Graded Gravels and Gravel-Sand Mixtures Little or No Fines.
		Gravels With Fines	GM	Silty Gravels, Gravel-Sand-Silt Mixtures.
			GC	Clayey Gravels, Gravel-Sand-Clay Mixtures.
	<b>SANDS</b> More Than 50% of Coarse Fraction Passes No.4 Sieve	Clean Sands	SW	Well Graded Sands and Gravelly Sands, Little or No Fines.
			SP	Poorly Graded Sands and Gravelly Sands, Little or No Fines.
		Sands With Fines	SM	Silty Sands, Sand-Silt Mixtures.
			SC	Clayey Sands, Sand-Clay Mixtures.
<b>FINE-GRAINED SOILS</b> 50% or More Passes The No.200 Sieve  Based on The Material Passing The 3-Inch (75mm) Sieve.  Reference: ASTM Standard D2487	<b>SILTS AND CLAYS</b> Liquid Limit Less Than 50%	ML	Inorganic Silts, 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	
	<b>SILTS AND CLAYS</b> Liquid Limit 50% or Greater	MH	Inorganic Silts, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silts.	
		CH	Inorganic Clays of High Plasticity, Fat Clays.	
		OH	Organic Clays of Medium To High Plasticity, Organic Silts.	
<b>HIGHLY ORGANIC SOILS</b>		PT	Peat and Other Highly Organic Soils.	

The descriptive terminology of the logs is modified from current ASTM Standards to suit the purposes of this study

ADDITIONAL TESTS
DS = Direct Shear
HY = Hydrometer Test
TC = Triaxial Compression Test
UC = Unconfined Compression
CN = Consolidation Test
(T) = Time Rate
EX = Expansion Test
CP = Compaction Test
PS = Particle Size Distribution
EI = Expansion Index
SE = Sand Equivalent Test
AL = Atterberg Limits
FC = Chemical Tests
RV = Resistance Value
SG = Specific Gravity
SU = Sulfates
CH = Chlorides
MR = Minimum Resistivity
pH
(N) = Natural Undisturbed Sample
(R) = Remolded Sample
CS = Collapse Test/Swell-Settlement

GEOLOGIC NOMENCLATURE
B = Bedding C = Contact J = Joint
F = Fracture Flt = Fault S = Shear
RS = Rupture Surface O = Seepage
▽ = Groundwater

SAMPLE SYMBOLS
Undisturbed Sample (California Sample)
Undisturbed Sample (Shelby Tube)
Bulk Sample
Unsuccessful Sampling Attempt
SPT Sample
10: 10 Blows for 12-Inches Penetration
6/4: 6 Blows Per 4-Inches Penetration
P: Push
(13): Uncorrected Blow Counts ("N" Values) for 12-Inches Penetration- Standard Penetration Test (SPT)



**LEGEND TO LOGS**  
 ASTM Designation: D 2487  
 (Based on Unified Soil Classification System)

Plate  
**A-1**



SOIL DENSITY/CONSISTENCY			
FINE GRAINED			
Consistency	Field Test	SPT (#blows/foot)	Mod (#blows/foot)
Very Soft	Easily penetrated by thumb, exudes between fingers	<2	<3
Soft	Easily penetrated one inch by thumb, molded by fingers	2-4	3-6
Firm	Penetrated over 1/2 inch by thumb with moderate effort	4-8	6-12
Stiff	Penetrated about 1/2 inch by thumb with great effort	8-15	12-25
Very Stiff	Readily indented by thumbnail	15-30	25-50
Hard	Indented with difficulty by thumbnail	>30	>50
COARSE GRAINED			
Density	Field Test	SPT (#blows/foot)	Mod (#blows/foot)
Very Loose	Easily penetrated with 0.5" rod pushed by hand	<4	<5
Loose	Easily penetrated with 0.5" rod pushed by hand	4-10	5-12
Medium Dense	Easily penetrated 1' with 0.5" rod driven by 5lb hammer	10-30	12-35
Dense	Difficult to penetrat 1' with 0.5" rod driven by 5lb hammer	31-50	35-60
Very Dense	Penetrated few inches with 0.5" rod driven by 5lb hammer	>50	>60

BEDROCK HARDNESS		
Density	Field Test	SPT (#blows/foot)
Soft	Can be crushed by hand, soil like and structureless	1-30
Moderately Hard	Can be grooved with fingernails, crumbles with hammer	30-50
Hard	Can't break by hand, can be grooved with knife	50-100
Very Hard	Scratches with knife, chips with hammer blows	>100

MODIFIERS	
Trace	1%
Few	1-5%
Some	5-12%
Numerous	12-20%
Abundant	>20%

GRAIN SIZE			
Description	Sieve Size	Grain Size	Approximate Size
Boulders	>12"	>12"	Larger than a basketball
Cobbles	3-12"	3-12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4-3"	Thumb-sized to fist-sized
	Fine	#4-3/4"	Pea-sized to thumb-sized
Sand	Coarse	#10-#4	Rock-salt-sized to pea-sized
	Medium	#40-#10	Sugar-sized to rock salt-sized
	Fine	#200-#40	Flour-sized to sugar-sized
Fines	passing #200	<0.0029"	Flour-sized and smaller

MOISTURE CONTENT	
Dry-	Very little or no moisture
Damp-	Some moisture but less than optimum
Moist-	Near optimum
Very Moist-	Above optimum
Wet/Saturated-	Contains free moisture



**LEGEND TO LOGS**  
 ASTM Designation: D 2487  
 (Based on Unified Soil Classification System)

Plate  
**A-2**

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-1

Sheet 1 of 1

Date(s) Excavated 7/7/2014	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor JES Engineering	Total Depth of Test Pit 5.5 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 335.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: 13 ft; Depth: 5.5 ft	
Remarks		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				ADDITIONAL TESTS
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	
2	<u>ARTIFICIAL FILL, UNDOCUMENTED (Qaf)</u>	SILTY SAND to SANDY SILT (SM to ML); light brown, dry to damp, fine to coarse grained sand, some trash	334	2	[Soil Symbol: Dotted pattern]					
		SILTY SAND to SANDY SILT (SM to ML); light reddish brown, damp to moist, medium dense, fine to medium grained sand with some coarse grained sand and subangular to subrounded gravel to cobbles up to 8 inches in diameter, minor amounts of trash and asphalt pieces	332							
4	<u>TERRACE DEPOSITS (Qt)</u>	SILTY SAND (SM); reddish brown, damp, fine to medium grained sand with some coarse grained sand, numerous subrounded gravel and cobbles up to 10 inches in diameter and rare boulders up to 18 inches in diameter	330							

TP\_REV1 14-001-00.GPJ GM&J.GDT 8/1/14

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-2

Sheet 1 of 1

Date(s) Excavated 7/7/2014	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor JES Engineering	Total Depth of Test Pit 7.0 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 310.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: 8 ft; Depth: 7 ft	
Remarks		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				ADDITIONAL TESTS
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	
	<u>ARTIFICIAL FILL, UNDOCUMENTED (Qaf)</u>	3/4 inch crushed gravel parking lot base								
		SILTY GRAVEL with SAND (GM); reddish brown, damp, medium dense/soft, abundant subangular to subrounded gravel and cobbles up to 8 inches in diameter								
2	<u>TERRACE DEPOSITS (Qt)</u>	SILTY SAND to SANDY SILT (SM to ML); light brown, damp to moist, medium dense, abundant gravel and some cobbles up to 6 inches in diameter, rare boulders up to 18 inches in diameter	308	2						
4			306	4						
6			304	6						

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

**Log of Test Pit TP-3**  
 Sheet 1 of 1

Date(s) Excavated: 7/7/2014	Logged By: KMF	Checked By:
Excavation Equipment: Backhoe	Excavation Contractor: JES Engineering	Total Depth of Test Pit: 6.0 feet
Sampling Method(s):	Approx. Surface Elevation, ft MSL: 298.0	
Groundwater Depth [Elevation], feet:	Test Pit Dimensions: Width: 2 ft; Length: 10.5 ft; Depth: 6 ft	
Remarks:		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
2	<u>ARTIFICIAL FILL, UNDOCUMENTED (Qaf)</u>	SILTY SAND (SM); light gray brown, dry to damp, loose, fine to medium grained sand	296	2	[Symbol: Dotted pattern]						
4	<u>TERRACE DEPOSITS (Qt)</u>	SILT (ML); gray and orange, dry, soft	294	4	[Symbol: Vertical lines]						
6		SAND to SILTY SAND (SP to SM); light gray brown, dry to damp, loose, fine to medium grained sand with some coarse grained sand, slight caving	292	6	[Symbol: Dotted pattern]						

TP\_REV1 14-001-00.GPJ GM&J.GDT 8/1/14



Project: **RMV Planning Area 3**  
 Project Location: **Rancho Mission Viejo, Ca.**  
 Project Number: **14-001-00**

**Log of Test Pit TP-4**  
 Sheet 1 of 1

Date(s) Excavated: <b>7/7/2014</b>	Logged By: <b>KMF</b>	Checked By:
Excavation Equipment: <b>Backhoe</b>	Excavation Contractor: <b>JES Engineering</b>	Total Depth of Test Pit: <b>6.5 feet</b>
Sampling Method(s):	Approx. Surface Elevation, ft MSL: <b>294.0</b>	
Groundwater Depth [Elevation], feet:	Test Pit Dimensions: <b>Width: 2 ft; Length: 10 ft; Depth: 6.5 ft</b>	
Remarks:		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
	<u>ARTIFICIAL FILL/DISTURBED SOIL (Qaf)</u>	SANDY SILT (ML); light gray brown, dry to damp, firm, fine to medium grained sand									
	<u>TERRACE DEPOSITS (Qt)</u>	SANDY SILT to SILTY SAND (ML to SM); light brown with some orange mottles, damp, firm/medium dense, fine grained sand									
2			292	2	[Soil Symbol]						
4		SAND to SILTY SAND (SP to SM); light brown gray with some orange staining, damp to moist, loose, fine to medium grained sand, slight caving	290	4	[Soil Symbol]						
6			288	6	[Soil Symbol]						

TP\_REV1 14-001-00.GPJ GM&J.GDT 8/1/14



Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-5B

Sheet 1 of 1

Date(s) Excavated 7/7/2014	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor JES Engineering	Total Depth of Test Pit 7.0 feet
Sampling Method(s)		Approx. Surface Elevation, ft MSL 270.0
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: 9 ft; Depth: 7 ft	
Remarks		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
2	<u>TERRACE DEPOSITS (Qt)</u>	SANDY SILT to SILTY SAND (ML to SM); brown, dry to moist, medium dense, some subrounded cobbles up to 10 inches in diameter	268	2						
4			266	4						
6		SILTY SAND to SAND (SM to SP); brown, moist, loose, fine to medium grained sand	264	6						

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-6

Sheet 1 of 1

Date(s) Excavated 7/7/2014	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor JES Engineering	Total Depth of Test Pit 5.5 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 342.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: 8 ft; Depth: 5.5 ft	
Remarks		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
2	<u>SLOPE WASH (Qsw)</u>	SILTY SAND to SANDY SILT (SP to SM); light gray brown to light brown gray, dry to damp, loose to medium dense, fine to medium grained sand with some clay, becomes sandier with depth	340	2							
4			338	4							

TP\_REV1 14-001-00.GPJ GM&J.GDT 8/1/14

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

**Log of Test Pit TP-7**  
 Sheet 1 of 1

Date(s) Excavated: 7/7/2014	Logged By: KMF	Checked By:
Excavation Equipment: Backhoe	Excavation Contractor: JES Engineering	Total Depth of Test Pit: 6.0 feet
Sampling Method(s):	Approx. Surface Elevation, ft MSL: 356.0	
Groundwater Depth [Elevation], feet:	Test Pit Dimensions: Width: 2 ft; Length: 9.5 ft; Depth: 6 ft	
Remarks:		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				ADDITIONAL TESTS
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	
2	<u>SLOPE WASH (Qsw)</u>	SILTY SAND to SANDY SILT (SM to ML); light brown gray, damp, loose to medium dense, fine to medium grained sand, some clay	354	2	[Soil Symbol: Dotted pattern]					
4		moist	352	4						
6			350	6						

TP\_REV1 14-001-00.GPJ GM&U.GDT 8/1/14



Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-8

Sheet 1 of 1

Date(s) Excavated	7/7/2014	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	JES Engineering	Total Depth of Test Pit	5.0 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	385.0
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: 7 ft; Depth: 5 ft				
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
2	<u>SLOPE WASH (Qsw)</u>	SILTY SAND to SANDY SILT (SM to ML); light brown gray, damp to moist, fine to medium grained sand, some clay	384	2						
4			382	4						
			380							

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-9

Sheet 1 of 1

Date(s) Excavated	7/7/2014	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	JES Engineering	Total Depth of Test Pit	4.5 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	380.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: 7 ft; Depth: 4.5 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				ADDITIONAL TESTS
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	
2	<u>SLOPE WASH (Qsw)</u>	SANDY SILT with CLAY (ML); brown gray, damp to moist, firm to stiff, fine to medium grained sand	378	2						
4			376	4						

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# APPENDIX B

## Infiltration Test Results

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# INFILTRATION RATE - Open Pit Falling Head Procedure

Job Number 14-001-00

TP- dimensions Depth= 6 ft

IT- 1

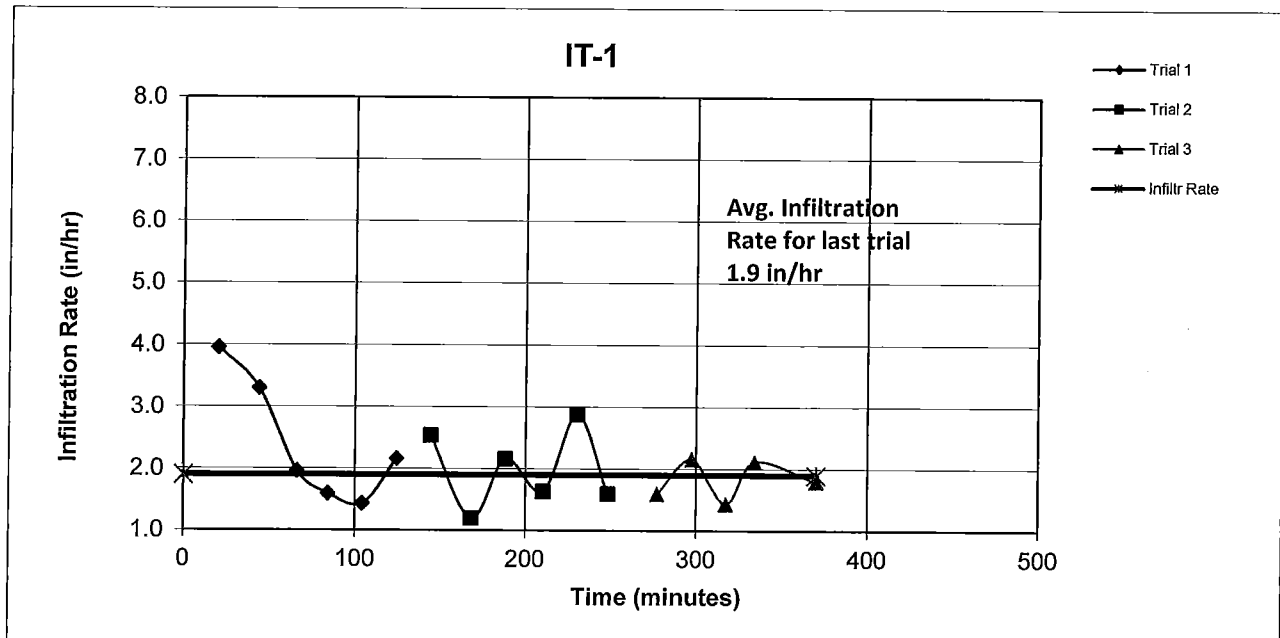
Width= 2.5

Test Date 7/8/2014

Length= 10

Elev 335

Test No.	Time (hour:min)	ΔT (min)	Cumulative Time (min)	Water Depth from ground surface (ft)	Height of Water column (ft)	ΔD (feet)	Infiltration Rate (in/hr)	Avg Infiltr Rate (in/hr)	% change in successive trials 10% criteria
Trial # 1	10:47			4.44	1.56			2.4	N/A
	11:07	20	20	4.55	1.45	0.11	4.0		
	11:31	24	44	4.66	1.34	0.11	3.3		
	11:53	22	66	4.72	1.28	0.06	2.0		
	12:11	18	84	4.76	1.24	0.04	1.6		
	12:31	20	104	4.80	1.20	0.04	1.4		
	12:51	20	124	4.86	1.14	0.06	2.2		
Trial # 2	12:54			4.38	1.62			2.0	20.0%
	13:11	17	144	4.44	1.56	0.06	2.5		
	13:35	24	168	4.48	1.52	0.04	1.2		
	13:55	20	188	4.54	1.46	0.06	2.2		
	14:17	22	210	4.59	1.41	0.05	1.6		
	14:37	20	230	4.67	1.33	0.08	2.9		
	14:55	18	248	4.71	1.29	0.04	1.6		
Trial # 3	14:57			4.39	1.61			1.9	6.6%
	15:24	27	277	4.45	1.55	0.06	1.6		
	15:44	20	297	4.51	1.49	0.06	2.2		
	16:04	20	317	4.55	1.45	0.04	1.4		
	16:21	17	334	4.60	1.40	0.05	2.1		
	16:57	36	370	4.69	1.31	0.09	1.8		



# INFILTRATION RATE - Open Pit Falling Head Procedure

Job Number 14-001-00

TP- dimensions

Depth= 7 ft

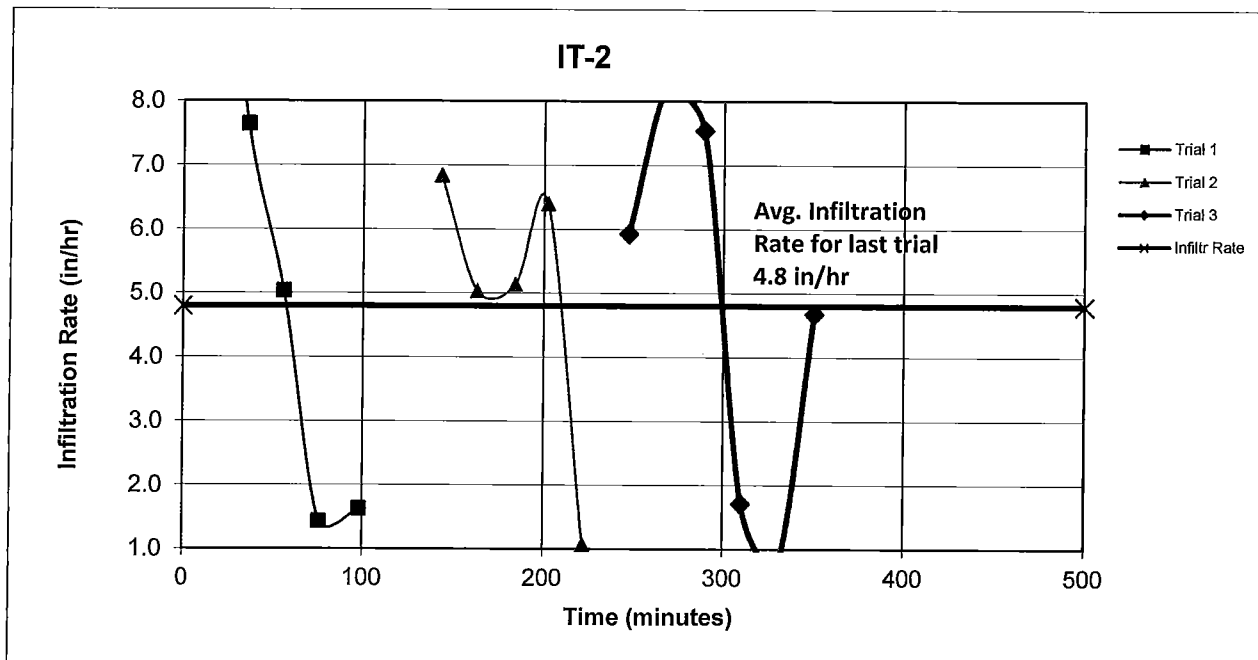
IT -2

Width= 2.25

Test Date 7/8/2014

Length= 8 Elev 310

Test No.	Time (hour:min)	ΔT (min)	Cumulative Time (min)	Water Depth from ground surface (ft)	Height of Water column (ft)	ΔD (feet)	Infiltration Rate (in/hr)	Avg Infiltr Rate (in/hr)	% change in successive trials 10% criteria
Trial # 1	11:24			5.90	1.10			5.5	
	11:44	20	20	6.23	0.77	0.33	11.9		
	12:00	16	36	6.40	0.60	0.17	7.6		
	12:20	20	56	6.54	0.46	0.14	5.0		
	12:40	20	76	6.58	0.42	0.04	1.4		
	13:02	22	98	6.63	0.37	0.05	1.6		
Trial # 2	13:27:00		123.0	5.87	1.13			4.9	12.8%
	13:47:00	20	143.0	6.06	0.94	0.19	6.8		
	14:07:00	20	163.0	6.20	0.80	0.14	5.0		
	14:28:00	21	184.0	6.35	0.65	0.15	5.1		
	14:46:00	18	202.0	6.51	0.49	0.16	6.4		
	15:06:00	20	222.0	6.54	0.46	0.03	1.1		
Trial # 3	15:14:00		230.0	5.90	1.10			4.8	1.5%
	15:31:00	17	247.0	6.04	0.96	0.14	5.9		
	15:52:00	21	268.0	6.28	0.72	0.24	8.2		
	16:13:00	21	289.0	6.50	0.50	0.22	7.5		
	16:34:00	21	310.0	6.55	0.45	0.05	1.7		
	16:54:00	20	330.0	6.57	0.43	0.02	0.7		
	17:14:00	20	350.0	6.70	0.30	0.13	4.7		



**INFILTRATION RATE - Open Pit Falling Head Procedure**

**Job Number** 14-001-00

**TP- dimensions** Depth= 6 ft

IT -3

Width= 2

**Test Date** 7/8/2014

Length= 9.5 Elev 244.0

Test No.	Time (hour:min)	$\Delta T$ (min)	Cumulative Time (min)	Water Depth from ground surface (ft)	Height of Water column (ft)	$\Delta D$ (feet)	Infiltration Rate (in/hr)	Avg Infiltration Rate (in/hr)	% change in successive trials 10% criteria
Trial # 1	Infiltration too quick to run test. Flow rate from hose at 10 gal/ 30 sec.								
	Attempted to fill test pit, filled for twenty minutes, achieved only 4" of water which quickly infiltrated.								
								#DIV/0!	

