LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. It should be noted that it is the responsibility of the owner or his representative to notify ***KC ENGINEERING CO.***, in writing, a minimum of two working days before any clearing, grading, or foundation excavation operations can commence at the site.

2. The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed in the borings and from a reconnaissance of the site. Should any variations or undesirable conditions be encountered during the development of the site, ***KC ENGINEERING CO.***, will provide supplemental recommendations as dictated by the field conditions.

3. This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information and recommendations contained herein are brought to the attention of the Architect and Engineer for the project and incorporated into the plans and that the necessary steps are taken to see that the Contractor and Subcontractors carry out such recommendations in the field.

4. At the present date, the findings of this report are valid for the property investigated. With the passage of time, significant changes in the conditions of a property can occur due to natural processes or works of man on this or adjacent properties. In addition, legislation or the broadening of knowledge may result in changes in applicable standards. Changes outside of our control may render this report invalid, wholly or partially. Therefore, this report should not be considered valid after a period of two (2) years without our review, nor should it be used, or is it applicable, for any properties other than those investigated.

5. Not withstanding, all the foregoing applicable codes must be adhered to at all times.

APPENDIX

Aerial Vicinity Map

Site Plan

Log of Test Borings

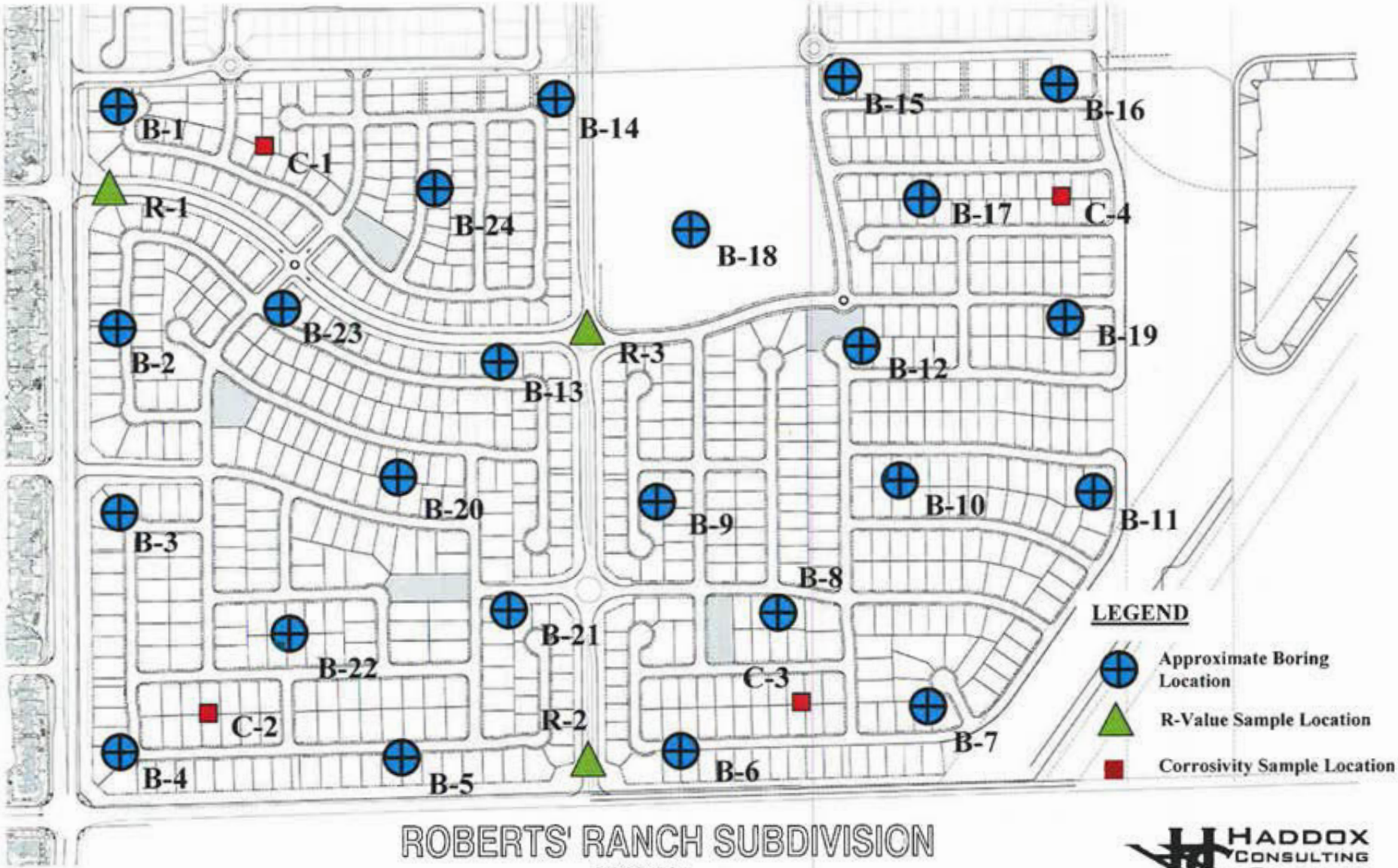
Subsurface Exploration Legend

Laboratory Test Results

USGS Seismic Design Map Report

KC ENGINEERING COMPANY
865 Cotting Lane, Suite A
Vacaville, CA 95688
707.447.4025

Project No. VV4006
Proposed Roberts' Ranch Subdivision
Leisure Town Road & Fry Road
Vacaville, California
Figure 1 – AERIAL VICINITY MAP