**INFILTRATION RATE - Open Pit Falling Head Procedure**

Job Number 14-001-00

TP- dimensions Depth= 10.5 ft

IT -4

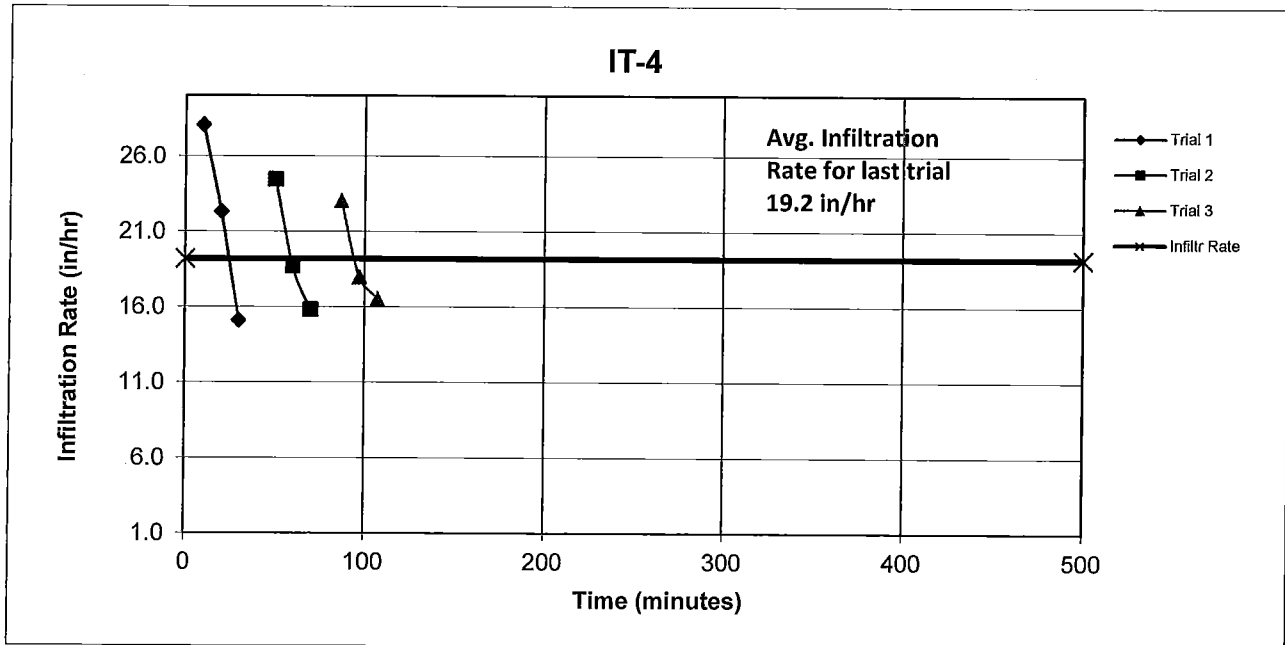
Width= 2 ft

Test Date 02/12/14-02/13/14

Length= 4 ft

Elev 294

Test No.	Time (hour:min)	ΔT (min)	Cumulative Time (min)	Water Depth from ground surface (ft)	Height of Water column (ft)	ΔD (feet)	Infiltration Rate (in/hr)	Avg Infiltration Rate (in/hr)	% change in successive trials 10% criteria
Trial # 1	8:04			5.05	5.45			21.8	N/A
	8:14	10	10	5.44	5.06	0.39	28.1		
	8:24	10	20	5.75	4.75	0.31	22.3		
	8:34	10	30	5.96	4.54	0.21	15.1		
Trial # 2	8:44			5.02	5.48			19.7	11.0%
	8:54	10	50	5.36	5.14	0.34	24.5		
	9:04	10	60	5.62	4.88	0.26	18.7		
	9:14	10	70	5.84	4.66	0.22	15.8		
Trial # 3	9:21			5.01	5.49			19.2	2.5%
	9:31	10	87	5.33	5.17	0.32	23.0		
	9:41	10	97	5.58	4.92	0.25	18.0		
	9:51	10	107	5.81	4.69	0.23	16.6		



# INFILTRATION RATE - Open Pit Falling Head Procedure

Job Number 14-001-00

TP- dimensions Depth= 7 ft

TP -5

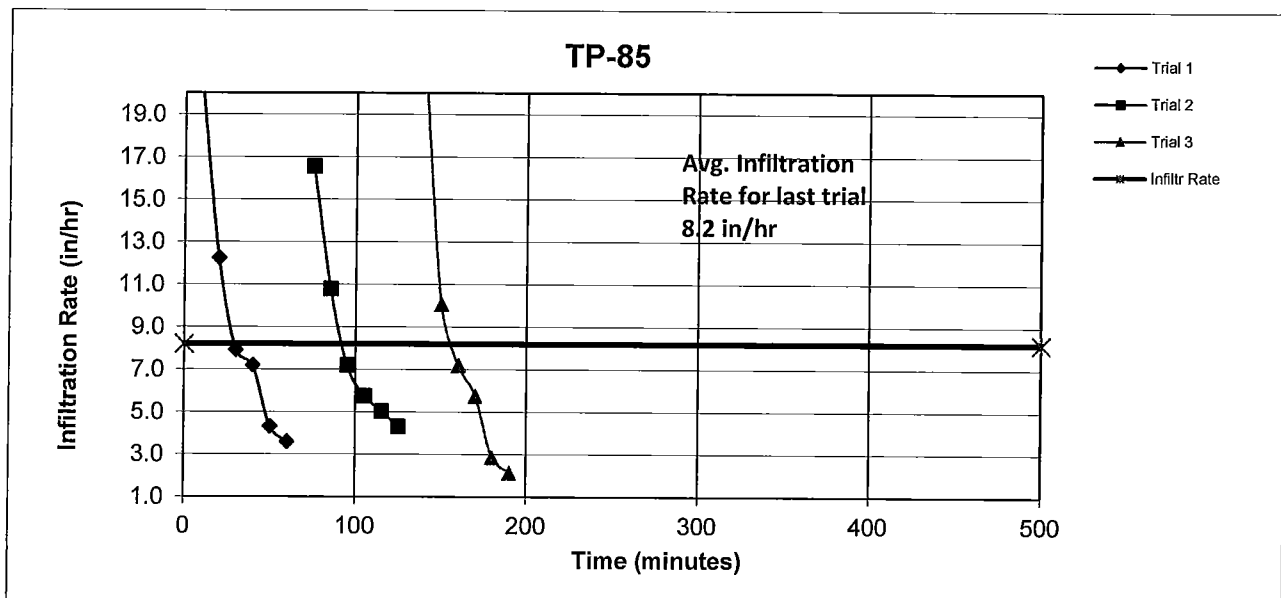
Width= 2.5

Test Date 7/10/2014

Length= 8

Elev 270

Test No.	Time (hour:min)	ΔT (min)	Cumulative Time (min)	Water Depth from ground surface (ft)	Height of Water column (ft)	ΔD (feet)	Infiltration Rate (in/hr)	Avg Infiltr Rate (in/hr)	% change in successive trials 10% criteria
Trial # 1	7:20			6.15	0.85			9.2	N/A
	7:30	10	10	6.43	0.57	0.28	20.2		
	7:40	10	20	6.60	0.40	0.17	12.2		
	7:50	10	30	6.71	0.29	0.11	7.9		
	8:00	10	40	6.81	0.19	0.10	7.2		
	8:10	10	50	6.87	0.13	0.06	4.3		
	8:20	10	60	6.92	0.08	0.05	3.6		
Trial # 2	8:25			6.15	0.85			8.3	11.6%
	8:35	10	75	6.38	0.62	0.23	16.6		
	8:45	10	85	6.53	0.47	0.15	10.8		
	8:55	10	95	6.63	0.37	0.10	7.2		
	9:05	10	105	6.71	0.29	0.08	5.8		
	9:15	10	115	6.78	0.22	0.07	5.0		
	9:25	10	125	6.84	0.16	0.06	4.3		
Trial # 3	9:30			6.17	0.83			8.2	1.5%
	9:40	10	140	6.46	0.54	0.29	20.9		
	9:50	10	150	6.60	0.40	0.14	10.1		
	10:00	10	160	6.70	0.30	0.10	7.2		
	10:10	10	170	6.78	0.22	0.08	5.8		
	10:20	10	180	6.82	0.18	0.04	2.9		
	10:30	10	190	6.85	0.15	0.03	2.2		
Trial # 4									





**INFILTRATION RATE - Open Pit Falling Head Procedure**

Job Number 14-001-00

TP- dimensions Depth= 8 ft

TP -6

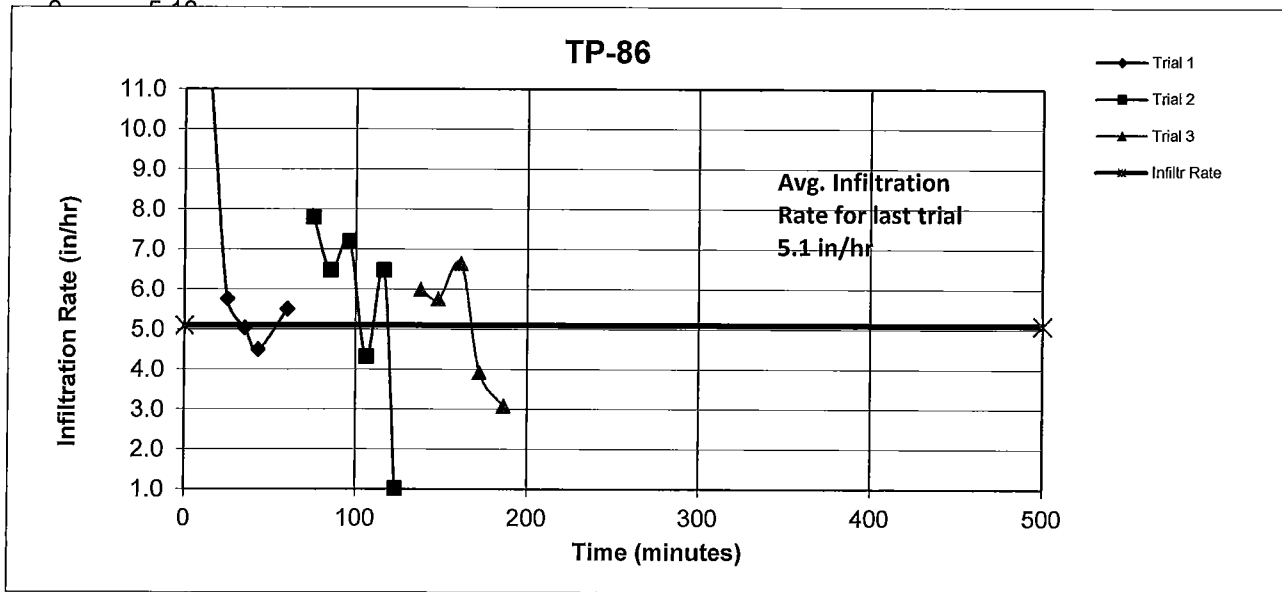
Width= 2

Test Date 7/9/2014

Length= 7

Elev 244

Test No.	Time (hour:min)	ΔT (min)	Cumulative Time (min)	Water Depth from ground surface (ft)	Height of Water column (ft)	ΔD (feet)	Infiltration Rate (in/hr)	Avg Infiltr Rate (in/hr)	% change in successive trials 10% criteria
Trial # 1	7:16			4.71	3.29			6.4	N/A
	7:31	15	15	4.94	3.06	0.23	11.0		
	7:41	10	25	5.02	2.98	0.08	5.8		
	7:51	10	35	5.09	2.91	0.07	5.0		
	7:59	8	43	5.14	2.86	0.05	4.5		
	8:16	17	60	5.27	2.73	0.13	5.5		
Trial # 2	8:19			4.69	3.31			5.6	14.7%
	8:31	12	75	4.82	3.18	0.13	7.8		
	8:41	10	85	4.91	3.09	0.09	6.5		
	8:52	11	96	5.02	2.98	0.11	7.2		
	9:02	10	106	5.08	2.92	0.06	4.3		
	9:12	10	116	5.17	2.83	0.09	6.5		
Trial # 3	9:19	7	123	5.18	2.82	0.01	1.0	5.1	9.2%
	9:22			4.69	3.31				
	9:34	12	138	4.79	3.21	0.10	6.0		
	9:44	10	148	4.87	3.13	0.08	5.8		
	9:57	13	161	4.99	3.01	0.12	6.6		
	10:08	11	172	5.05	2.95	0.06	3.9		
	10:22	14	186	5.11	2.89	0.06	3.1		



# INFILTRATION RATE - Open Pit Falling Head Procedure

Job Number 14-001-00

TP- dimensions Depth= 6 ft

TP -7

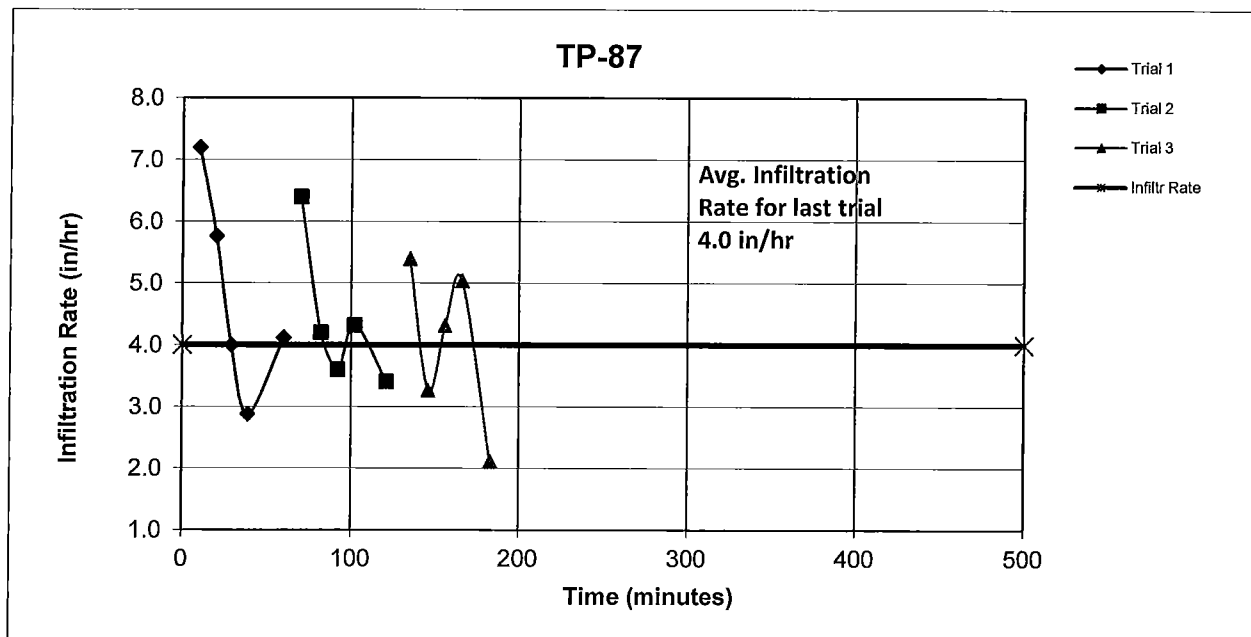
Width= 2

Test Date 7/9/2014

Length= 8.5

356

Test No.	Time (hour:min)	$\Delta T$ (min)	Cumulative Time (min)	Water Depth from ground surface (ft)	Height of Water column (ft)	$\Delta D$ (feet)	Infiltration Rate (in/hr)	Avg Infiltration Rate (in/hr)	% change in successive trials 10% criteria
Trial # 1	7:26			4.90	1.10			4.8	N/A
	7:36	10	10	5.00	1.00	0.10	7.2		
	7:46	10	20	5.08	0.92	0.08	5.8		
	7:55	9	29	5.13	0.87	0.05	4.0		
	8:05	10	39	5.17	0.83	0.04	2.9		
	8:26	21	60	5.29	0.71	0.12	4.1		
Trial # 2	8:27			4.86	1.14			4.4	9.2%
	8:36	9	70	4.94	1.06	0.08	6.4		
	8:48	12	82	5.01	0.99	0.07	4.2		
	8:58	10	92	5.06	0.94	0.05	3.6		
	9:08	10	102	5.12	0.88	0.06	4.3		
	9:27	19	121	5.21	0.79	0.09	3.4		
Trial # 3	9:29			4.87	1.13			4.0	8.8%
	9:41	12	135	4.96	1.04	0.09	5.4		
	9:52	11	146	5.01	0.99	0.05	3.3		
	10:02	10	156	5.07	0.93	0.06	4.3		
	10:12	10	166	5.14	0.86	0.07	5.0		
	10:29	17	183	5.19	0.81	0.05	2.1		



# INFILTRATION RATE - Open Pit Falling Head Procedure

Job Number 14-001-00

TP- dimensions

Depth= 5.58 ft

TP -8

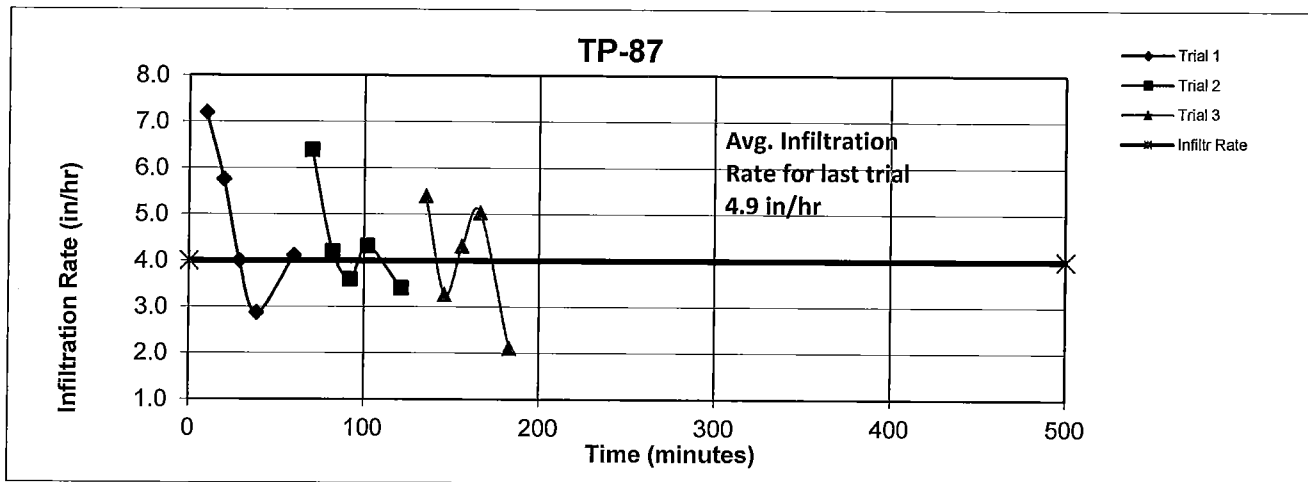
Width= 2

Test Date 7/9/2014

Length= 7

ele 385

Test No.	Time (hour:min)	ΔT (min)	Cumulative Time (min)	Water Depth from ground surface (ft)	Height of Water column (ft)	ΔD (feet)	Infiltration Rate (in/hr)	Avg Infiltr Rate (in/hr)	% change in successive trials
Trial # 1	11:11			4.31	1.27			7.0	N/A
	11:32	21	21	4.58	1.00	0.27	9.3		
	11:42	10	31	4.72	0.86	0.14	10.1		
	11:52	10	41	4.80	0.78	0.08	5.8		
	12:02	10	51	4.86	0.72	0.06	4.3		
	12:11	9	60	4.93	0.65	0.07	5.6		
Trial # 2	12:14			4.30	1.28			5.4	29.7%
	12:24	10	73	4.40	1.18	0.10	7.2		
	12:34	10	83	4.49	1.09	0.09	6.5		
	12:44	10	93	4.56	1.02	0.07	5.0		
	12:54	10	103	4.62	0.96	0.06	4.3		
	13:04	10	113	4.70	0.88	0.08	5.8		
Trial # 3	13:14	10	123	4.75	0.83	0.05	3.6	4.9	9.8%
	13:31			4.34	1.24				
	13:41	10	150	4.41	1.17	0.07	5.0		
	13:51	10	160	4.49	1.09	0.08	5.8		
	14:01	10	170	4.57	1.01	0.08	5.8		
	14:11	10	180	4.61	0.97	0.04	2.9		
	14:21	10	190	4.69	0.89	0.08	5.8		
	14:31	10	200	4.75	0.83	0.06	4.3		



**INFILTRATION RATE - Open Pit Falling Head Procedure**

Job Number 14-001-00      TP- dimensions      Depth= 6      ft  
 IT 9      Width= 2  
 Test Date 7/9/2014      Length= 7.5      Elev 380

Test No.	Time (hour:min)	$\Delta T$ (min)	Cumulative Time (min)	Water Depth from ground surface (ft)	Height of Water column (ft)	$\Delta D$ (feet)	Infiltration Rate (in/hr)	Avg Infiltration Rate (in/hr)	% change in successive
Trial # 1	Infiltration too slow to run test.								
	Fell 1/3 inch in 115 minutes								
								#DIV/0!	

THE RANCH PLAN PLANNED COMMUNITY  
PLANNING AREAS 3 AND 4 RUNOFF MANAGEMENT PLAN

**Michael Baker**  
INTERNATIONAL

**TECHNICAL APPENDIX N.2**

**NMU Geotechnical Report – September 14, 2017**

September 14, 2017

Mr. Jim Yates  
**RANCHO MISSION VIEJO**  
P.O. Box 9  
San Juan Capistrano, CA 92693

GMU Project No. 14-001-00

**Subject:** Subsurface Investigation and Screening-Level Infiltration Testing  
Pertaining to Possible PA-3 Infiltration Basin Locations, Planning Area 3,  
Rancho Mission Viejo

**References:** 1) Our “Screening-Level Infiltration Testing Pertaining to Possible PA-3  
Infiltration Basin Locations, Planning Area 3, Rancho Mission Viejo” dated  
August 6, 2014 (Proj. No. 14-001-00)

2) Our “Report of Geotechnical Investigation for Proposed Greenstone Rock  
Crushing Recycling Facility, County of Orange, California” dated January 7,  
2011 (Proj. No. 10-153-00)

Dear Mr. Yates:

This report provides the results of our limited subsurface investigation and preliminary infiltration testing for possible infiltration basin sites located along the southern limits of Planning Area 3 in Rancho Mission Viejo.

## **SUBSURFACE INVESTIGATION**

A subsurface investigation was performed in August 2017 in order to observe subsurface conditions near possible infiltration basin sites. The investigation consisted of excavating 17 test pits with a backhoe to a maximum depth of 15.5 feet. The soils at the investigation locations generally consisted of terrace deposits composed primarily of silty sands with lesser sands, clayey sands, and gravelly sands. Sandy silts and clays were also encountered in localized areas.

Infiltration testing was performed within ten of the test pits as discussed below. The location of the test pits are shown on Plate 1- Investigation Location Map and Plate 2- Geological Map. Logs of Test Pits are included in the appendix of this report.

## **INFILTRATION TESTING**

GMU conducted ten infiltration tests on 8/15/2017 through 8/18/2017. The screening-level infiltration testing was generally conducted using the open pit falling head procedure for establishing infiltration rate in accordance with the County of Orange Technical Guidance Document (TGD). The infiltration tests were conducted at depths approximately 3.5 feet to 6 feet below existing ground. After pre-saturating the subsurface soils, a minimum of three trials were conducted at each location and the average infiltration rate over the last trial was used to calculate the unadjusted (pre-factor of safety) infiltration rate.

The table below summarizes the average infiltration rate for the last trial at each test location.

<b>Location</b>	<b>Avg. Infiltration Rate for Last Trial (in/hr)</b>
TP-12	1.32
TP-13	8.28
TP-14	9.6
TP-16	1.8
TP-17	3.1
TP-19	0.36
TP-21	12 (caving)
TP-22	4.8
TP-23	1.2
TP-26	0.24

Appropriate safety factors should be applied to these unadjusted rates, especially since this is only considered screening-level testing and may not represent actual conditions at future basin locations/elevations. Additional design-level testing will be needed at a later date when the actual basin locations and elevations are known.

**PREVIOUS INFILTRATION TESTING**

Previous infiltration testing was performed within the subject site as screening-level testing for possible PA3 infiltration basin locations as well as for the existing Greenstone Facility. The previous infiltration tests are discussed in our reference (1) and (2) reports, and the location of the test pits are shown on Plate 1- Investigation Location Map and Plate 2- Geological Map. Logs of Test Pits for previously performed infiltration testing for the proposed PA3 are included in the appendix of this report.

The table below summarizes the average infiltration rate for the last trial at each previous test location within the proposed PA3 development (GMU Project No. 10-153-00).

<b>Location</b>	<b>Avg. Infiltration Rate for Last Trial (in/hr)</b>
TP-1	1.9
TP-2	4.8
TP-3	Infiltration too quick to run test, flow rate from hose at 20gal/min
TP-4	19.2
TP-5	8.2
TP-6	5.1
TP-7	4.0
TP-8	4.9
TP-9	No Infiltration

The table below summarizes the average infiltration rate for the last trial at each previous test location within the Greenstone Facility (GMU Project No. 10-153-00).

<b>Location</b>	<b>Avg. Infiltration Rate for Last Trial (in/hr)</b>
TP-1	>30 in/hr
TP-2	25.7
TP-3	27.0



Mr. Jim Yates, **RANCHO MISSION VIEJO**  
*Subsurface Investigation & Screening-Level Infiltration Testing for Possible PA-3 Infiltration Basin Locations*

Please do not hesitate to call if you have any questions regarding this information. Should you have any questions, please do not hesitate to contact our office.

Respectfully submitted,

**GMU GEOTECHNICAL, INC.**



Aron Taylor, M.S., PG, CEG 2455  
Principal Engineering Geologist

Attachments:

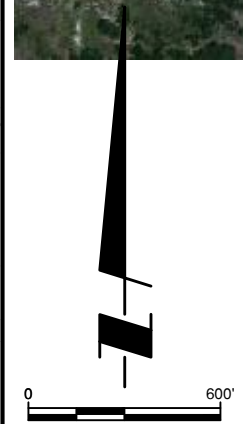
Appendix: Geotechnical Exploration Procedures and Logs  
Plate 1: Investigation Location Map  
Plate 2: Geological Map

cc: Michael Baker International (1 PDF copy)  
Attn: Ms. Rebecca Kinney

Hunsaker & Associates (1 PDF copy)  
Attn: Mr. Joe Wightman

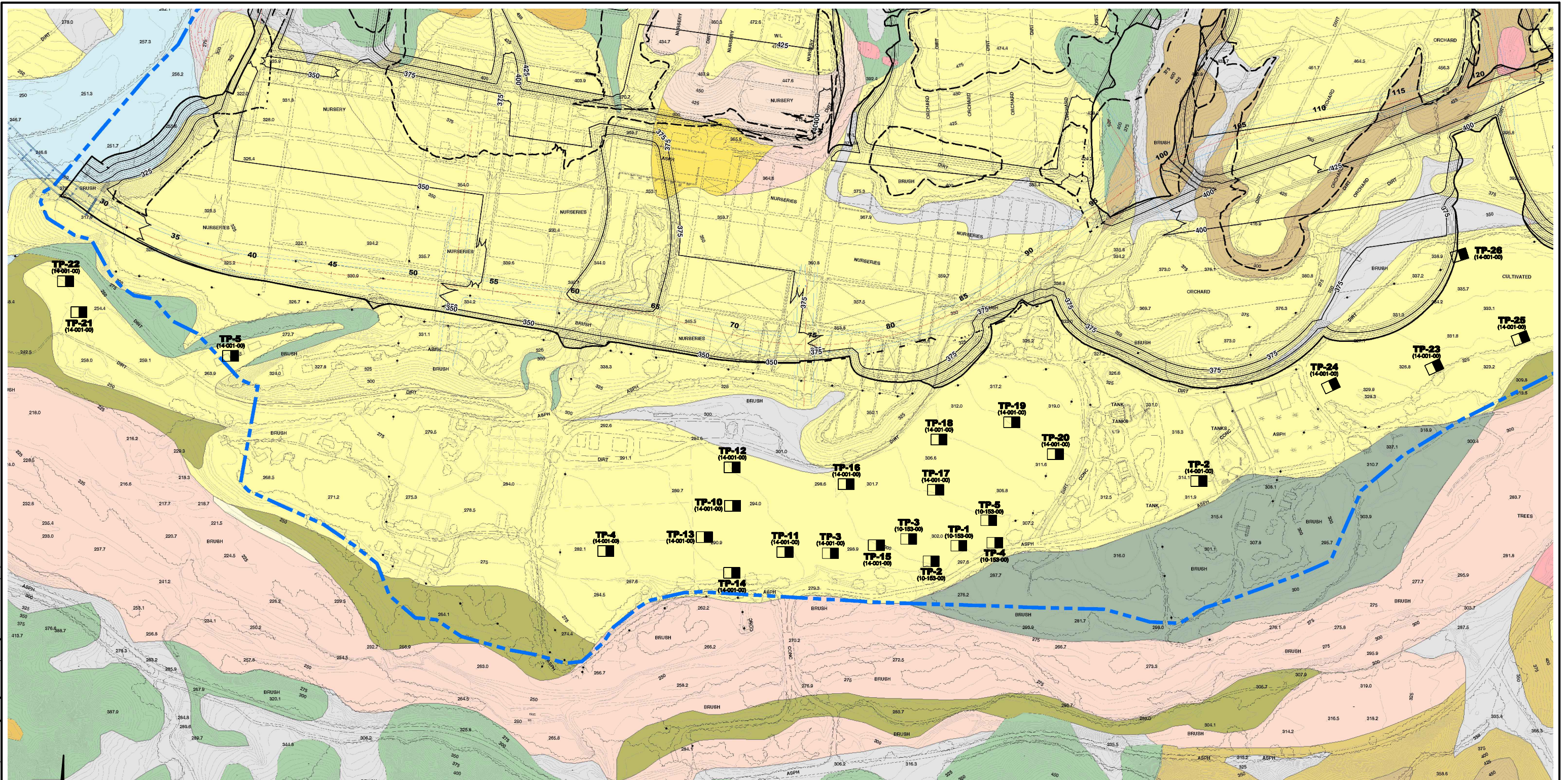
/14-001-00 (9-8-17)\_ Infiltration

DRAWING: q:\2014\14-001-00\dwg\1400100\_plate 1\_investigation location map.dwg PLOTTED: 1/4/2018 5:32 PM BY: Jmeza



<b>Investigation Location Map</b>		
	Date: September 14, 2017	Plate 1
	Project No.: 14-001-00	1

DRAWING: q:\2014\14-001-00\dwg\1400100\_plate 2\_geological map.dwg PLOTTED: 1/4/2018 5:48 PM BY: Jmeza

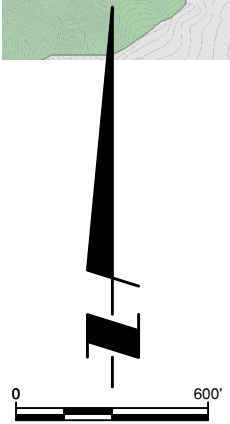


**Legend**

- West Basins
- Planning Area Boundary
- Fault
- Qafu
- Qal
- Qal1 Alluvium
- Qal2 Alluvium

- Qoa1 Older Alluvium
- Qsw Slope Wash
- Qsw/Qc Slope Wash over Colluvium
- Qt Terrace Deposits
- Qtr Terrace Deposits

- Qtr1 Terrace Deposits
- Qtr2 Terrace Deposits
- Qtr3 Terrace Deposits
- Qtr4 Terrace Deposits
- Tsi Silverado Formation
- Tsa Santiago Formation



**Geological Map**

	Date: September 14, 2017	Plate 2
	Project No.: 14-001-00	

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# APPENDIX

## Geotechnical Exploration Procedures and Logs

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## APPENDIX

### GMU GEOTECHNICAL EXPLORATION PROCEDURES AND LOGS

Our exploration at the subject site consisted of 17 test pits. The estimated locations of the explorations are shown on Plate (1) – Subsurface Investigation Location Map. Our test pits were logged by a Certified Engineering Geologist. The logs of each test pit are contained in this Appendix, and the Legend to Logs is presented as Plate A-1 and A-2.

The geologic and engineering field descriptions and classifications that appear on these logs are prepared according to Corps of Engineers and Bureau of Reclamation standards. Major soil classifications are prepared according to the Unified Soil Classification System as modified by ASTM Standard No. 2487. Since the descriptions and classifications that appear on the Log of Test Pits are intended to be that which most accurately describe a given interval of a test pit (frequently an interval of several feet), discrepancies do occur in the Unified Soil Classification System nomenclature between that interval and a particular sample in that interval. For example, an 8-foot-thick interval in a log may be identified as silty sand (SM) while one sample taken within the interval may have individually been identified as sandy silt (ML). This discrepancy is frequently allowed to remain to emphasize the occurrence of local textural variations in the interval.

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-10

Sheet 1 of 2

Date(s) Excavated 8/11/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 11.0 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 294.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: ft; Depth: 11 ft	
Remarks		

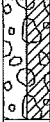
DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<u>TOPSOIL</u>	SILTY SAND (SM); brown, dry, medium dense, fine to coarse grained sand with few gravel and cobbles								
2	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SAND to SILTY SAND (SP to SM); brownish gray, damp, medium dense, fine to coarse grained sand, some subrounded to subangular gravel and cobbles up to 10 inches in diameter	292	2						
4			290	4						
6		lense of SILTY SAND (SM); brown, damp, medium dense, fine grained sand, some pores	288	6						
8		CLAYEY SAND (SC); reddish brown, damp, fine to medium grained sand	286	8						

TP REV1 14-001-00.GPJ GM&J.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

## Log of Test Pit TP-10

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	hard digging  practical refusal at 11 feet due to abundant cobbles	CLAYEY SAND with COBBLES (SC); reddish brown to brown, moist, dense, fine to coarse grained sand with abundant subangular to subrounded gravel and cobbles up to 10 inches in diameter								
		Total Depth 11' No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&J.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-11

Sheet 1 of 2

Date(s) Excavated	8/11/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	15.5 feet
Sampling Method(s)	Bulk	Approx. Surface Elevation, ft MSL			295.0
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: ft; Depth: 15.5 ft				
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0 - 2	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND (SM); brown, damp, medium dense, fine to coarse grained sand	294	2	[Soil Symbol]					
2 - 4	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND (SM); brownish gray, damp, medium dense, fine to medium grained sand	292	4	[Soil Symbol]					
4 - 6			290	6	[Soil Symbol]					
6 - 8			288	8	[Soil Symbol]					
8 - 10			286		[Soil Symbol]					

TP\_REV1 14-001-00.GPJ GM&J.GDT 9/8/17



Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-11

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0 - 12	subrounded to subangular gravel and cobble up to 12 inches in diameter with most about 5 inches in diameter or less	SAND to SILTY SAND (SP to SM); brownish gray, damp, fine to medium grained sand with some gravel and cobble	284	0 - 12	[Soil Symbol: Sand with gravel and cobble]					
12 - 14	less gravel, no cobbles	SAND (SP); brownish gray, damp, medium dense, fine to coarse grained sand with abundant gravel up to 1 inch in diameter  fine to medium grained sand, less gravel, no cobbles  some coarse grained sand, increase in fine gravel	282  14	12 - 14	[Soil Symbol: Sand with gravel]					
14 - 15.5		Total Depth 15.5 feet No Water Minor Caving at 15 feet	280	14 - 15.5						

TP\_REV1 14-001-00.GPJ GM&S.U.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-12

Sheet 1 of 1

Date(s) Excavated 8/14/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 4.5 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 295.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: ft; Depth: 4.5 ft	
Remarks Infiltration test conducted		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND (SM); brown, damp, medium dense, fine to medium grained sand								
	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND (SM); brown, damp, medium dense, fine to medium grained sand with some coarse grained sand	294							
-2				-2						
			292							
-4				-4						
		Total Depth 4.5 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&J.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-13

Sheet 1 of 1

Date(s) Excavated 8/14/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 4.5 feet
Sampling Method(s) Bulk	Approx. Surface Elevation, ft MSL 291.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: ft; Depth: 4.5 ft	
Remarks Infiltration test conducted		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<u>TOPSOIL/DISTURBED SOIL</u>	some trash and debris in upper 6 inches								
	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND (SM); brown, damp, medium dense, fine to medium grained sand with some coarse grained sand moist	290	2						
			288							
				4						

TP\_REV1 14-001-00.GPJ GM&J.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-14

Sheet 1 of 1

Date(s) Excavated 8/14/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 4.5 feet
Sampling Method(s)		Approx. Surface Elevation, ft MSL 290.0
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: ft; Depth: 4.5 ft	
Remarks Infiltration test conducted		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>ARTIFICIAL FILL (Qaf)</b>	SILTY SAND (SM); brown, dry to damp, abundant trash and debris								
2	<b>RECENT TERRACE DEPOSITS (Qtr)</b>	SAND (SW); gray brown to orange brown, damp, medium dense, fine to coarse grained sand, some rootlets, some lenses of fine grained silty sand	288	2						
4			286	4						
		Total Depth 4.5 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ SM&U.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-15

Sheet 1 of 2

Date(s) Excavated	8/14/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	13.5 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	300.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: ft; Depth: 13.5 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0 - 2	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND (SM); brown, dry to damp, medium dense, fine to medium grained sand with some coarse grained sand								
2 - 4	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND to SAND (SM to SP); orangish brown, damp, loose to medium dense, fine grained sand	298	2						
4 - 6		SILTY SAND (SM); gray brown and orange brown, damp, medium dense to dense, fine grained sand	296	4						
6 - 8		SAND (SP); gray brown, damp, medium dense, fine to medium grained sand	294	6						
8 - 13.5			292	8						

TP\_REV1 14-001-00.GPJ GM&J.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00


# Log of Test Pit TP-15

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
12		continues to be SAND (SP); gray brown, damp, medium dense, fine to medium grained sand	288	12						
		SAND (SP); brownish gray, moist, medium dense, fine grained sand with some medium grained sand								
		Total Depth 13.5 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&J.GDT 9/8/17

Date(s) Excavated	8/14/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	4.5 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	301.0
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: ft; Depth: 4.5 ft				
Remarks Infiltration test conducted					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
-2  -4	<u>ARTIFICIAL FILL(Qaf)</u>	SILTY SAND to CLAYEY SAND (SM to SC); brown, dry, medium dense, fine to medium grained sand with some coarse grained sand, some trash and debris	300  298	2  4						
		Total Depth 4.5 feet No Water No Caving								