ROBERTS' RANCH SUBDIVISION

1/26/2016

HADDOX CONSULTING ENGINEERS

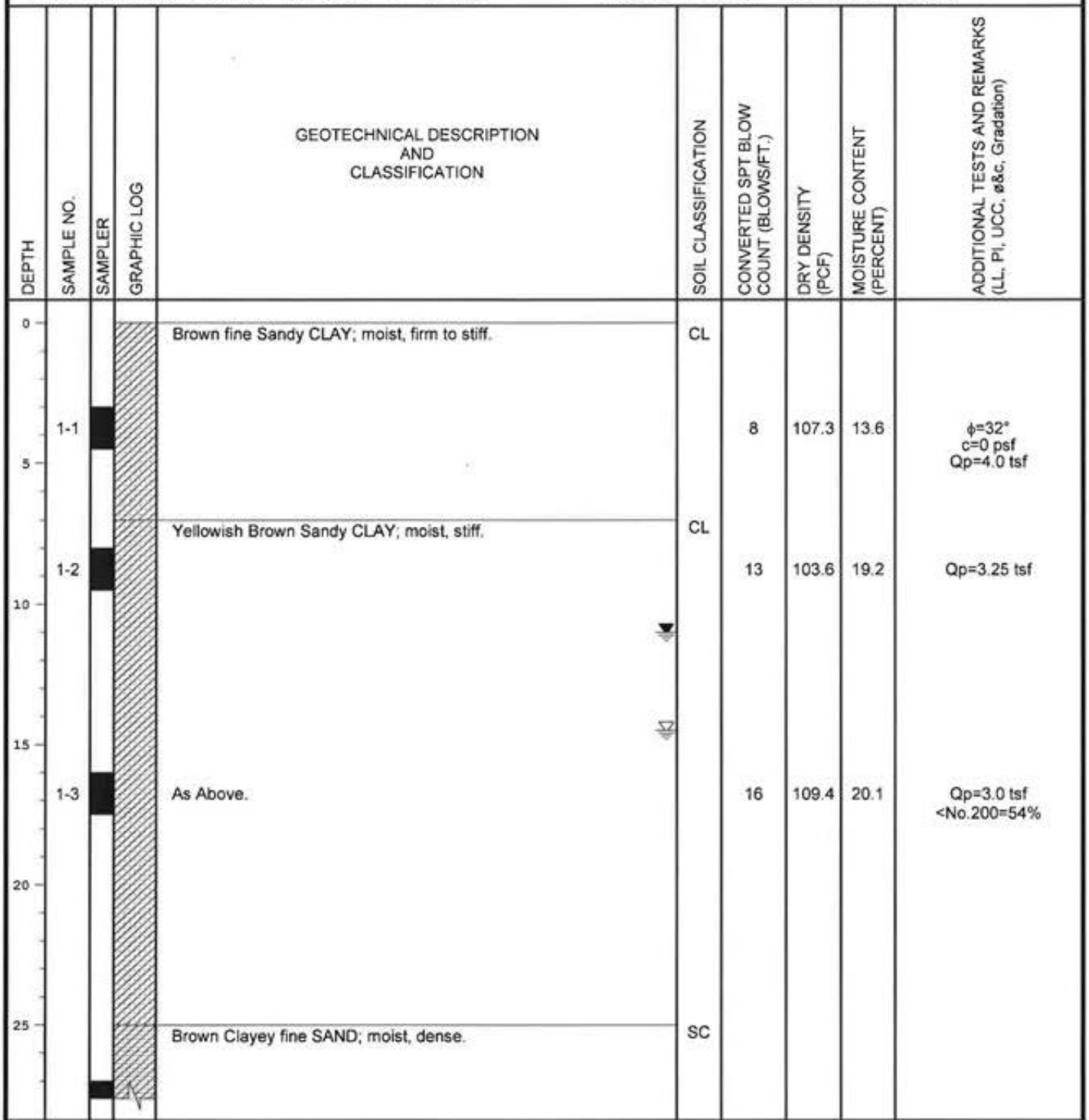
KC ENGINEERING COMPANY
865 Cotting Lane, Suite A
Vacaville, CA 95688
707-447-4025

Project No. VV4006
Proposed Roberts' Ranch Subdivision
Leisure Town Road & Fry Road
Vacaville, California
Figure 2 – SITE PLAN

LOG OF TEST BORING
BORING NO.: 1

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 14.5

PROJECT NO.: VV4006
DATE: 03/02/16
ELEVATION: n/a
LOGGED BY: DVC
BORING DIAMETER: 4"
FINAL ▼ : 11' AFTER: 7 days



This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 3

LOG OF TEST BORING
BORING NO.: 1

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 14.5

PROJECT NO.: VV4006
DATE: 03/02/16
ELEVATION: n/a
LOGGED BY: DVC
BORING DIAMETER: 4"
FINAL ▽ : 11' AFTER: 7 days

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
	1-4					41	116.4	16.3	
30									
35									
	1-5			As Above.		44			
40				Boring Terminated @ 40'. Groundwater encountered @ 14½'.					
45									
50									
55									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 3

LOG OF TEST BORING
BORING NO.: 2

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ :

PROJECT NO.: VV4006
DATE: 03/02/16
ELEVATION: n/a
LOGGED BY: DVC
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, top 2' soft then stiff to very stiff.	CL				
	2-1					18	113.4	16.5	Qp=2.5 tsf
5				Mottled Yellowish Brown Sandy CLAY w/ Calcium; hardpan, moist.	CL				
	2-2					48			Qp=4.0 tsf
10				Mottled Yellowish Brown Sandy CLAY; very moist, very stiff.	CL				
15	2-3					18	102.9	22.9	Qp=2.5 tsf
				Boring Terminated @ 16½'. No Groundwater Encountered.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 4

LOG OF TEST BORING
BORING NO.: 3

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ :

PROJECT NO.: VV4006
DATE: 03/02/16
ELEVATION: n/a
LOGGED BY: DVC
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, top 2' soft then firm to stiff.	CL-CH				
	3-1					7	96.9	24.3	UCC=3,017 psf
5				Mottled Yellowish Brown Clayey SILT; moist, hardpan.	CL				
	3-2					52	119.5	14.6	
10				Brown Silty CLAY; very moist, very stiff.	CL				
	3-3					18	105.7	21.3	
				Boring Terminated @ 13½'. No Groundwater Encountered.					
15									
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 5

LOG OF TEST BORING
BORING NO.: 4

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 15'

PROJECT NO.: VV4006
DATE: 03/02/16
ELEVATION: n/a
LOGGED BY: DVC
BORING DIAMETER: 4"
FINAL ▽ : 10' AFTER: 7 days

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Yellowish Brown CLAY; moist, soft in top 2' then very stiff.	CH				
5	4-1					20			LL=55% PI=36 <No.200=94% Qp=3.25 tsf
				Yellowish Brown Sandy CLAY; very moist, very stiff.	CL				
10	4-2					22	94.8	28.4	Qp=3.25 tsf
15				Brown & Gray Clayey SAND; wet, medium dense.	SC				
20	4-3			Boring Terminated @20'. Groundwater Encountered @ 15'.		12	102.3	23.5	<No.200=32%
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 6