TP\_REV1: 14-001-00.GPJ GM&U.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

**Log of Test Pit TP-17**  
 Sheet 1 of 1

Date(s) Excavated: <b>8/14/2017</b>	Logged By: <b>KMF</b>	Checked By:
Excavation Equipment: <b>Backhoe</b>	Excavation Contractor: <b>RMV</b>	Total Depth of Test Pit: <b>6.5 feet</b>
Sampling Method(s):		Approx. Surface Elevation, ft MSL: <b>305.0</b>
Groundwater Depth [Elevation], feet:	Test Pit Dimensions: <b>Width: 2 ft; Length: ft; Depth: 6.5 ft</b>	
Remarks: <b>Infiltration test conducted</b>		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>TOPSOIL/DISTURBED SOIL</b>	SILTY SAND (SM); brown, dry to damp, medium dense, fine to medium grained sand with some coarse grained sand and some clay	304		[Symbol]					
-2	<b>RECENT TERRACE DEPOSITS (Qtr)</b>	SILTY SAND (SM); orangey brown to brown, moist, medium dense contains some interbedded lenses of SAND (SP); gray, moist, medium dense	302	2	[Symbol]					
-4			300	4	[Symbol]					
-6				6	[Symbol]					
		Total Depth 6.5 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&J.GDT 9/8/17



Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-18

Sheet 1 of 2

Date(s) Excavated	8/14/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	12.5 feet
Sampling Method(s)	Bulk	Approx. Surface Elevation, ft MSL			309.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: ft; Depth: 12.5 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0 - 2	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND to CLAYEY SAND (SM to SC); brown, dry to damp, medium dense, rootlets and pores	308	2	[Hatched Pattern]					
2 - 4	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND (SM); brown, moist, medium dense, fine to medium grained sand with some coarse grained sand	306	4	[Dotted Pattern]					
4 - 6	caving	SAND (SP); brownish gray to grayish brown, damp to moist, fine to coarse grained sand	304	6	[Dotted Pattern]	[X]				
6 - 8			302	8						
8 - 10			300	10						

TP\_REV1 14-001-00.GPJ GM&J.CDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-18

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
12	refusal due to constant caving	continues to be SAND (SP); brownish gray to grayish brown, damp to moist, fine to coarse grained sand	298	12						
		Total Depth 12.5 feet No Water Heavy Caving at 5 feet								

TP\_REV1 14-001-00.GPJ GM&J.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-19

Sheet 1 of 1

Date(s) Excavated 8/14/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 7.0 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 315.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: ft; Depth: 7 ft	
Remarks Infiltration test conducted		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				ADDITIONAL TESTS
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	
	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND (SM); brown, dry to damp, fine to coarse grained sand, rootlets and pores	314							
2	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND (SM); brown, damp to moist, fine to coarse grained sand	312							
4			310							
6		CLAYEY SAND (SC); reddish brown, damp to moist, dense, fine to coarse grained sand, hard digging	308							
		Total Depth 7 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&J.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-20

Sheet 1 of 2

Date(s) Excavated	8/14/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	14.5 feet
Sampling Method(s)	Bulk			Approx. Surface Elevation, ft MSL	314.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: ft; Depth: 14.5 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND (SM); brown, dry to damp, medium dense, fine to coarse grained sand								
2	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND to SAND (SM to SP); light brown, damp, medium dense, fine to coarse grained sand	312	2						
4		laminated sands, reduction in fines	310	4						
6		SAND (SW); very light grayish brown, damp to moist, fine to coarse grained sand	308	6						
8	minor caving		306	8						

TP\_REV1 14-001-00.GPJ GM&U.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-20

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
12		SAND (SW); very light grayish brown, moist, fine to coarse grained sand	302	12						
14			300	14						
		Total Depth 14.5 feet No Water Slight Caving at 8 feet								

TP\_REV1 14-001-00.GPJ GM&J.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-21

Sheet 1 of 1

Date(s) Excavated 8/14/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 8.0 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 252.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: ft; Depth: 8 ft	
Remarks Infiltration test conducted		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND (SM); brown, dry to damp, medium dense, fine to medium grained sand								
	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND (SM); brown with some orange brown staining, damp to moist, medium dense, fine to medium grained sand								
2			250	2						
4	minor caving		248	4						
6		SAND (SP); gray brown to brown gray, moist, loose to medium dense, fine grained sand  some subrounded to subangular gravel, rare cobbles up to 5 inches in diameter	246	6						
8		Total Depth 8 feet No Water Slight Caving at 4 feet	244	8						

TP\_REV1 14-001-00.GPJ GM&L.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-22

Sheet 1 of 1

Date(s) Excavated	8/14/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	5.5 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	250.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: ft; Depth: 5.5 ft		
Remarks: Infiltration test conducted					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND (SM); brown, damp to moist, medium dense, fine grained sand, rootlets and pores								
2	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND to SAND (SM to SP); brown, damp to moist, medium dense, fine grained sand	248	2						
4	test pit bowing due to cobbles and boulders encountered during digging	SILTY SAND to SAND (SM to SP); gray brown with some orangey brown staining, damp to moist, fine grained sand with soe medium grained sand, few cobbles and rare boulders up to 18 inches in diameter	246	4						
		SANDY SILT with CLAY (ML); dark gray with some orangey brown staining, moist, firm, fine grained sand Total Depth 5.5 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&SU.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-23

Sheet 1 of 1

Date(s) Excavated 8/15/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 5.0 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 328.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: ft; Depth: 5 ft	
Remarks Infiltration test conducted		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<u>ARTIFICIAL FILL (Qaf)</u>	SILTY SAND to CLAYEY SAND (SM to SC); brown, dry to damp, fine to medium grained sand, some debris in the upper 1 foot								
2	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND to CLAYEY SAND (SM to SC); brown to dark brown, moist, medium dense, fine grained sand with some medium grained sand, slightly porous, few roots	326	2						
4			324	4						
		Total Depth 5 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&U.GDT 9/8/17



Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-24

Sheet 1 of 2

Date(s) Excavated	8/15/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	11.0 feet
Sampling Method(s)	Bulk			Approx. Surface Elevation, ft MSL	328.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: ft; Depth: 11 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0 - 2	<u>ARTIFICIAL FILL(Qaf)</u>	CLAYEY SAND (SC); light gray brown, dry, fine to coarse grained sand	326	2	[Hatched Pattern]					
2 - 4	<u>SLOPE WASH (Qsw)</u>	CLAYEY SAND (SC); brown, moist, dense, fine to coarse grained sand, very slight organic smell	324	4	[Hatched Pattern]					
4 - 8		SILTY SAND to SANDY SILT (SM to ML); olive brown, moist, firm, very fine grained to fine grained sand, some orangey brown mottles	320	8	[Dotted Pattern]					

TP\_REV1 14-001-00.GPJ GM&U.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-24

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
		continues to be SILTY SAND to SANDY SILT (SM to ML); olive brown, moist, firm, very fine grained to fine grained sand, some orangey brown mottles								
		Total Depth 11 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&J.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-25

Sheet 1 of 1

Date(s) Excavated	8/15/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	10.0 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	331.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: ft; Depth: 10 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0 - 2	<u>ARTIFICIAL FILL (Qaf)</u>	CLAYEY SAND to SILTY SAND (SC to SM); brown to reddish brown, damp, medium dense, fine to coarse grained sand, some angular gravels, porous, roots, minor debris	330	2						
2 - 8	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SANDY CLAY to CLAYEY SAND (CL to SC); reddish brown, moist, firm to stiff, fine grained sand with some coarse grained sand, rare fine gravel, porous, rootlets	328	4						
8 - 10	practical refusal due to abundance of boulders	SANDY GRAVEL (GP); reddish brown, damp to moist, fine to coarse grained sand, some clay, abundant gravel, cobbles, and boulders up to 2 feet in diameter  Refusal at 10 feet No Water No Caving	324	6						
			322	8						

TP\_REV1: 14-001-00.GPJ GM&SU.GDT 9/8/17

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

**Log of Test Pit TP-26**  
 Sheet 1 of 1

Date(s) Excavated: <b>8/15/2017</b>	Logged By: <b>KMF</b>	Checked By:
Excavation Equipment: <b>Backhoe</b>	Excavation Contractor: <b>RMV</b>	Total Depth of Test Pit: <b>5.5 feet</b>
Sampling Method(s): <b>Bulk</b>	Approx. Surface Elevation, ft MSL: <b>340.0</b>	
Groundwater Depth [Elevation], feet	Test Pit Dimensions: <b>Width: 2 ft; Length: ft; Depth: 5.5 ft</b>	
Remarks: <b>Infiltration test conducted</b>		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND to CLAYEY SAND (SM to SC); brown, dry to damp, medium dense, fine to medium grained sand with some coarse grained sand, rare gravel up to 3 inches in diameter, porous, roots			[Soil Symbol: Dotted Pattern]					
-2	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	CLAYEY SAND to SANDY CLAY (SC to CL); reddish brown, damp, medium dense/stiff, fine to medium grained sand with some coarse grained sand, porous, rootlets	338	2	[Soil Symbol: Diagonal Hatching]					
-4		SANDY CLAY (CL); reddish brown, moist, stiff/dense	336	4	[Soil Symbol: X-Hatching]					
		Total Depth 5.5 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&U.GDT 9/8/17

THE RANCH PLAN PLANNED COMMUNITY  
PLANNING AREAS 3 AND 4 RUNOFF MANAGEMENT PLAN

**Michael Baker**  
INTERNATIONAL

**TECHNICAL APPENDIX N.3**

**NMU Geotechnical Report – September 18, 2018**

September 18, 2018

Mr. Jim Yates  
**RANCHO MISSION VIEJO**  
28811 Ortega Highway  
San Juan Capistrano, CA 92693

GMU Project No. 14-044-01

Subject: Subsurface Investigation and Infiltration Testing Pertaining to Cow Camp Road Infiltration Basin Location, Cow Camp Road Phase 2B, Rancho Mission Viejo

Dear Mr. Yates:

This report provides the results of our subsurface investigation and design level infiltration testing for the proposed infiltration basin site located southwest of the Cow Camp Road Phase 2B extension in Rancho Mission Viejo.

## **SUBSURFACE INVESTIGATION**

A subsurface investigation was performed in July 2018 in order to observe subsurface conditions within the proposed infiltration basin site for Cow Camp Road Phase 2B. The investigation consisted of excavating two (2) test pits with a backhoe to a maximum depth of 12 feet and three (3) hollow stem auger bore holes to a maximum depth of 12.5 feet. The soils at the investigation locations generally consisted of terrace deposits/older alluvial deposits composed primarily of silty sands, clayey sands, and sands with localized sandy silts.

Infiltration testing was performed within the three hollow stem auger drill holes as discussed below. The location of the test pits and drill holes are shown on Plate 1- Geotechnical Map. Logs of Test Pits and Borings are included in the appendix of this report.

## **INFILTRATION TESTING**

GMU conducted three infiltration tests on July 3, 2018. The infiltration testing was conducted using the Shallow Percolation Test Procedure for establishing infiltration rate in accordance with

Mr. Jim Yates, **RANCHO MISSION VIEJO**  
*Subsurface Investigation & Infiltration Testing for Cow Camp Road Phase 2B Infiltration Basin Location*

the County of Orange Technical Guidance Document (TGD). The infiltration tests were conducted at depths approximately 7 to 12.5 feet below existing ground, which corresponds to approximate test elevations of 245 feet MSL. After pre-saturating the subsurface soils, two consecutive measurements were performed showing at least 6 inches of drop in less than 25 minutes to justify utilizing the test for sandy soils. Thereafter, measurements were taken every ten minutes for an hour and the drop during the final 10 minutes was used to calculate the uncorrected (pre-factor of safety) percolation rate.

The table below summarizes the average percolation rate for the last trial at each test location.

<b>Location</b>	<b>Percolation Rate (in/hr)</b>
DH-24	2.4
DH-25	10.9
DH-26	2.0

Appropriate safety factors should be applied to these unadjusted rates, by the water quality basin designer.

Mr. Jim Yates, RANCHO MISSION VIEJO  
*Subsurface Investigation & Infiltration Testing for Cow Camp Road Phase 2B Infiltration Basin Location*

Please do not hesitate to call if you have any questions regarding this information. Should you have any questions, please do not hesitate to contact our office.

Respectfully submitted,

GMU GEOTECHNICAL, INC.



Katie Farrington, M.S., PG, CEG 2611  
Project Engineering Geologist

Attachments:

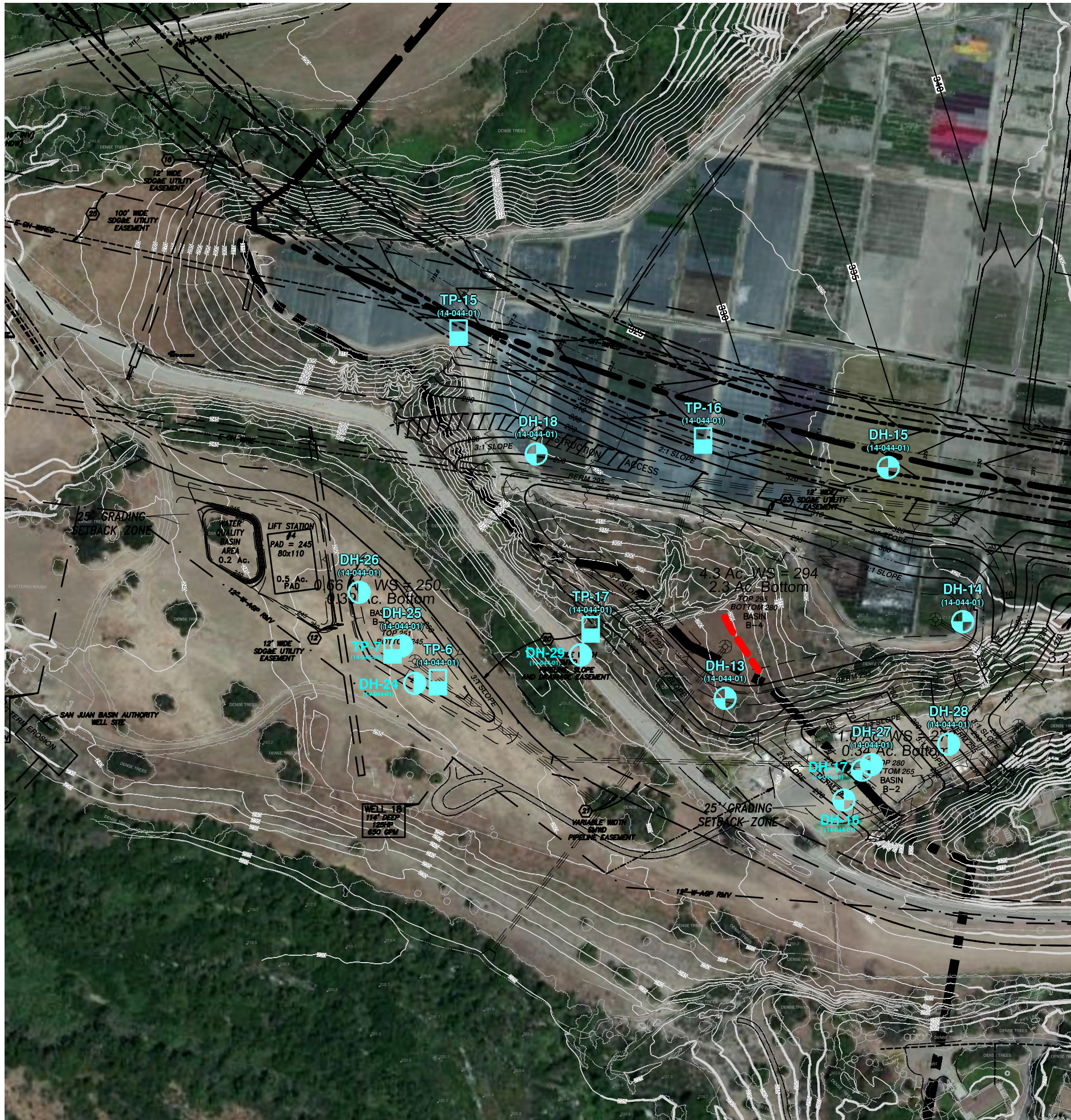
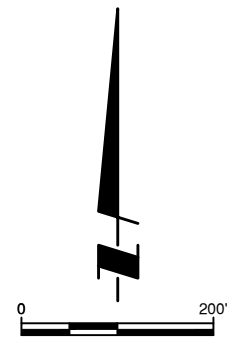
Plate 1: Geotechnical Map  
Appendix: Geotechnical Exploration Procedures and Logs

cc: Michael Baker International (1 PDF copy)  
Attn: Ms. Rebecca Kinney  
Attn: Mr. Michael Bruz






/14-044-01 (9-18-18)\_ Infiltration




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### GEOTECHNICAL LEGEND

- DH-18  
(14-044-01)  

BUCKET AUGER DRILL HOLE
- DH-28  
(14-044-01)  

HOLLOW STEM AUGER DRILL HOLE
- TP-17  
(14-044-01)  

TEST PIT
- 
DOZER ACCESS ROAD
- 
PLANNING AREA BOUNDARY

## Geotechnical Map

	Date: <b>September 18, 2018</b>	Plate <b>1</b>
	Project No.: <b>14-044-01</b>	

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# APPENDIX

## Geotechnical Exploration Procedures and Logs

---

## **APPENDIX**

### **GMU GEOTECHNICAL EXPLORATION PROCEDURES AND LOGS**

Our exploration at the subject site consisted of two backhoe test pits and three hollow stem auger drill holes. The estimated locations of the explorations are shown on Plate (1) – Geotechnical Map. Our drill holes were logged by a Certified Engineering Geologist, and drive, bulk, and SPT samples of the excavated soils were collected. “Undisturbed” samples were taken using a 3.0-inch outside-diameter drive sampler which contains a 2.416-inch-diameter brass sample sleeve 6 inches in length. Standard penetration testing (SPT) with a 2.0-inch outside diameter split spoon sampler without liners was performed in the borings during advancement. Blow counts recorded during sampling from the drive and SPT samples are shown on the drill hole logs. The logs of each drill hole and test pit are contained in this Appendix, and the Legend to Logs is presented as Plate A-1 and A-2.

The geologic and engineering field descriptions and classifications that appear on these logs are prepared according to Corps of Engineers and Bureau of Reclamation standards. Major soil classifications are prepared according to the Unified Soil Classification System as modified by ASTM Standard No. 2487. Since the descriptions and classifications that appear on the Log of Borings and Test Pits are intended to be that which most accurately describe a given interval of a boring or test pit (frequently an interval of several feet), discrepancies do occur in the Unified Soil Classification System nomenclature between that interval and a particular sample in that interval. For example, an 8-foot-thick interval in a log may be identified as silty sand (SM) while one sample taken within the interval may have individually been identified as sandy silt (ML). This discrepancy is frequently allowed to remain to emphasize the occurrence of local textural variations in the interval.

Project: Cow Camp Road Phase 2A-2B  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 14-044-01

# Log of Test Pit TP- 6

Sheet 1 of 2

Date(s) Excavated	6/28/18	Logged By	LB	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	12.0 feet
Sampling Method(s)	Bulk	Approx. Surface Elevation, ft MSL			257.0
Groundwater Depth [Elevation], feet	N/A [0.0]	Test Pit Dimensions Width: 8 ft; Length: 15 ft; Depth: 12 ft			
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
2 4 6 8	<b>TERRACE DEPOSITS/OLDER ALLUVIUM DEPOSITS (Qt/Qoa)</b>	SILTY SAND (SM); medim brown, dry, loose to medium dense, fine grained, 10% clasts	256	2	[Symbol]					
		SANDY SILT (ML); medium brown, dry, loose to medium dense, fine grained	254		[Symbol]					
		SITY SAND (SM); medium brown, damp, medium dense, fine grained	254		[Symbol]					
		CLAYEY SAND (SC); medium brown with red mottles, damp to moist, medium dense, rare clasts, fine to medium grained	252		[Symbol]					
		SILTY SAND (SM); light gray to light brown with some red staining, fine to medium grained sand, rare clasts up to 12-inches in diameter	250		[Symbol]					
			248							

TP\_REV1 14-044-01.GPJ GM&J.GDT 9/19/18

Project: Cow Camp Road Phase 2A-2B  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 14-044-01

# Log of Test Pit TP- 6

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
	some lenses of fat, gray, moist, clay	CLAYEY SAND (SC); brown to gray, damp to moist, medium dense, fine to coarse grained sand		246							
12	30% clasts in a sand matrix. Clasts consist of 70% gravel and 30% cobbles	SILTY SAND (SM); brown, damp to moist, medium dense, fine to coarse grained sand, some gravel and cobble		12							
		Total depth: 12-feet No Groundwater Heavy Caving									

TP\_REV1 14-044-01.GPJ GM&J.GDT 9/19/18

Project: Cow Camp Road Phase 2A-2B  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 14-044-01

# Log of Test Pit TP- 7

Sheet 1 of 1

Date(s) Excavated	6/28/18	Logged By	LB	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	9.5 feet
Sampling Method(s)	Bulk	Approx. Surface Elevation, ft MSL			254.0
Groundwater Depth [Elevation], feet	N/A [0.0]	Test Pit Dimensions Width: 2 ft; Length: 12 ft; Depth: 9.5 ft			
Remarks Minor to moderate caving of trench walls below 2-feet					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				ADDITIONAL TESTS
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	
	<b>TERRACE DEPOSITS/OLDER ALLUVIUM DEPOSITS (Qt/Qoa)</b>	SILTY SAND (SM); medium brown, dry, fine grained sand, loose to medium dense, rare clasts								
2	15% gravel in a sand matrix	SILTY SAND (SM); light gray to light brown, dry to damp, medium dense, fine to medium dense Discontinuous pocket of gray, damp, medium to coarse sand, some gravel	252	2						
4	interbedded sand and silty sand 10% gravel in a sand matrix	WELL GRADED SAND (SW); light gray to gray, damp, medium dense, fine to coarse grained sand, some gravel	250	4						
6		SILTY SAND (SM); medium brown to light gray, damp, dense, medium dense, rare gravel	248	6						
8		Total depth: 9.5-feet No Groundwater Moderate Caving	246	8						

TP\_REV1 14-044-01.GPJ GM&J.GDT 9/19/18

Project: Cow Camp Road Phase 2A-2B  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 14-044-01

# Log of Drill Hole DH-24

Sheet 1 of 1

Date(s) Drilled	7/2/18	Logged By	BSD	Checked By	KMF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	12.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	257.0
Groundwater Depth [Elevation], feet	N/A [0.0]	Sampling Method(s)	Cal-Mod, SPT, Bulk	Drill Hole Backfill	Native/tamped
Remarks	Used for infiltration testing			Driving Method and Drop	140 lb auto hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA				TEST DATA	
						SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
255			<b>TERRACE DEPOSITS/OLDER ALLUVIUM DEPOSITS (Qt/Qoal)</b>		SILTY SAND (SM); light brown to gray, dry, fine to medium grained sand						
					POORLY GRADED SAND (SP); light brown, dry, loose, fine to medium grained sand	3	2		1		
5					SANDY SILT (ML); dark brown, damp, stiff, fine grained sand	5	8		5	96	
250					SILTY SAND (SM); dark brown, damp, medium dense, fine grained sand						
					POORLY GRADED SAND (SP); dark brown, damp, medium dense, fine grained sand, with some coarse grained sand	5	8				
10			Matrix supported with clasts up to 3-inches in diameter		GRAVELLY-SAND (SW); dark brown, damp, dense, fine to coarse grained sand, gravel is subrounded and subangular. 15%-20% is gravel	14	22		2		
245					Total depth: 12.5-feet No Groundwater No Caving						

DH\_REV3 14-044-01.GPJ GMULAB.GPJ 9/19/18



**Drill Hole DH-24**

**Project: Cow Camp Road Phase 2A-2B**  
**Project Location: Rancho Mission Viejo, CA**  
**Project Number: 14-044-01**

# Log of Drill Hole DH-25

Sheet 1 of 1

Date(s) Drilled <b>7/2/18</b>	Logged By <b>BSD</b>	Checked By <b>KMF</b>
Drilling Method <b>Hollow Stem Auger</b>	Drilling Contractor <b>2R Drilling</b>	Total Depth of Drill Hole <b>9.0 feet</b>
Drill Rig Type <b>CME 75</b>	Diameter(s) of Hole, inches <b>8</b>	Approx. Surface Elevation, ft MSL <b>254.0</b>
Groundwater Depth [Elevation], feet <b>N/A [0.0]</b>	Sampling Method(s) <b>Cal-Mod, SPT, Bulk</b>	Drill Hole Backfill <b>Native/tamped</b>
Remarks <b>Used for infiltration testing</b>		Driving Method and Drop <b>140 lb auto hammer</b>

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA			TEST DATA			
						SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS	
			<b>TOPSOIL</b> Numerous rootlets		SANDY SILT (ML); dark brown, dry, fine to medium grained sand							
			<b>TERRACE DEPOSITS/OLDER ALLUVIUM DEPOSITS (Qt/Qoa)</b>		SILTY SAND (SM); brown, dry, loose, fine grained sand  Becomes fine to medium grained sand		3 2 2		2			
250	5		Trace reddish mottles		<b>POORLY GRADED SAND (SP)-SILTY SAND (SM)</b> ; brown, dry, medium dense, fine grained sand Becomes fine to coarse grained sand		4 7 9		2	100		
245					<b>POORLY GRADED SAND (SP)</b> ; gray, damp, loose to medium dense, medium to coarse grained sand		3 5 7					
					Total depth: 9-feet No Groundwater No Caving							

DH\_REV3 14-044-01.GPJ GMULAB.GPJ 9/19/18



**Drill Hole DH-25**



Project: Cow Camp Road Phase 2A-2B  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 14-044-01

# Log of Drill Hole DH-26

Sheet 1 of 1

Date(s) Drilled 7/2/18	Logged By BSD	Checked By KMF
Drilling Method Hollow Stem Auger	Drilling Contractor 2R Drilling	Total Depth of Drill Hole 7.0 feet
Drill Rig Type CME 75	Diameter(s) of Hole, inches 8	Approx. Surface Elevation, ft MSL 252.0
Groundwater Depth [Elevation], feet N/A [0.0]	Sampling Method(s) Cal-Mod, SPT, Bulk	Drill Hole Backfill Native/tamped
Remarks Used for infiltration testing		Driving Method and Drop 140 lb auto hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA			TEST DATA	
						SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf
			<u>TOPSOIL</u>		SILTY SAND (SM); brown, dry, fine to medium grained sand					
250			<u>TERRACE DEPOSITS/OLDER ALLUVIUM DEPOSITS (Qt/Qoal)</u>		POORLY GRADED SAND (SP); gray, damp, loose, medium to coarse grained sand		4 3 4		3	108
5					SILTY SAND (SM)-CLAYEY SAND (SC); brown, damp to moist, loose, fine to coarse grained sand		5 3 3		6	
245					SANDY SILT (ML); dark brown, moist, loose/soft, fine to medium grained sand					
					Total depth: 7-feet No Groundwater No Caving					

DH\_REV3 14-044-01.GPJ GMULAB.GPJ 9/19/18



Drill Hole DH-26

THE RANCH PLAN PLANNED COMMUNITY  
PLANNING AREAS 3 AND 4 RUNOFF MANAGEMENT PLAN

**Michael Baker**  
INTERNATIONAL

**TECHNICAL APPENDIX N.4**

**NMU Geotechnical Report – November 16, 2018**

November 16, 2018

Mr. Jim Yates  
**RANCHO MISSION VIEJO**  
P.O. Box 9  
San Juan Capistrano, CA 92693

GMU Project No. 18-150-00

**Subject:** Subsurface Investigation and Preliminary Design-Level Infiltration Testing Pertaining to Possible PA-3 Infiltration Basin Locations, Southern Planning Area 3, Rancho Mission Viejo

**References:**

- 1) Our “Subsurface Investigation and Screening-Level Infiltration Testing for Possible PA-3 Infiltration Basin Locations, Rancho Mission Viejo” dated September 14, 2017 (Proj. No. 14-001-10)
- 2) Our “Screening-Level Infiltration Testing Pertaining to Possible PA-3 Infiltration Basin Locations, Planning Area 3, Rancho Mission Viejo” dated August 6, 2014 (Proj. No. 14-001-00)
- 3) Our “Report of Geotechnical Investigation for Proposed Greenstone Rock Crushing Recycling Facility, County of Orange, California” dated January 7, 2011 (Proj. No. 10-153-00)

Dear Mr. Yates:

This report provides the results of our subsurface investigation and infiltration testing based on the preliminary design for infiltration basin sites located along the southern limits of Planning Area 3 in Rancho Mission Viejo.

## **RECENT SUBSURFACE INVESTIGATION**

A subsurface investigation was performed in October and November 2018 in order to observe subsurface conditions near possible infiltration basin sites in southern PA-3. The investigation consisted of excavating 23 test pits with a backhoe to a maximum depth of 15 feet. The soils at the investigation locations generally consisted of older alluvium and terrace deposits composed

primarily of silty sands with lesser sands, clayey sands, and gravelly sands. Sandy silts and clays were also encountered in localized areas.

Infiltration testing was performed within eight of the recent test pits as discussed below. The location of the test pits are shown on Plate 1- Investigation Location Map and Plate 2- Geological Map. Logs of Test Pits are included in Appendix A-1 of this report.

In test pit TP-55, fragments of concrete and asphalt were encountered as well as a concrete slab approximately 3 feet below the ground surface. This is most likely undocumented fill associated with past mining operations in San Juan Creek. The estimated limits of the undocumented fill are shown on Plate 2- Geologic Map. Proposed infiltration testing was not conducted at this location due to the presence of undocumented fill and debris at this location.

An infiltration test was planned for test pit TP-53, however, during excavation heavy caving was occurring within the sandy soils between 2 feet to 6 feet below ground surface. An infiltration test was not performed in TP-53 due to the inability to excavate the test pit in a manner that would allow the test pit to remain open and not cave. Based on the materials encountered in TP-53 and our experience with similar materials encountered in adjacent test pits (i.e., TP-54 (18-150-00) and TP-56 (18-150-00)), the infiltration rate for TP-53 would be expected to be greater than 30 inches per hour.

## **INFILTRATION TESTING**

GMU conducted eight infiltration tests on 11/6/2018 through 11/7/2018. The preliminary design-level infiltration testing was generally conducted using the open pit falling head procedure for establishing infiltration rate in accordance with the County of Orange Technical Guidance Document (TGD). The infiltration tests were conducted at depths approximately 3.8 feet to 7.0 feet below existing ground. After pre-saturating the subsurface soils, a minimum of three trials were conducted at each location and the average infiltration rate over the last trial was used to calculate the unadjusted (pre-factor of safety) infiltration rate.

Mr. Jim Yates, **RANCHO MISSION VIEJO**  
*Subsurface Investigation and Preliminary Design-Level Infiltration Testing Pertaining to Possible PA-3  
Infiltration Basin Locations, Planning Area 3, Rancho Mission Viejo*

The table below summarizes the average infiltration rate for the last trial at each test location.

<b>Location</b>	<b>Avg. Infiltration Rate for Last Trial (in/hr)</b>
TP-46	2.9
TP-47	23.0
TP-48	10.1
TP-49	11.7
TP-50	10.4
TP-51	9.5
TP-54	50.9
TP-56	61.7

It should be noted that these rates are unadjusted and appropriate safety factors should be applied. Additional design-level testing may be needed at a later date when the final basin locations and elevations are known.

### **PREVIOUS INFILTRATION TESTING**

Previous infiltration testing was performed within the subject site as screening-level testing for possible PA3 infiltration basin locations as well as for the existing Greenstone Facility. The previous infiltration tests are discussed in our reference (1), (2), and (3) reports and the location of the test pits are shown on Plate 1- Investigation Location Map and Plate 2- Geological Map. Logs of Test Pits for previously performed infiltration testing for the proposed PA3 are included in Appendix A-2 of this report.

Mr. Jim Yates, **RANCHO MISSION VIEJO**  
*Subsurface Investigation and Preliminary Design-Level Infiltration Testing Pertaining to Possible PA-3  
 Infiltration Basin Locations, Planning Area 3, Rancho Mission Viejo*

The table below summarizes the average infiltration rate for the last trial at each previous test location within the proposed PA3 development (GMU Project No. 14-001-00).

<b>Location</b>	<b>Avg. Infiltration Rate for Last Trial (in/hr)</b>
TP-1	1.9
TP-2	4.8
TP-3	>90.0*
TP-4	19.2
TP-12	1.3
TP-13	8.3
TP-14	9.6
TP-16	1.8
TP-17	3.1
TP-19	0.4

\*Infiltration rate exceeds flow rate from hose.

The table below summarizes the average infiltration rate for the last trial at each previous test location within the Greenstone Facility (GMU Project No. 10-153-00).

<b>Location</b>	<b>Avg. Infiltration Rate for Last Trial (in/hr)</b>
TP-1	>30.0*
TP-2	25.7
TP-3	27.0

\*Infiltration rate exceeds flow rate from hose.

Mr. Jim Yates, RANCHO MISSION VIEJO  
*Subsurface Investigation and Preliminary Design-Level Infiltration Testing Pertaining to Possible PA-3  
Infiltration Basin Locations, Planning Area 3, Rancho Mission Viejo*

Please do not hesitate to call if you have any questions regarding this information.  
Should you have any questions, please do not hesitate to contact our office.

Respectfully submitted,

GMU GEOTECHNICAL, INC.



Katie Farrington, M.S., PG, CEG 2611  
Project Engineering Geologist

Attachments:

Plate 1:	Investigation Location Map
Plate 2:	Geological Map
Appendix A-1:	Recent Geotechnical Exploration Procedures and Logs
Appendix A-2:	Previously Performed Exploration Logs



cc: Michael Baker International (1 PDF copy)  
Attn: Ms. Rebecca Kinney

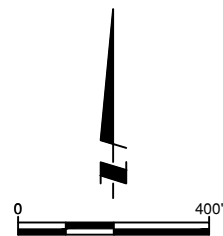
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**GEOTECHNICAL LEGEND**

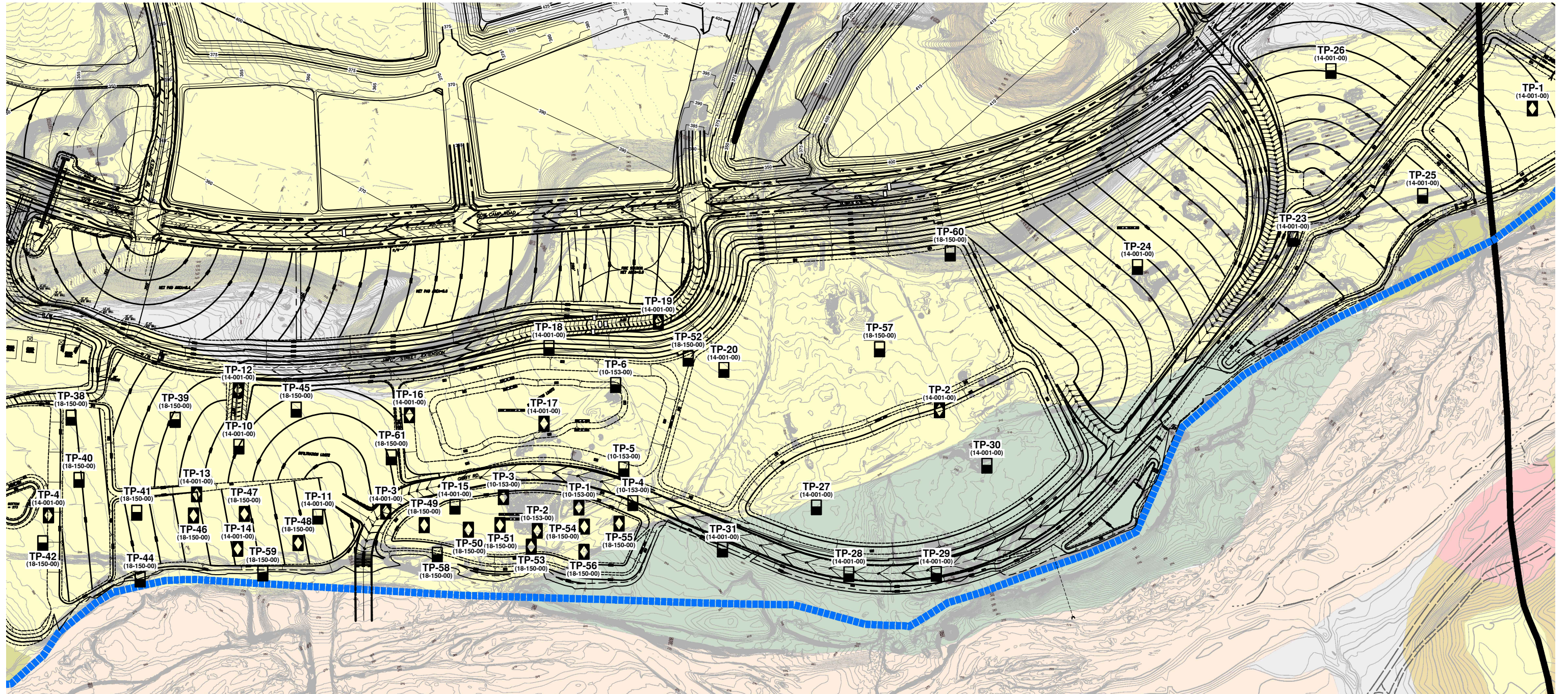
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**TP-15 (14-001-00)** APPROXIMATE LOCATION OF TEST PIT
- 
**TP-15 (14-001-00)** APPROXIMATE LOCATION OF INFILTRATION TEST PIT







<b>Investigation Location Map</b>		
	Date: November 16, 2018	Plate 1
	Project No.: 18-150-00	









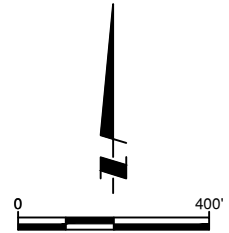
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### GEOTECHNICAL LEGEND

-  TP-15 (14-001-00) APPROXIMATE LOCATION OF TEST PIT
-  TP-15 (14-001-00) APPROXIMATE LOCATION OF INFILTRATION TEST PIT
-  PLANNING AREA BOUNDARY
-  FAULT

-  Qafu, UNDOCUMENTED ARTIFICIAL FILL
-  Qal, ALLUVIUM
-  Qoal, OLDER ALLUVIUM
-  Qsw, SLOPE WASH
-  Qsw/Qc, SLOPE WASH OVER COLLUVIUM
-  Qtr, TERRACE DEPOSITS



## Geology Map



Date: November 16, 2018

Project No.: 18-150-00

Plate

2

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# APPENDIX

## Geotechnical Exploration Procedures and Logs

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# APPENDIX A-1

## Recent Geotechnical Exploration Procedures and Logs

---

## **APPENDIX A-1**

### **GMU GEOTECHNICAL EXPLORATION PROCEDURES AND LOGS**

Our recent exploration at the subject site consisted of 23 test pits. The estimated locations of the explorations are shown on Plate (1) – Subsurface Investigation Location Map and Plate (2)- Geologic Map. Our test pits were logged by a Geologist. The logs of each test pit are contained in this Appendix A-1, and the Legend to Logs is presented as Plate A-1 and A-2.

The geologic and engineering field descriptions and classifications that appear on these logs are prepared according to Corps of Engineers and Bureau of Reclamation standards. Major soil classifications are prepared according to the Unified Soil Classification System as modified by ASTM Standard No. 2487. Since the descriptions and classifications that appear on the Log of Test Pits are intended to be that which most accurately describe a given interval of a test pit (frequently an interval of several feet), discrepancies do occur in the Unified Soil Classification System nomenclature between that interval and a particular sample in that interval. For example, an 8-foot-thick interval in a log may be identified as silty sand (SM) while one sample taken within the interval may have individually been identified as sandy silt (ML). This discrepancy is frequently allowed to remain to emphasize the occurrence of local textural variations in the interval.