LOG OF TEST BORING
BORING NO.: 5

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ :

PROJECT NO.: VV4006
DATE: 03/02/16
ELEVATION: n/a
LOGGED BY: DVC
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Silty CLAY; moist, top 2' soft then stiff to very stiff.	CL-CH				
	5-1					19	105.9	18.8	Qp=3.75 tsf
5				Yellowish Brown fine Sandy CLAY; hardpan, moist.	CL				
	5-2					38	112.2	16.7	
10				Light Brown CLAY; moist, very stiff.	CL				
	5-3					17	106.7	22.1	<No.200=89%
15				Boring Terminated @ 15'. No Groundwater Encountered.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 7

LOG OF TEST BORING
BORING NO.: 6

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 17'

PROJECT NO.: VV4006
DATE: 03/02/16
ELEVATION: n/a
LOGGED BY: DVC
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Dark Brown Silty CLAY; moist, firm to stiff.	CH				
	6-1					20	103.1	21.1	Qp=3.0 tsf
5				Yellowish Brown Sandy CLAY; moist, very stiff.	CL				
	6-2					25	110.7	16.9	Qp=3.5 tsf
10				Yellowish Brown Clayey SAND; moist, medium dense.	SC				
				Mottled Yellow & Brown fine Sandy Silty CLAY; moist, hard.	CL				
15	6-3			▽		30			Qp=3.75 tsf
				Boring Terminated @ 17½'. Groundwater Encountered @ 17'.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 8

LOG OF TEST BORING
BORING NO.: 7

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 13'

PROJECT NO.: VV4006
DATE: 03/03/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, top 2' soft then very stiff.	CL				
	7-1					23			LL=42% PI=22 Qp=4.0 tsf
5				Yellowish Brown Sandy CLAY; moist, very stiff to hard.	CL				
	7-2					30	112.1	16.4	Qp=4.0+ tsf
10				Yellowish Brown SAND w/ Clay; very wet, medium dense.	SC				
	7-3					12	107.6	19.5	<No.200=23%
20				Yellowish Brown Clayey SAND; very wet, loose to medium dense.	SC				
25	7-4					10			No Recovery

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 9

LOG OF TEST BORING
BORING NO.: 7

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 13'

PROJECT NO.: VV4006
DATE: 03/03/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
30				Mottled Yellow & Gray CLAY & SAND w/ fine gravels; moist, medium dense.	CL				
35									
40	7-5			Boring Terminated @ 40'. Groundwater Encountered @ 13'.		21	116.1	17.4	<No.200=36%
45									
50									
55									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 9

LOG OF TEST BORING
BORING NO.: 8

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ :

PROJECT NO.: VV4006
DATE: 03/03/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Mottled Brown & Gray Sandy CLAY; moist, top 2' soft then very stiff.	SC				
	8-1					20	110.0	17.9	ϕ=28° c=668 psf Qp=3.0 tsf
5				Yellowish Brown Silty CLAY; moist, hardpan.	CL				
	8-2					39			Qp=4.0+ tsf
10				Yellowish Brown Silty CLAY; moist, very stiff.	CL				
15	8-3					16			Qp=3.2 tf
				Boring Terminated @ 16½'. No Groundwater Encountered.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

LOG OF TEST BORING
BORING NO.: 9

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ :

PROJECT NO.: VV4006
DATE: 03/03/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, loose to firm top 2'.	CL				
				Yellowish Brown Sandy CLAY; moist, hardpan.	CL				
	9-1					50-6"			Qp=4.0+ tsf
5									
	9-2			As Above.		50-5"			Qp=4.0+ tsf
10									
15									
	9-3			As Above.		50-6"			Qp=4.0+ tsf
				Boring Terminated @ 17½'. No Groundwater Encountered.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 11

LOG OF TEST BORING
BORING NO.: 10

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ :

PROJECT NO.: VV4006
DATE: 03/03/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, loose to firm.	CL				
				Mottled Brown & Gray Silty CLAY; moist, very stiff.	CL				
	10-1					23	109.5	19.7	Qp=3.5+ tsf
5				Yellowish Brown Sandy CLAY; moist, hardpan.	CL				
	10-2					50-6"			
10									
	10-3			As Above.	CL	50-5"	92.0	30.8	
15				Boring Terminated @ 15'. No Groundwater Encountered.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 12

LOG OF TEST BORING
BORING NO.: 11

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 13'

PROJECT NO.: VV4006
DATE: 03/03/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, top 2' soft then very stiff.	CL				
	11-1					16	100.5	22.3	UCC=2,624 psf Qp=1.5 tsf
5				Brown Sandy CLAY; moist, very stiff.	CL				
	11-2					23	104.1	18.5	Qp=1.5 tsf
				Yellowish Brown Sandy CLAY; moist, stiff.	CL				
10									
	11-3					13	112.2	18.0	<No.200=58% Qp=4.0 tsf
15				Boring Terminated @ 15½'. Groundwater Encountered @ 13'.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 13

LOG OF TEST BORING
BORING NO.: 12

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 15'

PROJECT NO.: VV4006
DATE: 03/03/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist. top 2' soft then very stiff	CL				
	12-1					23	109.2		Qp=2.5 tsf
5				Yellowish Brown Sandy CLAY; moist, very stiff.	CL				
	12-2					29			Qp=2.7 tsf
10				Mottled Brown & Gray CLAY w/ Sand; moist, stiff.	CL				
15	12-3			▽		12	103.1	23.6	<No.200=71% Qp=2.0 tsf
	12-4			As Above.		14	113.1	18.8	Qp=3.0 tsf
20				Boring Terminated @ 20'. Groundwater Encountered @ 15'.					
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 14

LOG OF TEST BORING
BORING NO.: 13

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ :

PROJECT NO.: VV4006
DATE: 03/03/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, top 2' soft then stiff.	CL				
	13-1					12	106.4	19.8	Qp=3.0 tsf
5				Yellowish Brown Silty CLAY; moist, hardpan.	CL				
	13-2					50-6"	111.2	19.2	Qp=4.0+ tsf
10				Mottled Yellowish Brown & Gray Silty CLAY; moist, very stiff.	CL				
	13-3					25	105.9	20.7	Qp=3.5 tsf
15				Boring Terminated 15½'. No Groundwater Encountered.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 15

LOG OF TEST BORING
BORING NO.: 14

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 12'

PROJECT NO.: VV4006
DATE: 03/04/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, top 2' soft then firm to stiff.	CL				
	14-1					8	99.1	23.2	UCC=3,387 psf Qp=2.0 tsf
5				Yellowish Brown Silty CLAY; moist, very stiff.	CL				
	14-2					20	97.9	26.2	Qp=3.0 tsf
10				Yellowish Brown Sandy CLAY; moist, firm. ▽	CL				
	14-3					6	100.2	30.2	Qp=1.0 tsf <No.200=64%
15				Boring Terminated @ 14½'. Groundwater Encountered @ 12'.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 16

LOG OF TEST BORING
BORING NO.: 15

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 12'

PROJECT NO.: VV4006
DATE: 03/04/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, soft to firm.	CL				
				Yellowish Brown Silty CLAY; moist, very stiff.	CL				
	15-1					26	103.9	19.9	Qp=4.5 tsf
5									
	15-2			As Above.		45			Qp=4.0+ tsf
10									
				Mottled Yellowish Brown & Gray Sandy CLAY; moist, very stiff. ▽	CL				
15	15-3					20	110.4	18.9	Qp=2.5 tsf
				Boring Terminated @ 17'. Groundwater Encountered @ 12'.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 17

LOG OF TEST BORING
BORING NO.: 16

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 12'

PROJECT NO.: VV4006
DATE: 03/04/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, firm.	CL				
	16-1			Mottled Brown & Yellowish Brown Sandy CLAY; moist, very stiff.	CL	18	108.7	19.2	UCC=4,118 psf Qp=3.5 tsf
5				Yellowish Brown Sandy CLAY; moist, hardpan.	CL				
	16-2					37			Qp=4.0+ tsf
10				▽ Mottled Yellowish Brown & Gray Sandy CLAY; moist, stiff.	CL				
15									
	16-3					13	101.7	25.1	Qp=1.5 tsf
20				Boring Terminated @ 19½'. Groundwater Encountered @ 12'.					
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 18

LOG OF TEST BORING
BORING NO.: 17

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 10'

PROJECT NO.: VV4006
DATE: 03/04/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▽ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, top 2' soft then stiff to very stiff.	CL				
	17-1					28	109.0	20.0	Qp=3.5 tsf
5				Yellowish Brown Silty CLAY; moist, hardpan.	CL				
	17-2					40			Qp=4.0+ tsf
10				▽					
				Mottled Yellowish Brown & Gray CLAY w/ Sand; moist, stiff.	CL				
	17-3					10	100.1	23.5	Qp=1.5 tsf <No.200=77%
15				Boring Terminated @ 15'. Groundwater Encountered @ 10'.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 19

LOG OF TEST BORING
BORING NO.: 18

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 10'

PROJECT NO.: VV4006
DATE: 03/04/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▽ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, top 2' soft then stiff.	CL				
5	18-1					12	104.7	22.1	Qp=3.5 tsf
				Yellowish Brown Sandy CLAY; moist, very stiff.	CL				
	18-2					21	89.8	22.0	Qp=2.0 tsf
10				Yellowish Brown Sandy CLAY; very wet, firm.	CL				
15									
	18-3			As Above.		4			Qp=0.5 tsf
20									
				Light Brown Clayey SAND; wet, medium dense.	SC				
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

LOG OF TEST BORING
BORING NO.: 18

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 10'

PROJECT NO.: VV4006
DATE: 03/04/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
30	18-4			As Above, wet, medium dense.	CL	16	118.1	19.6	Qp=1.0 tsf Pc=2,717 psf <No.200=29%
				Boring Terminated @ 30'. Groundwater Encountered @ 10'.					
35									
40									
45									
50									
55									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 20

LOG OF TEST BORING
BORING NO.: 19

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 10'

PROJECT NO.: VV4006
DATE: 03/04/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown CLAY; moist, top 2' soft then stiff.	CH				
	19-1					12	91.0	26.6	LL=61% PI=41 <No.200=93% Qp=1.5 tsf
5				Yellowish Brown Sandy CLAY; moist, stiff.	CL				
	19-2					13	104.4	20.7	Qp=1.5 tsf
10				▽ Light Brown Clayey SAND; wet, very loose.	SC				
	19-3			As Above.		3	112.7	29.9	Pc=3,353 psf <No.200=39%
15				Boring Terminated @ 15'. Groundwater Encountered @ 10'.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 21

LOG OF TEST BORING
BORING NO.: 20

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 13'

PROJECT NO.: VV4006
DATE: 03/23/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, soft to firm.	CL				
	20-1			Yellowish Brown Silty CLAY; moist, stiff.	CL-CH	11			Qp=2.2 tsf
5				Yellowish Brown fine Sandy CLAY; moist, hardpan.	CL				
	20-2					50-6"	109.0	19.4	Qp=4.5+ tsf
10									
	20-3			Mottled Yellowish Brown & Gray Silty CLAY; moist, stiff.	CL-ML	10	110.5	15.7	<No.200=69%
15				Boring Terminated @ 15'. Groundwater Encountered @ 13'.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 22

LOG OF TEST BORING
BORING NO.: 21

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ :

PROJECT NO.: VV4006
DATE: 03/23/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist. soft to firm.	CL				
				Yellowish Brown Silty CLAY; moist, very stiff.	CL				
	21-1					26	107.0	20.6	Qp=3.5 tsf
5									
	21-2			As Above.		20	96.1	26.1	Qp=2.0 tsf
10									
	21-3			As above.		16	95.7	28.4	Qp=2.7 tsf
15				Boring Terminated @ 15'. No Groundwater Encountered.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 23

LOG OF TEST BORING
BORING NO.: 22

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 14'