MAJOR DIVISIONS		Group Letter	Symbol	TYPICAL NAMES
<b>COARSE-GRAINED SOILS</b> More Than 50% Retained On No.200 Sieve  Based on The Material Passing The 3-Inch (75mm) Sieve.  Reference: ASTM Standard D2487	<b>GRAVELS</b> 50% or More of Coarse Fraction Retained on No.4 Sieve	Clean Gravels	GW	Well Graded Gravels and Gravel-Sand Mixtures, Little or No Fines.
		Gravels With Fines	GP	Poorly Graded Gravels and Gravel-Sand Mixtures Little or No Fines.
			GM	Silty Gravels, Gravel-Sand-Silt Mixtures.
		Clean Sands	GC	Clayey Gravels, Gravel-Sand-Clay Mixtures.
	<b>SANDS</b> More Than 50% of Coarse Fraction Passes No.4 Sieve		SW	Well Graded Sands and Gravelly Sands, Little or No Fines.
		SP	Poorly Graded Sands and Gravelly Sands, Little or No Fines.	
		SM	Silty Sands, Sand-Silt Mixtures.	
		SC	Clayey Sands, Sand-Clay Mixtures.	
	<b>FINE-GRAINED SOILS</b> 50% or More Passes The No.200 Sieve  Based on The Material Passing The 3-Inch (75mm) Sieve.  Reference: ASTM Standard D2487	<b>SILTS AND CLAYS</b> Liquid Limit Less Than 50%	ML	Inorganic Silts, 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	
<b>SILTS AND CLAYS</b> Liquid Limit 50% or Greater		MH	Inorganic Silts, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silts.	
		CH	Inorganic Clays of High Plasticity, Fat Clays.	
		OH	Organic Clays of Medium To High Plasticity, Organic Silts.	
<b>HIGHLY ORGANIC SOILS</b>		PT	Peat and Other Highly Organic Soils.	

The descriptive terminology of the logs is modified from current ASTM Standards to suit the purposes of this study






#### ADDITIONAL TESTS

DS = Direct Shear  
 HY = Hydrometer Test  
 TC = Triaxial Compression Test  
 UC = Unconfined Compression  
 CN = Consolidation Test  
 (T) = Time Rate  
 EX = Expansion Test  
 CP = Compaction Test  
 PS = Particle Size Distribution  
 EI = Expansion Index  
 SE = Sand Equivalent Test  
 AL = Atterberg Limits  
 FC = Chemical Tests  
 RV = Resistance Value  
 SG = Specific Gravity  
 SU = Sulfates  
 CH = Chlorides  
 MR = Minimum Resistivity  
 pH  
 (N) = Natural Undisturbed Sample  
 (R) = Remolded Sample  
 CS = Collapse Test/Swell-Settlement

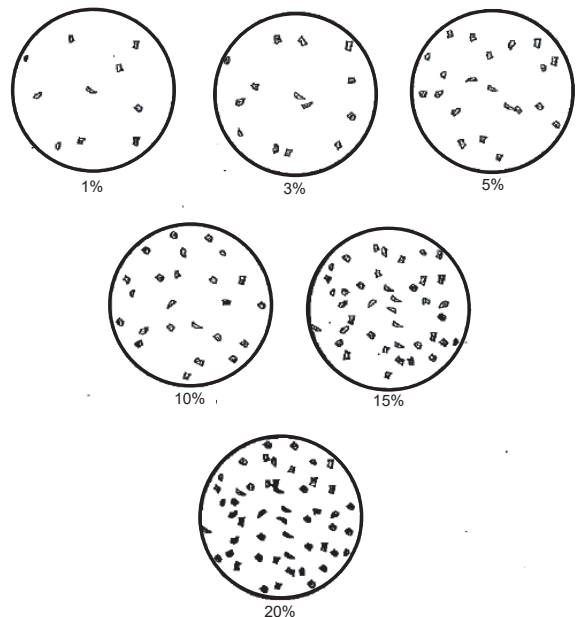
#### GEOLOGIC NOMENCLATURE

B = Bedding C = Contact J = Joint  
 F = Fracture Flt = Fault S = Shear  
 RS = Rupture Surface  = Seepage  
 = Groundwater

#### SAMPLE SYMBOLS

 Undisturbed Sample (California Sample)  
 Undisturbed Sample (Shelby Tube)  
 Bulk Sample  
 Unsuccessful Sampling Attempt  
 SPT Sample

5  
10  
15  
Blows per 6-Inches Penetration  
 10: 10 Blows for 12-Inches Penetration  
 6/4": 6 Blows for 4-Inches Penetration  
 P: Push  
 (13): Uncorrected Blow Counts ("N" Values) for 12-Inches Penetration- Standard Penetration Test (SPT)



SOIL DENSITY/CONSISTENCY			
FINE GRAINED			
Consistency	Field Test	SPT (#blows/foot)	Mod (#blows/foot)
Very Soft	Easily penetrated by thumb, exudes between fingers	<2	<3
Soft	Easily penetrated one inch by thumb, molded by fingers	2-4	3-6
Firm	Penetrated over 1/2 inch by thumb with moderate effort	4-8	6-12
Stiff	Penetrated about 1/2 inch by thumb with great effort	8-15	12-25
Very Stiff	Readily indented by thumbnail	15-30	25-50
Hard	Indented with difficulty by thumbnail	>30	>50
COARSE GRAINED			
Density	Field Test	SPT (#blows/foot)	Mod (#blows/foot)
Very Loose	Easily penetrated with 0.5" rod pushed by hand	<4	<5
Loose	Easily penetrated with 0.5" rod pushed by hand	4-10	5-12
Medium Dense	Easily penetrated 1' with 0.5" rod driven by 5lb hammer	10-30	12-35
Dense	Difficult to penetrate 1' with 0.5" rod driven by 5lb hammer	31-50	35-60
Very Dense	Penetrated few inches with 0.5" rod driven by 5lb hammer	>50	>60

BEDROCK HARDNESS		
Density	Field Test	SPT (#blows/foot)
Soft	Can be crushed by hand, soil like and structureless	1-30
Moderately Hard	Can be grooved with fingernails, crumbles with hammer	30-50
Hard	Can't break by hand, can be grooved with knife	50-100
Very Hard	Scratches with knife, chips with hammer blows	>100

MODIFIERS	
Trace	1%
Few	1-5%
Some	5-12%
Numerous	12-20%
Abundant	>20%

GRAIN SIZE			
Description	Sieve Size	Grain Size	Approximate Size
Boulders	>12"	>12"	Larger than a basketball
Cobbles	3-12"	3-12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4-3"	Thumb-sized to fist-sized
	Fine	#4-3/4"	Pea-sized to thumb-sized
Sand	Coarse	#10-#4	Rock-salt-sized to pea-sized
	Medium	#40-#10	Sugar-sized to rock salt-sized
	Fine	#200-#40	Flour-sized to sugar-sized
Fines	passing #200	<0.0029"	Flour-sized and smaller

MOISTURE CONTENT
Dry- Very little or no moisture
Damp- Some moisture but less than optimum
Moist- Near optimum
Very Moist- Above optimum
Wet/Saturated- Contains free moisture



**LEGEND TO LOGS**  
ASTM Designation: D 2487  
(Based on Unified Soil Classification System)

Plate  
**A-2**

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-38

Sheet 1 of 2

Date(s) Excavated	10/15/18	Logged By	WD	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	15.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			287.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 23 ft; Depth: 15 ft			
Remarks TD = 15', No GW					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>TOPSOIL</b>	CLAYEY SILT (ML-CL); dark brown, moist, soft, some fine grained sand	286							
2	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> moderately porous, white mottles (caliche), minor caving, weakly defined bedding	SANDY SILT (ML); brown, dry, medium dense, fine grained sand, trace fine gravels and cobbles	284	2						
4	Approximately 5% gravels and 3% cobbles	SILTY SAND (SM); brownish gray mottled with gray and brown, moist, loose, medium grained sand	282	4						
6	Becomes denser with depth	POORLY GRADED SAND to SILTY SAND (SP-SM); grayish brown, moist, medium dense, medium grained sand	280	6						
8			278	8						

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-38

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
12	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b>	Continues to be POORLY GRADED SAND to SILTY SAND (SP-SM); grayish brown, moist, medium dense, medium grained sand	276							
14			274							
14			272							
		Total Depth = 15' No Groundwater Minor caving at 2'								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18



Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-39

Sheet 1 of 1

Date(s) Excavated	10/15/18	Logged By	WD	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	6.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL	291.0		
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions	Width: 3 ft; Length: 17 ft; Depth: 6 ft		
Remarks	TD = 6', No GW				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS	
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf			
	<b>TOPSOIL</b> rootlets, porous	CLAYEY SILT (ML-CL); dark brown, moist, soft, some sand										
	<b>ALLUVIUM (Qal)</b> moderately porous	SANDY SILT (ML); brown dry to damp, fine grained sand	290									
2	Weakly bedded	POORLY GRADED SAND to SILTY SAND (SP-SM); brown and gray brown, dry, loose, medium to coarse grained sand, trace gravel	288									
4	Approximately 30% sand, 60% gravel, and 10% cobbles, maximum particle size 10" with an average of 1-2"	SILTY SAND (SM); reddish brown, moist, medium dense, fine to medium grained sand, trace gravel										
6		Gravel (GP); reddish brown, moist, dense, numerous medium grained sands	286									
		Total Depth = 6' No Groundwater No Caving										

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-40

Sheet 1 of 1

Date(s) Excavated	10/15/18	Logged By	WD	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	7.5 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			287.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 16 ft; Depth: 7.5 ft			
Remarks TD = 7.5', No GW					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				ADDITIONAL TESTS
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	
	<b>TOPSOIL</b> porous, rootlets, disturbed by agriculture	SANDY SILT (ML); brown, damp, loose, fine grained sand								
2	<b>ALLUVIUM (Qa)</b> approximately 5% gravel and <1% cobbles, rootlets	SANDY SILT (ML); grayish brown, damp, medium dense, fine grained sand, few gravels, trace cobbles	286	2						
4	No rootlets		284	4						
6	Approximately <1% gravel	SILTY SAND (SM); brown mottled with gray brown, some orange brown staining, moist, moderately dense, fine grained sand, trace gravel	282	6						
		Total Depth = 7.5' No Groundwater No Caving	280							

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-41

Sheet 1 of 1

Date(s) Excavated	10/15/18	Logged By	WD	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	9.3 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			288.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 14.5 ft; Depth: 9.25 ft			
Remarks TD = 9.25', No GW					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				ADDITIONAL TESTS
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	
	<b>TOPSOIL</b>	SANDY SILT (ML); brown, damp, loose, fine grained sand								
2	<b>ALLUVIUM (Qal)</b> porous, krotovina  Finely laminated, rare charcoal fragments	SILT (ML); brown mottled with gray and grayish brown, some orange staining, moist, soft, trace fine grained sand  Becomes medium dense	286	2						
4	Caving sand, approximately 60% sand, 30% gravel, and 10% cobble, maximum particle size is 10" and average size is 1-2", weakly bedded	GRAVELLY SAND (SW); gray, damp, loose, medium to coarse grained sand, some cobbles	284	4						
6	Approximately 5% gravel	SANDY SILT (ML); gray, moist, soft to medium dense, fine grained sand	282	6						
8	Heavy caving - unable to continue digging		280	8						
		Total Depth = 9.25' No Groundwater Heavy caving at 4.5'								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-42

Sheet 1 of 1

Date(s) Excavated	10/15/18	Logged By	WD	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	5.5 feet
Sampling Method(s)	BULK			Approx. Surface Elevation, ft MSL	284.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions	Width: 3 ft; Length: 13.5 ft; Depth: 5.5 ft		
Remarks	TD = 5.5', No GW				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS	
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf			
	<b>TOPSOIL</b> rootlets, porous	SILTY SAND (SM); brown to dark brown, moist, loose to medium dense, fine grained sand										
	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b>	SILTY SAND (SM); brown to pale brown and gray with orangish brown staining, damp, medium dense, fine grained sand										
2			282	2								
4	Horizontal bedding, approximately 80% sand, 20% gravel, and <1% cobbles, maximum particle size is 8" with an average of 1"	GRAVELLY SAND (SW); gray, moist, loose, medium to coarse grained sand	280	4								
	Running sand/heavy caving - unable to excavate deeper	Total Depth = 5.5' No Groundwater Heavy caving at 5.5'										

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-44

Sheet 1 of 1

Date(s) Excavated	10/15/18	Logged By	WD	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	6.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			270.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 14 ft; Depth: 6 ft			
Remarks TD = 6', No GW					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS	
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf			
	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Approximately 10% sub-rounded gravel and cobble with a maximum particle size of 4" with an average of 1"	SILTY SAND (SM); grayish brown, dry, loose										
2	Abundant tree roots, interbedded sand and gravel up to 6" thick, approximately 70-80% sand, 20-30% gravel, 1-3% cobble, and <1% boulders, maximum clast size is 12" with an average of 1"	GRAVELLY SAND (SP-GP); gray and brownish gray, dry to damp, loose, fine to coarse grained sand	268	2								
4			266	4								
6	Severe caving - unable to excavate deeper	Total Depth = 5.5' No Groundwater Severe Caving from 1'	264	6								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-45

Sheet 1 of 1

Date(s) Excavated	11/5/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	7.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			297.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 15 ft; Depth: 7 ft			
Remarks TD = 7', No GW					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Disturbed due to agricultural use, some rootlets, pinhole porosity, moderate to severe caving	SILTY SAND (SM); light brown, damp, loose, fine to medium grained sand, some coarse grained sand, some clay	296	2						
2	Depth of disturbance, trace rootlets, trace porosity, no caving	Becomes yellowish brown, damp, loose to medium dense, fine to medium grained sand, some coarse grained sand, friable	294	4						
4	No rootlets, slightly cemented	medium dense, little to no clay	292	6						
6	Hard digging	Becomes yellow, very dense, fine to coarse grained sand, dry to damp	290							
		CLAYEY SAND (SC); brown mottled with orangish brown, dry to damp, medium dense, fine to coarse grained sand	290							
		Total Depth = 7' No Groundwater Moderate to severe caving in upper 3'								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-46

Sheet 1 of 1

Date(s) Excavated	11/5/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	7.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			291.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 10 ft; Depth: 7 ft			
Remarks TD = 7', No GW, used for Infiltration Testing					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Disturbed due to agricultural use, some rootlets, pinhole porosity, loose due to ripping/discing, moderately caving	SILTY SAND (SM); brown, damp, loose, fine to medium grained sand, some coarse grained sand, trace gravel, with some clay	290							
2	Trace rootlets	Some gravel		2						
	Depth of disturbance, no rootlets, little to no caving	Becomes medium dense to dense, reduced clay, yellowish brown mottled with orange	288							
4		Becomes yellow, dry to damp, dense, fine to medium grained sand		4						
6			286							
		Becomes brown, damp, dense, fine to medium grained sand, with some clay	284							
		Total Depth = 7' No Groundwater Moderate caving in upper 3'								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-47

Sheet 1 of 1

Date(s) Excavated	11/5/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	6.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			292.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 10 ft; Depth: 6 ft			
Remarks TD = 6', No GW, used for Infiltration Testing					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Disturbed due to agricultural use, some rootlets, pinhole porosity, loose due to ripping/discing, severe caving in upper 2'	SILTY SAND (SM); brown, damp, loose, fine to medium grained sand, with some clay								
2	Depth of disturbance, no rootlets, dense sub-horizontal lens of very fine grained sand	SILTY SAND (SM); gray, damp, moderately dense, fine to medium grained sand, some coarse grained sand	290	2						
4	~3" thick lens of fine gravel		288	4						
6		WELL GRADED SAND (SW); yellow, dry to damp, moderately dense to dense but easily friable, fine to coarse grained sand	286	6						
		Total Depth = 6' No Groundwater Severe caving in upper 2'								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18



Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-48

Sheet 1 of 1

Date(s) Excavated	11/5/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	6.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			293.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions	Width: 3 ft; Length: 8 ft; Depth: 6 ft		
Remarks TD = 6', No GW, used for Infiltration Testing					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Disturbed due to agricultural use, some rootlets, pinhole porosity, loose due to ripping/discing, trace weathered claystone fragments, minor caving in upper 2'	SILTY SAND (SM); brown, damp, loose, fine to medium grained sand, some coarse grained sand, with some clay	292							
2	Depth of disturbance, few rootlets, no porosity	SILTY SAND to WELL GRADED SAND (SM/SW); yellow, damp, moderately dense, fine to coarse grained sand, trace fine gravel	290	2						
4	No rootlets, nearly horizontal depositional beds. N50E, 6SE (approx.)	SILTY SAND (SM); tan, dry to damp, dense, fine to medium grained sand	288	4						
6	Sub-rounded gravel	WELL GRADED SAND (SW); yellow, dry, dense, fine to coarse grained sand, numerous gravel		6						
		Total Depth = 6' No Groundwater Minor caving in the upper 2'								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-49

Sheet 1 of 1

Date(s) Excavated	11/5/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	6.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			299.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions	Width: 3 ft; Length: 8 ft; Depth: 6 ft		
Remarks TD = 6', No GW, used for Infiltration Testing					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Disturbed due to agricultural use, some rootlets, pinhole porosity, loose due to ripping/discing	SILTY SAND (SM); brown, damp, loose, moderately hard, fine to medium grained sand, some coarse grained sand, with some clay	298							
2	Depth of disturbance, poorly cemented, heavy caving, numerous oxidation patches No oxidation	WELL GRADED SAND (SW); yellowish gray, dry to damp, moderately dense to dense, fine to coarse grained sand, some fine gravels		2						
4										
6		Total Depth = 6' No Groundwater Heavy caving from 2-6' Refusal due to caving		6						

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-50

Sheet 1 of 1

Date(s) Excavated	11/5/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	7.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			300.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 10 ft; Depth: 7 ft			
Remarks TD = 7', No GW, used for Infiltration Testing					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
2	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Disturbed due to agricultural use, some rootlets, pinhole porosity, loose due to ripping/discing	SILTY SAND (SM); brown, damp, loose, fine to medium grained sand, some coarse grained sand, with some clay	298	2						
4	Depth of disturbance, moderate caving  Thin, sub-horizontal lenses of very fine sand, numerous oxidation patches	WELL GRADED SAND (SW); yellowish gray, dry to damp, fine to coarse grained sand, some trace gravel  Numerous gravels	296	4						
6		Some gravels	294	6						
		Total Depth = 7' No Groundwater Moderate caving from 2-7'								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-51

Sheet 1 of 1

Date(s) Excavated	11/5/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	5.5 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			301.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 8 ft; Depth: 5.5 ft			
Remarks TD = 5.5', No GW, used for Infiltration Testing					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
	<b>OLDER ALLUVIUM/ TERRACE DEPOSITS (Qoal/Qtr)</b> Disturbed due to agricultural use, some rootlets, pinhole porosity, loose due to discing/ripping	SILTY SAND (SM); brown, damp, loose, fine to medium grained sand, some coarse grained sand, with some clay	300								
2	Depth of disturbance, severe caving, trace rootlets, no porosity, sub-rounded gravels	WELL GRADED SAND (SW); yellowish gray, dry to damp, dense but friable, fine to coarse grained sand, numerous gravel		2							
	Few gravels		298								
4	Thin 0.25" sub-horizontal lenses of very fine to fine grained sand and silty clay			4							
	Numerous gravels										
	Trace rootlets		296								
		Total Depth = 5.5' No Groundwater Severe caving from 1.5-5.5' Refusal due to caving									

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-52

Sheet 1 of 1

Date(s) Excavated	11/5/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	6.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			314.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 10 ft; Depth: 6 ft			
Remarks TD = 6', No GW					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Disturbed due to agricultural use, some rootlets, pinhole porosity, loose due to discing/ripping	SILTY SAND (SM); brown, moist, loose, fine to medium grained sand, some coarse grained sand, with some clay									
2	Depth of disturbance, no porosity, trace rootlets	CLAYEY SAND (SC); brown, moist, dense, fine to medium grained sand		312	2						
	Gradational contact	WELL GRADED SAND (SW); yellow, moist, dense to very dense, fine to coarse grained sand									
4	Minor caving, sub-rounded gravels and cobbles <4"	Some gravels and cobbles		310	4						
6		CLAYEY SILT (ML); yellow, damp, dense, some very fine grained sand		308	6						
		Total Depth = 6' No Groundwater Minor caving at 4'									

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-53

Sheet 1 of 1

Date(s) Excavated	11/5/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	6.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			294.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 10 ft; Depth: 6 ft			
Remarks TD = 6', No GW					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Numerous rootlets, pinhole porosity, some roots ~0.5" thick	SILTY SAND (SM); brown, damp, dense, fine to medium grained sand, some coarse grained sand, with some clay								
2	Sub-rounded gravel, severe caving, some roots 1-5" thick	WELL GRADED SAND to SILTY SAND (SW/SM); yellowish gray, dry to damp, dense but easily friable, fine to coarse grained sand, numerous gravels  Some gravels	292	2						
4		Numerous gravels  Some gravels	290	4						
6			288	6						
		Total Depth = 6' No Groundwater Severe caving from 2-6" Refusal due to caving								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-54