PROJECT NO.: VV4006
DATE: 03/23/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▽ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Sandy CLAY; moist, soft to firm.	CL				
	22-1			Brown & Yellowish Brown Silty CLAY; moist, firm to stiff.	CL	8	103.4	22.1	Qp=3.5 tsf
5				Yellowish Brown Silty CLAY; moist, very stiff.	CL				
	22-2					27	101.1	24.1	Qp=4.0 tsf
10				Yellowish Brown Sandy CLAY; moist, stiff.	CL				
	22-3			▽		14	94.9	28.8	Qp=1.5 tsf
15				Boring Terminated @ 15'. Groundwater Encountered @ 14'.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 24

LOG OF TEST BORING
BORING NO.: 23

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 13'

PROJECT NO.: VV4006
DATE: 03/23/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▽ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Silty CLAY; moist. top 2' soft then stiff.	CL				
	23-1					14	101.7	23.7	Qp=2.5 tsf
5									
	23-2			As Above, very stiff.	CL	20	98.5	25.3	Qp=3.0 tsf
				Yellowish Brown Silty CLAY; wet, firm.	CL				
10									
	23-3					7	92.4	27.6	<No.200=81% Qp=1.5 tsf
15				Yellowish Brown Silty SAND; very wet, loose.	SM				
	23-4								<No.200=48%
20				Yellowish Brown Sandy CLAY; wet, firm to stiff.	CL				
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 25

LOG OF TEST BORING
BORING NO.: 23

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 13'

PROJECT NO.: VV4006
DATE: 03/23/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
30				Boring Terminated @ 30'. Groundwater Encountered @ 13'.					
35									
40									
45									
50									
55									

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 25

LOG OF TEST BORING
BORING NO.: 24

PROJECT: Roberts' Ranch Subdivision
CLIENT: Sares Regis Group
LOCATION: Leisure Town Road & Fry Road
DRILLER: Hillside Drilling
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ :

PROJECT NO.: VV4006
DATE: 03/23/16
ELEVATION: n/a
LOGGED BY: ESS
BORING DIAMETER: 4"
FINAL ▼ : AFTER: hrs.

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown Silty CLAY; moist, top 2' soft then stiff.	CL				
5	24-1					14	107.8	20.2	LL=47% PI=33 Qp=4.5 tsf <No.200=90%
				Yellowish Brown Sandy CLAY; moist, very stiff.	CL				
10	24-2					22	103.3	23.1	Qp=3.5 tsf
				Yellowish Brown & Gray Sandy CLAY; moist, very stiff.	CL				
15	24-3					20	102.4	22.4	Qp=2.0 tsf
				Boring Terminated @ 17½'. No Groundwater Encountered.					
20									
25									

This information pertains only to this boring and is not necessarily indicative of the whole site.

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYMBOLS		TYPICAL NAMES
COARSE GRAINED SOILS: More than half of material is retained on the No. 200 Sieve	GRAVEL: More than half of coarse fraction is larger than No. 4 sieve	Clean gravels (<5% fines)	GW		Well graded gravels, gravel-sand mixtures, little or no fines (Cu>4 & 1<Cc<3)
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines (Cu < 4 and/or 1>Cc>3)
		Gravel with fines (>12% fines)	GM		Silty gravels and gravel-sand-silt mixtures (PI<4 or below "A" line)
			GC		Clayey gravels and gravel-sand-clay mixtures (PI>7 & on or above "A" line)
	SAND: Half or more of the coarse fraction is smaller than No. 4 sieve	Clean sands (<5% fines)	SW		Well graded sands, gravelly sands, little or no fines (Cu>6 & 1<Cc<3)
			SP		Poorly graded sands, gravelly sands, little or no fines (Cu<6 and/or 1>Cc>3)
		Sand with fines (>12% fines)	SM		Silty sands and gravel-sand-silt mixtures (PI<4 or below "A" line)
			SC		Clayey sands and gravel-sand-clay mixtures (PI>7 & on or above "A" line)
FINE GRAINED SOILS: Half or more of the material passes the No. 200 Sieve	SILTS AND CLAYS: Liquid Limit is less than 50%		ML		Inorganic silts with gravel and sand having slight plasticity (PI<4 or below "A" line)
			CL		Inorganic clays of low to med. plasticity with gravel and sand (PI>7 & on or above "A" line)
			OL		Organic silts and clays of low plasticity
	SILTS AND CLAYS: Liquid Limit is 50% or more		MH		Inorganic elastic silts (PI below "A" line)
			CH		Inorganic clays of high plasticity, fat clays (PI on or above "A" line)
			OH		Organic silts and clays of medium to high plasticity
HIGHLY ORGANIC SOILS			Pt		Peat and other highly organic soils

MTI-KC ENGINEERING COMPANY
865 Cotting Lane, Ste A, Vacaville, CA 95688
8798 Airport Road, Redding, CA 96002

SAMPLER AND LAB TESTING LEGEND

- Auger
- Bulk Sample, taken from auger cuttings
- California Sampler
- Bulk/Grab Sample
- Pitcher
- Standard Penetration Test
- Shelby Tube
- No Recovery

LL=Liquid Limit (%)
PI=Plasticity Index
ϕ =Friction Angle
C=Cohesion
UCC=Unconfined Compression
R value=Resistance Value
Consol=Consolidation Test

SOIL GRAIN SIZE

U.S. STANDARD SIEVE OPENINGS

		#200		#40	#10	#4	¾"		3"	12"	
CLAY	SILT	SAND					GRAVEL			COBBLES	BOULDERS
		FINE		MEDIUM	COARSE		FINE	COARSE			
0.002	0.075		0.425		2.00	4.75	19.0		75	300	

SOIL GRAIN SIZE IN MILLIMETERS

RELATIVE DENSITY (Coarse-grained soils)

SANDS & GRAVELS	BLOWS/FOOT[1]
Very Loose	0 – 4
Loose	4 – 10
Medium Dense	10 – 30
Dense	30 – 50
Very Dense	> 50

CONSISTENCY (Fine-grained soils)

SILTS & CLAYS	STRENGTH[2]	BLOWS/FOOT[1]
Very Soft	< 500	0 – 2
Soft	500 – 1,000	2 – 4
Firm	1,000 – 2,000	4 – 8
Stiff	2,000 – 4,000	8 – 15
Very Stiff	4,000 – 8,000	15 – 30
Hard	> 8,000	>30

1 – Number of blows of 140 pound hammer falling 30 inches to drive a 2-inch O.D. split spoon sampler (ASTM D1586)
2 – Unconfined compressive strength in lb/ft^2 as determined by lab testing or approximated by the standard penetration test (ASTM D1586) or pocket penetrometer.

WEATHERING (Bedrock)

Fresh	No visible sign of decomposition or discoloration; rings under hammer impact
Slightly weathered	Slight discoloration inwards from open fractures; little or no effect on normal cementation; otherwise similar to Fresh
Moderately weathered	Discoloration throughout; weaker minerals decomposed; strength somewhat less than fresh rock but cores can not be broken by hand or scraped with knife; texture preserved; cementation little to not affected; fractures may contain filling
Highly weathered	Most minerals somewhat decomposed; specimens can be broken by hand with effort or shaved with knife; texture becoming indistinct but fabric preserved; faint fractures
Completely weathered	Minerals decomposed to soil but fabric and structure preserved; specimens can be easily crumbled or penetrated

STRENGTH (Bedrock)

Plastic	Very low strength
Friable	Crumbles easily by rubbing with fingers
Weak	An unfractured specimen will crumble under light hammer blows
Moderately strong	Specimen will withstand a few heavy hammer blows before breaking
Strong	Specimen will withstand a few heavy ringing blows and will yield with difficulty only dust and small flying fragments
Very strong	Specimen will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments

BEDDING (Bedrock)	SPACING (inches)
Very thickly bedded	> 48
Thickly bedded	24 to 48
Thin bedded	2.5 to 24
Very thin bedded	5/8 to 2.5
Laminated	1/8 to 5/8
Thinly laminated	<1/8

FRACTURING (Bedrock)	SPACING (inches)
Very little fractured	> 48
Occasionally fractured	12 to 48
Moderately fractured	6 to 12
Closely fractured	1 to 6
Intensely fractured	5/8 to 1
Crushed	<5/8

Materials Testing, Inc.

8798 Airport Road
Redding, California 96002
(530) 222-1116, fax 222-1611

865 Cotting Lane, Suite A
Vacaville, California 95688
(707) 447-4025, fax 447-4143

Client: Sares Regis Group
1900 Third Street, Suite 400
Sacramento, CA 95814

Client No.: VV4006-001
Report No.: 0300-001
Date: 03/29/16

Project: Roberts Ranch Subdivision
Leisure Town Road & Fry Road – Vacaville, CA

Submitted by: KC Engineering

Density of Soil in Place by the Drive-Cylinder Method (ASTM D2937) and Liquid Limit, Plastic Limit & Plasticity Index of Soils (ASTM D4318)

Sample #	Description	Dry Density p.c.f.	Moisture Content %	Liquid Limit	Plastic Limit	Plastic Index
1-1 @ 4.0'	Brown Sandy Clay (visual)	107.3	13.6	---	---	---
1-2 @ 9.0'	Dark Brown Sandy Clay (visual)	103.6	19.2	---	---	---
1-3 @ 17.0'	Light Brown Sandy Clay (visual)	109.4	20.1	---	---	---
1-4 @ 28.0'	Light Brown Clayey Sand (visual)	116.4	16.3	---	---	---
2-1 @ 3.0'	Brown Sandy Clay (visual)	113.4	16.5	---	---	---
2-3 @ 16.0'	Brown Sandy Clay (visual)	102.9	22.9	---	---	---
3-1 @ 2.0'	Brown Sandy Clay (visual)	96.9	24.3	---	---	---
3-2 @ 7.0'	Light Brown Clayey Silt (visual)	119.5	14.6	---	---	---
3-3 @ 12.0' - 13.5'	Brown Silty Clay (visual)	105.7	21.3	---	---	---
4-1 @ 4.0'	Light Brown Clay	---	---	55	19	36
4-2 @ 9.5'	Brown Sandy Clay (visual)	94.8	28.4	---	---	---
4-3 @ 19.5'	Light Brown Clayey Sand (visual)	102.3	23.5	---	---	---
5-1 @ 2.0'	Brown Silty Clay (visual)	105.9	18.8	---	---	---
5-2 @ 7.0'	Brown Sandy Clay (visual)	112.2	16.7	---	---	---
5-3 @ 14.5'	Light Brown Clay (visual)	106.7	22.1	---	---	---
6-1 @ 4.0'	Dark Brown Silty Clay (visual)	103.1	21.1	---	---	---