Sheet 1 of 1

Date(s) Excavated	11/5/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	6.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			299.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 8 ft; Depth: 6 ft			
Remarks TD = 6', No GW, used for Infiltration Testing					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Numerous rootlets, pinhole porosity, some krotovina	SILTY SAND (SM): brown, damp, moderately dense, fine to medium grained sand, some coarse grained sand, some gravels	298	0						
2	Poorly cemented/unconsolidated  ~3" lens of 1" gravels	WELL GRADED SAND to SILTY SAND (SW/SM); yellowish brown, dry to damp, dense but friable, fine to coarse grained sand, numerous gravels  Numerous 1" gravels	296	2						
4	Sub-rounded gravel, minor caving	No gravels, fine grained sand	294	4						
6		Numerous gravels		6						
		Total Depth = 6' No Groundwater Minor caving at 5'								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-55

Sheet 1 of 1

Date(s) Excavated	11/5/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	3.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			300.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 10 ft; Depth: 3 ft			
Remarks TD = 3', No GW, used for Infiltration Testing					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
2	<p><b>ARTIFICIAL FILL, UNDOCUMENTED (Qafu)</b></p> <p>Numerous rootlets, pinhole porosity</p> <p>Numerous fragments of concrete and asphalt (0.5-2' in size), no porosity</p> <p>Some rootlets</p>	<p>SILTY SAND (SM); yellowish brown, damp, moderately dense, fine to medium grained sand, some coarse grained sand</p> <p>Becomes dense, some gravels</p>	298	2						
		<p>Concrete slab</p> <p>Total Depth = 3'            No Groundwater            No Caving            Refusal due to concrete slab</p>								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18



Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-56

Sheet 1 of 1

Date(s) Excavated	11/5/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	6.5 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			296.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 7 ft; Depth: 6.5 ft			
Remarks TD = 6.5', No GW, used for Infiltration Testing					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0	<b>ARTIFICIAL FILL, UNDOCUMENTED (Qafu)</b> Numerous rootlets, some krotovina, pinhole porosity Some rootlets, sub-rounded gravel	SILTY SAND (SM); brown, dry to damp, moist, dense, fine to medium grained sand, some coarse grained sand, some gravel  Becomes dense, numerous gravel  Few gravel								
2	No porosity		294	2						
4	Trace rootlets, unconsolidated sands, moderate caving  Found Eagles cassette tape	Sands becomes fine to coarse grained, some gravel								
4			292	4						
6	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Unconsolidated Sub-rounded gravels and cobbles, cobbles <6"	WELL GRADED SAND to SILTY SAND (SW/SM); yellowish brown, damp, dense but friable, fine to coarse grained sand, numerous gravels, some cobbles								
6			290	6						
		Total Depth = 6.5' No Groundwater Moderate caving from 3-6.5'								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-57

Sheet 1 of 1

Date(s) Excavated	11/6/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	6.5 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			318.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 10 ft; Depth: 6.5 ft			
Remarks TD = 6.5', No GW					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
2	<b>ARTIFICIAL FILL, UNDOCUMENTED (Qafu)</b> 20-30% sub-angular to sub-rounded gravel	WELL GRADED GRAVEL (GW); gray, dry, coarse, some sand	316	2	[Symbol]	[Symbol]				
	Trace rootlets	SILTY SAND (SM); light brown, dry to damp, dense, with numerous fine to coarse grained gravels								
	Road base, hard digging, sub-angular to sub-rounded gravel	SILTY GRAVEL (GM); olive brown, damp, very dense, some fine to coarse grained sand								
6	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b>	SILTY SAND (SM); reddish brown, damp to moist, very dense, fine to coarse grained sand, some gravels	312	6	[Symbol]	[Symbol]				
	<16" sub-rounded cobbles and boulders	Numerous gravels, some cobbles								
		Total Depth = 6.5' No Groundwater Refusal due to the backhoe getting hung-up on cobbles and boulders along with roadbase trench walls								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-58

Sheet 1 of 1

Date(s) Excavated	11/6/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	9.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			292.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 10 ft; Depth: 9 ft			
Remarks TD = 9', No GW					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Numerous rootlets, some krotovina	SILTY SAND (SM); light brown, dry, moderately dense to dense, fine to coarse grained sand									
2	Sub-angular to sub-rounded gravel, unconsolidated sand, moderate caving, severe caving upon contact	WELL GRADED SAND to SILTY SAND (SW/SM); yellowish brown, dry, dense, fine to coarse grained sand, numerous gravels	290	2							
4	Faint cross bedding and lenses of fine grained sand, moderate caving Sub-horizontal lenses of fine gravel	Few gravels	288	4							
6	Trace rootlets Sub-rounded gravels and cobbles <6"	SANDY SILT (ML); gray mottled with orange, dry to damp, very stiff, fine grained sand, with some clay	286	6							
8	Uncemented sand, gravel and cobbles, severe caving <12" sub-rounded cobbles	WELL GRADED SAND to SILTY SAND (SW/SM); yellowish brown, dry to damp, dense but friable, fine to coarse grained sand, some gravel and cobbles  Trace cobbles	284	8							
		Total Depth = 9' No Groundwater Moderately caving 3-4' and severe caving 7-9'									

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-59

Sheet 1 of 1

Date(s) Excavated	11/6/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	4.5 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			281.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 8 ft; Depth: 4.5 ft			
Remarks TD = 4.5', No GW					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
-	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Some <1" thick roots  Thin <0.25" sub-horizontal lenses of fine grained silty sand	SILTY SAND (SM); yellowish brown, dry to damp, very dense, fine to coarse grained sand, few gravels  Dominantly fine grained	-	-	-	-	-	-	-	-
2	cohesionless sand, severe caving, no roots	POORLY GRADED SAND (SP); yellow, dry to damp, dense, fine to medium grained sand	2	2						
-	Sub-horizontal lens of numerous gravel, sub-rounded and trace <5" cobbles	Numerous gravels, trace cobbles  Few gravels	-	-	-	-	-	-	-	-
4		Fine to coarse grained sand	4	4						
		Total Depth = 4.5' No Groundwater Severe caving from 2-4.5'								

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-60

Sheet 1 of 1

Date(s) Excavated	11/8/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	8.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			342.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 8 ft; Depth: 8 ft			
Remarks TD = 8', No GW					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
	<b>OLDER ALLUVIUM/TERRACE DEPOSITS (Qoal/Qtr)</b> Pinhole porosity, some roots, <1" thick, some krotovina	SILTY SAND (SM) with some clay; light brown, dry, fine to medium grained sand, trace gravels									
2	Trace rootlets, no porosity, 10-15% sub-angular to sub-rounded gravels 8% sub-rounded cobbles, ~1% <14" boulders Irregular fracturing along expansion shears Hard digging moderately cemented	SANDY CLAY (CL); reddish brown mottled with orange and yellow, damp, very stiff, fine to medium grained sand, numerous gravel, some cobbles, trace boulders, with silt  Becomes orangish brown, trace coarse sand	340	2							
4	Trace rootlets, less expansion shears observed  No rootlets		338	4							
6	Very hard digging	Slight increase in sand abundance, becomes reddish brown	336	6							
8	~10% sub-rounded to sub-angular gravels, ~5% sub-rounded cobbles	CLAYEY SAND (SC); reddish orange, damp, very stiff to very dense, fine to medium grained sand, numerous gravel, few cobbles	334	8							
	Total Depth = 8' No Groundwater No Caving										

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

Project: PA 3.1 & 3.2  
 Project Location: Rancho Mission Viejo, CA  
 Project Number: 18-150-00

# Log of Test Pit TP-61

Sheet 1 of 1

Date(s) Excavated	11/8/18	Logged By	DW	Checked By	KMF
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	10.0 feet
Sampling Method(s)	BULK	Approx. Surface Elevation, ft MSL			299.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions Width: 3 ft; Length: 9 ft; Depth: 10 ft			
Remarks TD = 10', No GW					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
	<b>OLDER ALLUVIAL/TERRACE DEPOSITS (Qoal/Qtr)</b> Disturbed in upper 2.5 feet due to agricultural use, some rootlets, pinhole porosity, loose due to ripping/discing, severe caving	SILTY SAND (SM); light brown, dry to damp, loose, fine to medium grained sand, trace coarse grained sand, with some clay	298	2							
2	Trace rootlets										
	Depth of disturbance	SANDY SILT (ML); olive mottled with orange, damp, stiff, fine grained sand, with some clay	296								
	No porosity										
4	Slightly cemented	Becomes grayish olive, some medium grained sand, stiff to very stiff	294								
	Trace rootlets, small 0.5" black organics with oxidized boundaries, numerous pinhole porosity		292								
6											
8	Some oxidation	SILTY SAND (SM); olive gray mottled with orange, dry to damp, dense, fine to coarse grained sand, with some clay	290								
	Minor caving, unconsolidated sand										

TP\_REV1 18-150-00.GPJ GM&J.GDT 11/16/18

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# APPENDIX A-2

## Previously Performed Geotechnical Exploration Logs

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Project: **RMV Planning Area 3**  
 Project Location: **Rancho Mission Viejo, Ca.**  
 Project Number: **14-001-00**

# Log of Test Pit TP-1

Sheet 1 of 1

Date(s) Excavated <b>7/7/2014</b>	Logged By <b>KMF</b>	Checked By
Excavation Equipment <b>Backhoe</b>	Excavation Contractor <b>JES Engineering</b>	Total Depth of Test Pit <b>5.5 feet</b>
Sampling Method(s)	Approx. Surface Elevation, ft MSL <b>335.0</b>	
Groundwater Depth [Elevation], feet	Test Pit Dimensions <b>Width: 2 ft; Length: 13 ft; Depth: 5.5 ft</b>	
Remarks		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
2	<b>ARTIFICIAL FILL, UNDOCUMENTED (Qaf)</b>	SILTY SAND to SANDY SILT (SM to ML); light brown, dry to damp, fine to coarse grained sand, some trash	334		[Soil Symbol: Dotted pattern]	[Sample]				
		SILTY SAND to SANDY SILT (SM to ML); light reddish brown, damp to moist, medium dense, fine to medium grained sand with some coarse grained sand and subangular to subrounded gravel to cobbles up to 8 inches in diameter, minor amounts of trash and asphalt pieces	332							
4	<b>TERRACE DEPOSITS (Qt)</b>	SILTY SAND (SM); reddish brown, damp, fine to medium grained sand with some coarse grained sand, numerous subrounded gravel and cobbles up to 10 inches in diameter and rare boulders up to 18 inches in diameter	330							

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18



Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-2

Sheet 1 of 1

Date(s) Excavated 7/7/2014	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor JES Engineering	Total Depth of Test Pit 7.0 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 310.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: 3 ft; Depth: 7 ft	
Remarks		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>ARTIFICIAL FILL, UNDOCUMENTED (Qaf)</b>	3/4 inch crushed gravel parking lot base								
		SILTY GRAVEL with SAND (GM); reddish brown, damp, medium dense/soft, abundant subangular to subrounded gravel and cobbles up to 8 inches in diameter								
2	<b>TERRACE DEPOSITS (Qt)</b>	SILTY SAND to SANDY SILT (SM to ML); light brown, damp to moist, medium dense, abundant gravel and some cobbles up to 6 inches in diameter, rare boulders up to 18 inches in diameter	308	2						
4			306	4						
6			304	6						

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-3

Sheet 1 of 1

Date(s) Excavated 7/7/2014	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor JES Engineering	Total Depth of Test Pit 6.0 feet
Sampling Method(s)		Approx. Surface Elevation, ft MSL 298.0
Groundwater Depth [Elevation], feet N/A □	Test Pit Dimensions Width: 2 ft; Length: 10.5 ft; Depth: 6 ft	
Remarks		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
2	<b>ARTIFICIAL FILL, UNDOCUMENTED (Qaf)</b>	SILTY SAND (SM); light grayish brown, dry to damp, loose, fine to medium grained sand	296	2						
4	<b>TERRACE DEPOSITS (Qtr)</b>  Slight caving	SILT (ML); gray and orange, dry, soft  SAND to SILTY SAND (SP/SM); light grayish brown, dry to damp, loose, fine to medium grained sand, some coarse grained sand	294	4						
6		Total Depth = 6' No Groundwater Some caving at 4'	292	6						

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-4

Sheet 1 of 1

Date(s) Excavated 7/7/2014	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor JES Engineering	Total Depth of Test Pit 6.5 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 294.0	
Groundwater Depth [Elevation], feet N/A □	Test Pit Dimensions Width: 2 ft; Length: 10 ft; Depth: 6.5 ft	
Remarks		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS	
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf			
	<b>ARTIFICIAL FILL/DISTURBED SOIL (Qaf)</b>	SANDY SILT (ML); light grayish brown, dry to damp, firm, fine to medium grained sand										
	<b>TERRACE DEPOSITS (Qtr)</b>	SANDY SILT to SILTY SAND (ML/SM); light brown with some orange mottles, damp, firm to medium dense, fine grained sand										
2			292	2								
4	Slight caving	SAND to SILTY SAND (SP/SM); light brownish gray with some orange staining, damp to moist, loose, fine to medium grained sand	290	4								
6			288	6								
		Total Depth = 6.5' No Groundwater Slight caving at 4'										

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-10

Sheet 1 of 2

Date(s) Excavated	8/11/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	11.0 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	294.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions	Width: 2 ft; Length: 13 ft; Depth: 11 ft		
Remarks					


DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<u>TOPSOIL</u>	SILTY SAND (SM); brown, dry, medium dense, fine to coarse grained sand, few gravels and cobbles								
2	<u>OLDER ALLUVIUM DEPOSITS/TERRACE DEPOSITS (Qoal/Qtr)</u> gravels are sub-angular to sub-rounded, cobbles are up to 10" in diameter	SAND to SILTY SAND (SP/SM); brownish gray, damp, medium dense, fine to coarse grained sand, some gravels and cobbles	292	2						
4	Some pores	lense of SILTY SAND (SM); brown, damp, medium dense, fine grained sand, some pores	290	4						
6			288	6						
8		CLAYEY SAND (SC); reddish brown, damp, fine to medium grained sand	286	8						

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-10

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	TEST DATA				
						SAMPLE	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	Hard digging, gravels are sub-angular to sub-rounded, cobbles are up to 10" in diameter Practical refusal at 11' due to abundant cobbles	CLAYEY SAND with COBBLES (SC); reddish brown to brown, moist, dense, fine to coarse grained sand, numerous gravels and cobbles								
		Total Depth = 11' No Groundwater No Caving								

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-11

Sheet 1 of 2

Date(s) Excavated	8/11/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	15.5 feet
Sampling Method(s)	Bulk			Approx. Surface Elevation, ft MSL	295.0
Groundwater Depth [Elevation], feet	N/A □	Test Pit Dimensions	Width: 2 ft; Length: 17 ft; Depth: 15.5 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0 - 2	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND (SM); brown, damp, medium dense, fine to coarse grained sand	294	2						
2 - 4	<u>OLDER ALLUVIUM DEPOSITS/TERRACE DEPOSITS (Qoal/Qtr)</u>	SILTY SAND (SM); brownish gray, damp, medium dense, fine to medium grained sand	292	4						
4 - 6			290	6						
6 - 8			288	8						
8 - 10			286							

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-11

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	Sub-rounded to sub-angular gravel and cobble up to 12 inches in diameter with most about 5 inches in diameter or less	SAND to SILTY SAND (SP to SM); brownish gray, damp, fine to medium grained sand, some gravel and cobble		284						
12	Gravels up to 1" in diameter	SAND (SP); brownish gray, damp, medium dense, fine to coarse grained sand, numerous gravels		12						
		Fine to medium grained sand, less gravel, no cobbles		282						
14		Some coarse grained sand, increase in fine gravels		14						
	Minor caving			280						
		Total Depth = 15.5' No Groundwater Minor Caving at 15'								

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-12

Sheet 1 of 1

Date(s) Excavated 8/14/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 4.5 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 295.0	
Groundwater Depth [Elevation], feet N/A □	Test Pit Dimensions Width: 2 ft; Length: 6 ft; Depth: 4.5 ft	
Remarks Infiltration test conducted		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND (SM); brown, damp, medium dense, fine to medium grained sand									
	<u>OLDER ALLUVIUM DEPOSITS/TERRACE DEPOSITS (Qoal/Qtr)</u>	SILTY SAND (SM); brown, damp, medium dense, fine to medium grained sand, some coarse grained sand	294	2							
			292	4							
		Total Depth = 4.5' No Groundwater No Caving									

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18



Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-13

Sheet 1 of 1

Date(s) Excavated	8/14/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	4.5 feet
Sampling Method(s)	Bulk			Approx. Surface Elevation, ft MSL	291.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: 6 ft; Depth: 4.5 ft		
Remarks	Infiltration test conducted				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
	<u>TOPSOIL/DISTURBED SOIL</u>	some trash and debris in upper 6 inches									
	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND (SM); brown, damp, medium dense, fine to medium grained sand with some coarse grained sand moist	290	2							
2											
			288								
4											

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: **RMV Planning Area 3**  
 Project Location: **Rancho Mission Viejo, Ca.**  
 Project Number: **14-001-00**

# Log of Test Pit TP-14

Sheet 1 of 1

Date(s) Excavated	8/14/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	4.5 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	290.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: 6 ft; Depth: 4.5 ft		
Remarks	Infiltration test conducted				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS	
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf			
	<b>ARTIFICIAL FILL(Qaf)</b>	SILTY SAND (SM); brown, dry to damp, abundant trash and debris										
2	<b>RECENT TERRACE DEPOSITS (Qtr)</b>	SAND (SW); gray brown to orange brown, damp, medium dense, fine to coarse grained sand, some rootlets, some lenses of fine grained silty sand	288	2								
4			286	4								
		Total Depth 4.5 feet No Water No Caving										

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-15

Sheet 1 of 2

Date(s) Excavated	8/14/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	13.5 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	300.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: 15 ft; Depth: 13.5 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND (SM); brown, dry to damp, medium dense, fine to medium grained sand with some coarse grained sand								
2	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND to SAND (SM to SP); orangish brown, damp, loose to medium dense, fine grained sand	298	2						
4		SILTY SAND (SM); gray brown and orange brown, damp, medium dense to dense, fine grained sand	296	4						
6			294	6						
8		SAND (SP); gray brown, damp, medium dense, fine to medium grained sand	292	8						

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-15

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
12		continues to be SAND (SP); gray brown, damp, medium dense, fine to medium grained sand	288	12						
		SAND (SP); brownish gray, moist, medium dense, fine grained sand with some medium grained sand								
		Total Depth 13.5 feet No Water No Caving								

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-16

Sheet 1 of 1

Date(s) Excavated 8/14/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 4.5 feet
Sampling Method(s)		Approx. Surface Elevation, ft MSL 301.0
Groundwater Depth [Elevation], feet N/A □	Test Pit Dimensions Width: 2 ft; Length: 6 ft; Depth: 4.5 ft	
Remarks Infiltration test conducted		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
2	ARTIFICIAL FILL (Qaf) some trash and debris	SILTY SAND to CLAYEY SAND (SM to SC); brown, dry, medium dense, fine to medium grained sand, some coarse grained sand	300	2	[Soil Symbol]	[Sample]	[Moisture Content]	[Dry Unit Weight]	[Maximum Density]	[Additional Tests]
4			298	4						
		Total Depth = 4.5' No Groundwater No Caving								

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: **RMV Planning Area 3**  
 Project Location: **Rancho Mission Viejo, Ca.**  
 Project Number: **14-001-00**

# Log of Test Pit TP-17

Sheet 1 of 1

Date(s) Excavated <b>8/14/2017</b>	Logged By <b>KMF</b>	Checked By
Excavation Equipment <b>Backhoe</b>	Excavation Contractor <b>RMV</b>	Total Depth of Test Pit <b>6.5 feet</b>
Sampling Method(s)	Approx. Surface Elevation, ft MSL <b>305.0</b>	
Groundwater Depth [Elevation], feet	Test Pit Dimensions <b>Width: 2 ft; Length: 7 ft; Depth: 6.5 ft</b>	
Remarks <b>Infiltration test conducted</b>		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>TOPSOIL/DISTURBED SOIL</b>	SILTY SAND (SM); brown, dry to damp, medium dense, fine to medium grained sand with some coarse grained sand and some clay	304							
2	<b>RECENT TERRACE DEPOSITS (Qtr)</b>	SILTY SAND (SM); orangey brown to brown, moist, medium dense contains some interbedded lenses of SAND (SP); gray, moist, medium dense	302	2						
4			300	4						
6				6						
		Total Depth 6.5 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-18

Sheet 1 of 2

Date(s) Excavated	8/14/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	12.5 feet
Sampling Method(s)	Bulk			Approx. Surface Elevation, ft MSL	309.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: 15 ft; Depth: 12.5 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0 - 2	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND to CLAYEY SAND (SM to SC); brown, dry to damp, medium dense, rootlets and pores	308	2						
2 - 4	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND (SM); brown, moist, medium dense, fine to medium grained sand with some coarse grained sand	306	4						
4 - 6	caving	SAND (SP); brownish gray to grayish brown, damp to moist, fine to coarse grained sand	304	6						
6 - 8			302	8						
8 - 10			300							

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-18

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
12	refusal due to constant caving	continues to be SAND (SP); brownish gray to grayish brown, damp to moist, fine to coarse grained sand	298	12						
		Total Depth 12.5 feet No Water Heavy Caving at 5 feet								

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18



Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-19

Sheet 1 of 1

Date(s) Excavated 8/14/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 7.0 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 315.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: 9 ft; Depth: 7 ft	
Remarks Infiltration test conducted		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND (SM); brown, dry to damp, fine to coarse grained sand, rootlets and pores	314							
2	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SILTY SAND (SM); brown, damp to moist, fine to coarse grained sand	312							
4			310							
6		CLAYEY SAND (SC); reddish brown, damp to moist, dense, fine to coarse grained sand, hard digging	308							
		Total Depth 7 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: **RMV Planning Area 3**  
 Project Location: **Rancho Mission Viejo, Ca.**  
 Project Number: **14-001-00**

# Log of Test Pit TP-20

Sheet 1 of 2

Date(s) Excavated	8/14/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	14.5 feet
Sampling Method(s)	Bulk	Approx. Surface Elevation, ft MSL			314.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: 15 ft; Depth: 14.5 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>TOPSOIL/DISTURBED SOIL</b>	SILTY SAND (SM); brown, dry to damp, medium dense, fine to coarse grained sand								
2	<b>RECENT TERRACE DEPOSITS (Qtr)</b>	SILTY SAND to SAND (SM to SP); light brown, damp, medium dense, fine to coarse grained sand	312	2						
4		laminated sands, reduction in fines	310	4						
6		SAND (SW); very light grayish brown, damp to moist, fine to coarse grained sand	308	6						
8	minor caving		306	8						

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-20

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
12		SAND (SW); very light grayish brown, moist, fine to coarse grained sand	302	12						
14			300	14						
		Total Depth 14.5 feet No Water Slight Caving at 8 feet								

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-23

Sheet 1 of 1

Date(s) Excavated	8/15/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	5.0 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	328.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: 7 ft; Depth: 5 ft		
Remarks	Infiltration test conducted				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>ARTIFICIAL FILL(Qaf)</b>	SILTY SAND to CLAYEY SAND (SM to SC); brown, dry to damp, fine to medium grained sand, some debris in the upper 1 foot								
2	<b>RECENT TERRACE DEPOSITS (Qtr)</b>	SILTY SAND to CLAYEY SAND (SM to SC); brown to dark brown, moist, medium dense, fine grained sand with some medium grained sand, slightly porous, few roots	326	2						
4			324	4						
		Total Depth 5 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-24

Sheet 1 of 2

Date(s) Excavated	8/15/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	11.0 feet
Sampling Method(s)	Bulk			Approx. Surface Elevation, ft MSL	328.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: 13 ft; Depth: 11 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
2	<b>ARTIFICIAL FILL(Qaf)</b>	CLAYEY SAND (SC); light gray brown, dry, fine to coarse grained sand	326	2							
		layer of 3/4 inch gravel									
4	<b>RECENT TERRACE DEPOSITS (Qtr)</b>	CLAYEY SAND (SC); brown, moist, dense, fine to coarse grained sand, very slight organic smell	324	4							
6			322	6							
8		SILTY SAND to SANDY SILT (SM to ML); olive brown, moist, firm, very fine grained to fine grained sand, some orangey brown mottles	320	8							

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

## Log of Test Pit TP-24

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
		continues to be SILTY SAND to SANDY SILT (SM to ML); olive brown, moist, firm, very fine grained to fine grained sand, some orangey brown mottles								
		Total Depth 11 feet No Water No Caving								

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-25

Sheet 1 of 1

Date(s) Excavated 8/15/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 10.0 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 331.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: 12 ft; Depth: 10 ft	
Remarks		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0 - 2	<u>ARTIFICIAL FILL (Qaf)</u>	CLAYEY SAND to SILTY SAND (SC to SM); brown to reddish brown, damp, medium dense, fine to coarse grained sand, some angular gravels, porous, roots, minor debris	330	2						
2 - 4	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	SANDY CLAY to CLAYEY SAND (CL to SC); reddish brown, moist, firm to stiff, fine grained sand with some coarse grained sand, rare fine gravel, porous, rootlets	328	4						
4 - 6			326	6						
6 - 8			324	8						
8 - 10	practical refusal due to abundance of boulders	SANDY GRAVEL (GP); reddish brown, damp to moist, fine to coarse grained sand, some clay, abundant gravel, cobbles, and boulders up to 2 feet in diameter  Refusal at 10 feet No Water No Caving	322	10						

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-26

Sheet 1 of 1

Date(s) Excavated	8/15/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	5.5 feet
Sampling Method(s)	Bulk			Approx. Surface Elevation, ft MSL	340.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: 7 ft; Depth: 5.5 ft		
Remarks	Infiltration test conducted				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<u>TOPSOIL/DISTURBED SOIL</u>	SILTY SAND to CLAYEY SAND (SM to SC); brown, dry to damp, medium dense, fine to medium grained sand with some coarse grained sand, rare gravel up to 3 inches in diameter, porous, roots								
2	<u>RECENT TERRACE DEPOSITS (Qtr)</u>	CLAYEY SAND to SANDY CLAY (SC to CL); reddish brown, damp, medium dense/stiff, fine to medium grained sand with some coarse grained sand, porous, rootlets	338	2						
4		SANDY CLAY (CL); reddish brown, moist, stiff/dense	336	4						
		Total Depth 5.5 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18



Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-27

Sheet 1 of 1

Date(s) Excavated 8/15/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 8.0 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 316.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: 10 ft; Depth: 8 ft	
Remarks		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>ARTIFICIAL FILL(Qaf)</b>	SANDY SILT (ML); olive brown with orange brown staining, dry, stiff, fine grained sand, rare fine gravel								
2		moist	314	2						
4			312	4						
6			310	6						
8	refusal on concrete	CONCRETE	308	8						
		Refusal at 8 feet No Water No Caving								

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-28

Sheet 1 of 1

Date(s) Excavated <b>8/15/2017</b>	Logged By <b>KMF</b>	Checked By
Excavation Equipment <b>Backhoe</b>	Excavation Contractor <b>RMV</b>	Total Depth of Test Pit <b>3.0 feet</b>
Sampling Method(s)		Approx. Surface Elevation, ft MSL <b>305.0</b>
Groundwater Depth [Elevation], feet	Test Pit Dimensions <b>Width: 2 ft; Length: 4 ft; Depth: 3 ft</b>	
Remarks		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
	<b>ARTIFICIAL FILL(Qaf)</b>	SILTY SAND to SANDY SILT (SM to ML); light brown, damp, loose to medium dense, fine to medium grained sand	304	2							
	refusal on concrete	CONCRETE	302								
		Refusal at 3 feet No Water No Caving									

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-29

Sheet 1 of 2

Date(s) Excavated	8/15/2017	Logged By	KMF	Checked By	
Excavation Equipment	Backhoe	Excavation Contractor	RMV	Total Depth of Test Pit	12.0 feet
Sampling Method(s)	Bulk	Approx. Surface Elevation, ft MSL			307.0
Groundwater Depth [Elevation], feet		Test Pit Dimensions	Width: 2 ft; Length: 15 ft; Depth: 12 ft		
Remarks	Seperate test pit dug to 5' adjacent for Infiltration testing				

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS	
0	<b>ARTIFICIAL FILL(Qaf)</b>	SANDY SILT to SILTY SAND (ML to SM); light brown, dry to damp, loose, very fine grained to fine grained sand, rootlets and pores	306	0							
2			304	2							
4			302	4							
6			300	6							
8			300	8							
				continues to be SANDY SILT to SILTY SAND (ML to SM); light brown, dry to damp, loose, very fine grained to fine grained sand			298				

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Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

## Log of Test Pit TP-29

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
12		thinly laminated SILTS, CLAYS, and SANDS (ML, CL, and SP); brown to light brown, dense, very fine grained sand	296								
		Total Depth 12 feet No Water No Caving		12							

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-30

Sheet 1 of 2

Date(s) Excavated 8/15/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 11.0 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 308.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: 13 ft; Depth: 11 ft	
Remarks		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
2	<b>ARTIFICIAL FILL(Qaf)</b> base material in upper 6 to 8 inches	GRAVELLY SAND (SP); brown, moist, loose to medium dense, fine to coarse grained sand, some clay and silt, abundant 1/2 inch to 3/4 inch gravel	306	2	[Soil Symbol: Fine to coarse grained sand with gravel]					
4			304	4						
6		increase in gravel and cobbles up to 6 inches in diameter, some metal and plastic debris	302	6	[Soil Symbol: Sand with gravel and cobbles]					
8			300	8						

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-30

Sheet 2 of 2

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
		Total Depth 11 feet No Water No Caving								

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

Project: RMV Planning Area 3  
 Project Location: Rancho Mission Viejo, Ca.  
 Project Number: 14-001-00

# Log of Test Pit TP-31

Sheet 1 of 1

Date(s) Excavated 8/15/2017	Logged By KMF	Checked By
Excavation Equipment Backhoe	Excavation Contractor RMV	Total Depth of Test Pit 8.5 feet
Sampling Method(s)	Approx. Surface Elevation, ft MSL 298.0	
Groundwater Depth [Elevation], feet	Test Pit Dimensions Width: 2 ft; Length: 10 ft; Depth: 8.5 ft	
Remarks Seperate test pit dug to 5' adjacent for Infiltration testing		

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>ARTIFICIAL FILL(Qaf)</b>	SAND (SP); light brown, dry, loose, abundant gravel, some roots								
2	heavy caving		296	2						
4	decrease in caving	some cobbles	294	4						
6		SAND (SW); light brown, moist, loose, fine to coarse grained sand, some gravel and cobbles	292	6						
8		increase in gravel and cobbles	290	8						
		Total Depth 8.5 No Water Heavy caving in upper 3 feet, minor caving below 3 feet								

TP\_REV1 14-001-00.GPJ GM&J.GDT 11/16/18

**Project: Greenstone Rock Crushing Facility**

**Project Location: Ortega Highway**

**Project Number: 10-153-00**

# Log of Test Pit TP-1

Sheet 1 of 1

Date(s) Excavated	12/28/10	Logged By	KMF	Checked By	ART
Excavation Equipment	Backhoe	Excavation Contractor	Mike's Geotechnical Backhoe Service	Total Depth of Test Pit	4.0 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	301.0
Groundwater Depth [Elevation], feet	NA □	Test Pit Dimensions	Width: 2 ft; Length: 4 ft; Depth: 4 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA				ADDITIONAL TESTS
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf		
	<u>TOPSOIL</u>	Silty Sand (SM); brown grey to orange brown, moist, loose to medium dense, fine to medium grained	300								
2	<u>OLDER ALLUVIUM (Qoa)</u>	Well Graded Sand (SW); grey to brown grey to orange grey, slightly moist, medium dense, fine to course grained, some gravel and rare cobbles	298	2							
4	increase in gravel			4							

TP\_REV1 P-10180.GPJ GM&U.GDT 11/16/18



**Project: Greenstone Rock Crushing Facility**

**Project Location: Ortega Highway**

**Project Number: 10-153-00**

# Log of Test Pit TP-2

Sheet 1 of 1

Date(s) Excavated	12/28/10	Logged By	KMF	Checked By	ART
Excavation Equipment	Backhoe	Excavation Contractor	Mike's Geotechnical Backhoe Service	Total Depth of Test Pit	6.5 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	300.0
Groundwater Depth [Elevation], feet	NA □	Test Pit Dimensions	Width: 4 ft; Length: 10 ft; Depth: 6.5 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0 - 2	<b>TOPSOIL</b>	Silty Sand (SM); brown to orangy brown, moist, medium dense, fine to medium grained								
2 - 6.5	<b>OLDER ALLUVIUM (Qoa)</b> some caving  layers of finer and course sand with some more gravelly layers  total caving below 6.5 feet	Well Graded Sand (SW); grey to brown grey to orangy grey, slightly moist to moist, medium dense, fine to course grained, some gravel and cobbles	298	2						
			296	4						
			294	6						

TP\_REV1 P-10180.GPJ GM&U.GDT 11/16/18



**Project: Greenstone Rock Crushing Facility**

**Project Location: Ortega Highway**

**Project Number: 10-153-00**

# Log of Test Pit TP-3

Sheet 1 of 1

Date(s) Excavated	12/28/10	Logged By	KMF	Checked By	ART
Excavation Equipment	Backhoe	Excavation Contractor	Mike's Geotechnical Backhoe Service	Total Depth of Test Pit	4.0 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	301.0
Groundwater Depth [Elevation], feet	NA □	Test Pit Dimensions	Width: 2 ft; Length: 4 ft; Depth: 4 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
2	<u>TOPSOIL</u>	Silty Sand (SM); brown, moist, loose to medium dense, fine to course grained	300	2						
4	<u>OLDER ALLUVIUM (Qoal)</u>	Well Graded Sand (SW); greyish brown, slightly moist to moist, medium dense, fine to course grained, some gravel	298	4						

TP\_REV1 P-10180.GPJ GM&U.GDT 11/16/18

**Project: Greenstone Rock Crushing Facility**

**Project Location: Ortega Highway**

**Project Number: 10-153-00**

# Log of Test Pit TP-4

Sheet 1 of 1

Date(s) Excavated	12/28/10	Logged By	KMF	Checked By	ART
Excavation Equipment	Backhoe	Excavation Contractor	Mike's Geotechnical Backhoe Service	Total Depth of Test Pit	7.0 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	302.0
Groundwater Depth [Elevation], feet	NA □	Test Pit Dimensions	Width: 3 ft; Length: 8 ft; Depth: 7 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0 - 2	<b>TOPSOIL</b>	Silty Sand (SM); brown grey to orange brown, moist, loose to medium dense	300	2	[Symbol]					
2 - 4	<b>OLDER ALLUVIUM (Qoa)</b> caving at 3 feet, gravel and cobbles up to 6", sand is laminated	Well Graded Sand (SW); grey to orange grey, slightly moist, medium dense, fine to medium grained with some gravel and cobbles	298	4	[Symbol]					
4 - 6	Some siltier patches at 5 to 6 feet									
6 - 7	Total caving below 7'		296	6						

TP\_REV1 P-10180.GPJ GM&U.GDT 11/16/18



**Project: Greenstone Rock Crushing Facility**

**Project Location: Ortega Highway**

**Project Number: 10-153-00**

# Log of Test Pit TP-5

Sheet 1 of 1

Date(s) Excavated	12/28/10	Logged By	KMF	Checked By	ART
Excavation Equipment	Backhoe	Excavation Contractor	Mike's Geotechnical Backhoe Service	Total Depth of Test Pit	6.5 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	304.0
Groundwater Depth [Elevation], feet	NA □	Test Pit Dimensions	Width: 4 ft; Length: 10 ft; Depth: 6.5 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
	<b>TOPSOIL</b>	Silty Sand (SM); Brown, moist, loose to medium dense, numerous rootlets								
2	<b>OLDER ALLUVIUM (Qoa)</b> subrounded to rounded gravel and cobbles, finer grained to 3 feet, caving within sand	Well Graded Sand (SW); grey to orangy grey, slightly moist to moist, medium dense, fine to course grained with some gravel and cobbles	302	2						
4	lense of courser grained sand  finer grained		300	4						
6	total caving below 7 feet		298	6						

TP\_REV1 P-10180.GPJ GM&U.GDT 11/16/18



**Project: Greenstone Rock Crushing Facility**

**Project Location: Ortega Highway**

**Project Number: 10-153-00**

# Log of Test Pit TP-6

Sheet 1 of 1

Date(s) Excavated	12/28/10	Logged By	KMF	Checked By	ART
Excavation Equipment	Backhoe	Excavation Contractor	Mike's Geotechnical Backhoe Service	Total Depth of Test Pit	7.5 feet
Sampling Method(s)				Approx. Surface Elevation, ft MSL	308.0
Groundwater Depth [Elevation], feet	NA □	Test Pit Dimensions	Width: 4.5 ft; Length: 10 ft; Depth: 7.5 ft		
Remarks					

DEPTH, feet	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ENGINEERING CLASSIFICATION AND DESCRIPTION	ELEVATION, feet	DEPTH, feet	SOIL SYMBOL	SAMPLE	TEST DATA			
							MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	MAXIMUM DENSITY, pcf	ADDITIONAL TESTS
0 - 2	<b>TOPSOIL</b> sandier than previous test pits  some caving	Silty Sand (SM); brown, moist, loose to medium dense, fine to course grained	306	2	[Symbol]					
2 - 4	<b>OLDER ALLUVIUM (Qoa)</b> less gravel and cobbles than previous test pits  some rootlets  some siltier layers, darker, more dense	Well Graded Sand (SW); greyish brown, slightly moist to moist, medium dense, fine to course grained, some gravel and cobble	304	4	[Symbol]					
4 - 6	layer of very clean sand, whitish grey to yellowish grey, moist, medium grained		302	6	[Symbol]					
6 - 7.5	total caving below 7.5 feet									

TP\_REV1 P-10180.GPJ GM&U.GDT 11/16/18



THE RANCH PLAN PLANNED COMMUNITY  
PLANNING AREAS 3 AND 4 RUNOFF MANAGEMENT PLAN



**Michael Baker**  
INTERNATIONAL

**TECHNICAL APPENDIX N.5**

**Infiltration Investigation Location Maps**



**GEOTECHNICAL LEGEND**

- 
 TP-15 (14-001-00) APPROXIMATE LOCATION OF TEST PIT
- 
 TP-15 (14-001-00) APPROXIMATE LOCATION OF INFILTRATION TEST PIT



**Michael Baker**



**INTERNATIONAL**

5 Hutton Centre Drive, Suite 500  
 Santa Ana, CA 92707  
 (949) 472-3505 · MBAKERINTL.COM

**RANCHO MISSION VIEJO  
 INVESTIGATION LOCATION MAP**



**GEOTECHNICAL LEGEND**

- 
 TP-15 (14-001-00) APPROXIMATE LOCATION OF TEST PIT
- 
 TP-15 (14-001-00) APPROXIMATE LOCATION OF INFILTRATION TEST PIT



**Michael Baker**

**INTERNATIONAL**



5 Hutton Centre Drive, Suite 500  
 Santa Ana, CA 92707  
 (949) 472-3505 · MBAKERINTL.COM

**RANCHO MISSION VIEJO  
 INVESTIGATION LOCATION MAP**





**GEOTECHNICAL LEGEND**

- 
 TP-15 (14-001-00) APPROXIMATE LOCATION OF TEST PIT
- 
 TP-15 (14-001-00) APPROXIMATE LOCATION OF INFILTRATION TEST PIT

**Michael Baker**

**INTERNATIONAL**



5 Hutton Centre Drive, Suite 500  
 Santa Ana, CA 92707  
 (949) 472-3505 · MBAKERINTL.COM



**RANCHO MISSION VIEJO  
 INVESTIGATION LOCATION MAP**



**GEOTECHNICAL LEGEND**

- 
 TP-15 (14-001-00) APPROXIMATE LOCATION OF TEST PIT
- 
 TP-15 (14-001-00) APPROXIMATE LOCATION OF INFILTRATION TEST PIT

**Michael Baker**

**INTERNATIONAL**

5 Hutton Centre Drive, Suite 500  
 Santa Ana, CA 92707  
 (949) 472-3505 · MBAKERINTL.COM



**RANCHO MISSION VIEJO  
 INVESTIGATION LOCATION MAP**