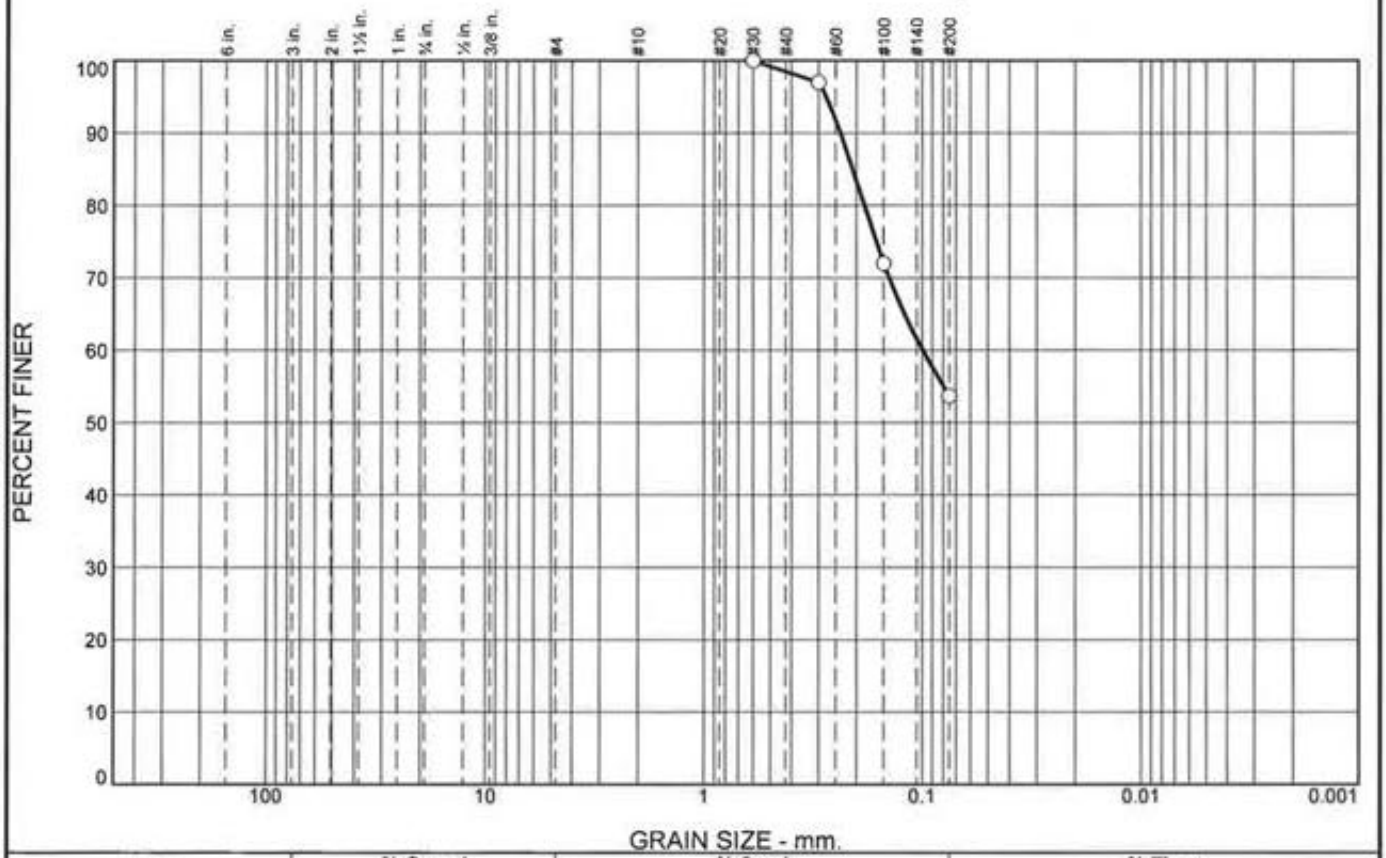
Density of Soil in Place by the Drive-Cylinder Method (ASTM D2937) and Liquid Limit, Plastic Limit & Plasticity Index of Soils (ASTM D4318)

Sample #	Description	Dry Density p.c.f.	Moisture Content %	Liquid Limit	Plastic Limit	Plastic Index
6-2 @ 9.0'	Light Brown Clayey Sand (visual)	110.7	16.9	---	---	---
7-1 @ 3.0'	Brown Sandy Clay (visual)	---	---	42	20	22
7-2 @ 8.0'	Brown Sandy Clay with Gravel (visual)	112.1	16.4	---	---	---
7-3 @ 16.0'	Light Brown Clayey Sand (visual)	107.6	19.5	---	---	---
7-5 @ 39.5'	1/2 & 1/2 Light Brown Clay and Sand with Gravel (visual)	116.1	17.4	---	---	---
8-1 @ 3.0'	Dark Brown Sandy Clay (visual)	110.0	17.9	---	---	---
10-1 @ 4.0'	Brown Silty Clay (visual)	109.5	19.7	---	---	---
10-3 @ 9.5'	Light Brown Sandy Clay (visual)	92.0	30.8	---	---	---
11-1 @ 3.0'	Light Brown Sandy Clay (visual)	100.5	22.3	---	---	---
11-2 @ 8.0'	Brown Sandy Clay (visual)	104.1	18.5	---	---	---
11-3 @ 15.0'	Light Brown Sandy Clay (visual)	112.2	18.0	---	---	---
12-1 @ 4.0'	Light Brown Sandy Clay (visual)	109.6	19.2	---	---	---
12-3 @ 15.0'	Light Brown Clay with Sand (visual)	103.1	23.6	---	---	---
12-4 @ 19.5'	Light Brown Clay with Sand (visual)	113.1	18.8	---	---	---
13-1 @ 2.0'	Brown Sandy Clay (visual)	106.4	19.8	---	---	---
13-2 @ 8.0'	Brown Silty Clay (visual)	111.2	19.2	---	---	---
13-3 @ 15.0'	Brown Clay (visual)	105.9	20.7	---	---	---
14-1 @ 3.0'	Brown Sandy Clay (visual)	99.1	23.2	---	---	---
14-2 @ 8.0'	Light Brown Silty Clay (visual)	97.9	26.2	---	---	---
14-3 @ 14.0'	Light Brown Sandy Clay (visual)	100.2	30.2	---	---	---
15-1 @ 4.0'	Brown Silty Clay (visual)	103.9	19.9	---	---	---
15-3 @ 16.0'	Light Brown Sandy Clay (visual)	110.4	18.9	---	---	---
16-1 @ 3.0'	Light Brown Sandy Clay (visual)	108.7	19.2	---	---	---

Density of Soil in Place by the Drive-Cylinder Method (ASTM D2937) and Liquid Limit, Plastic Limit & Plasticity Index of Soils (ASTM D4318)

Sample #	Description	Dry Density p.c.f.	Moisture Content %	Liquid Limit	Plastic Limit	Plastic Index
16-3 @ 19.0'	Light Brown Sandy Clay (visual)	101.7	25.1	---	---	---
17-1 @ 4.0'	Dark Brown Sandy Clay (visual)	109.0	20.0	---	---	---
17-3 @ 14.5'	Light Brown Clay with Sand (visual)	100.1	23.5	---	---	---
18-1 @ 4.0'	Dark Brown Sandy Clay (visual)	104.7	22.1	---	---	---
18-2 @ 9.0'	Light Brown Sandy Clay (visual)	89.8	22.0	---	---	---
18-4 @ 29.5'	Light Brown Clayey Sand (visual)	118.1	19.6	---	---	---
19-1 @ 3.0'	Dark Brown Clay	91.0	26.6	61	20	41
19-2 @ 8.0'	Light Brown Sandy Clay (visual)	104.4	20.7	---	---	---
19-3 @ 14.5'	Light Brown Clayey Sand (visual)	112.7	29.9	---	---	---
20-2 @ 8.0'	Strong Brown Fine Sandy Clay (visual)	109.0	19.4	---	---	---
20-3 @ 14.5'	Brown Silty Clay (visual)	110.5	15.7	---	---	---
21-1 @4.0'	Strong Brown Silty Clay (visual)	107.0	20.6	---	---	---
21-2 @ 9.0'	Strong Brown Silty Clay (visual)	96.1	26.1	---	---	---
21-3 @ 14.5'	Brown Silty Clay (visual)	95.7	28.4	---	---	---
22-1 @ 3.0'	Dark Brown Silty Clay (visual)	103.4	22.1	---	---	---
22-2 @ 8.0'	Brown Silty Clay (visual)	101.1	24.1	---	---	---
22-3 @ 14.5'	Brown Sandy Clay (visual)	94.9	28.8	---	---	---
23-1 @ 3.0'	Strong Brown Silty Clay (visual)	101.7	23.7	---	---	----
23-2 @ 8.0'	Brown Silty Clay (visual)	98.5	25.3	---	---	---
23-3 @ 14.5'	Light Brown Silty Clay (visual)	92.4	27.6	---	---	---
24-1 @ 4.0'	Brown Clay	107.8	20.0	47	14	33
24-2 @ 9.5'	Strong Brown Sandy Clay (visual)	103.3	23.1	---	---	---
24-3 @ 17.0'	Strong Brown Sandy Clay (visual)	102.4	22.4	---	---	---

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	45	54	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#30	100		
#50	97		
#100	72		
#200	54		

* (no specification provided)

Material Description

Light Brown Sandy Clay (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= 0.2378 D_{85}= 0.2087 D_{60}= 0.0993
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

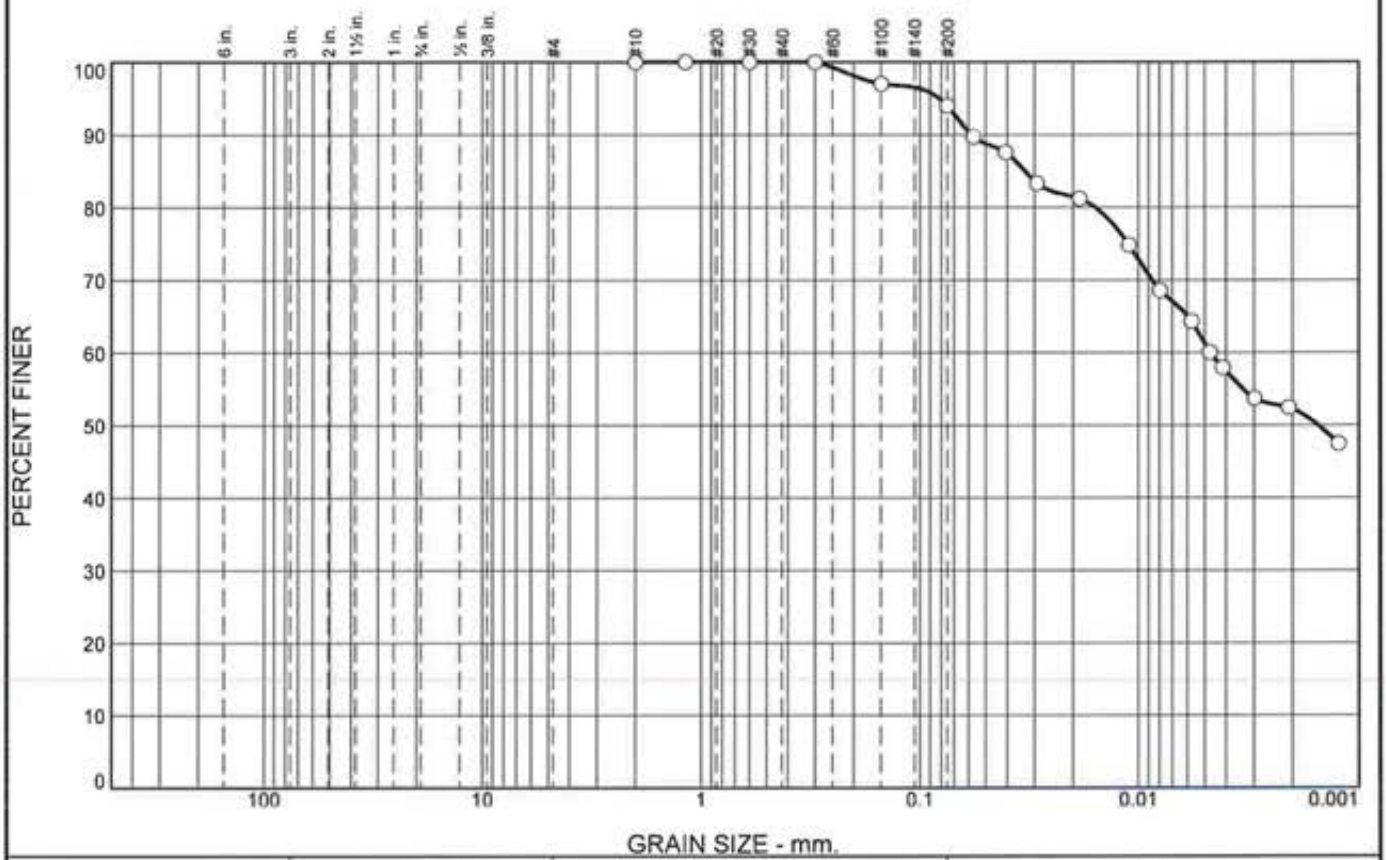
Material tested in accordance with ASTM D6913.

Location: 1-3
Sample Number: 3 **Depth:** 17.0' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-002

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	0	6	33	61

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100		
#16	100		
#30	100		
#50	100		
#100	97		
#200	94		

* (no specification provided)

Material Description

Light Brown Clay

Atterberg Limits

PL= 19 LL= 55 PI= 36

Coefficients

D_{90}= 0.0583 D_{85}= 0.0332 D_{60}= 0.0047
D_{50}= 0.0015 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(37)

Remarks

Hydrometer tested in accordance with ASTM D422.
Atterberg Limits tested in accordance with ASTM D4318.

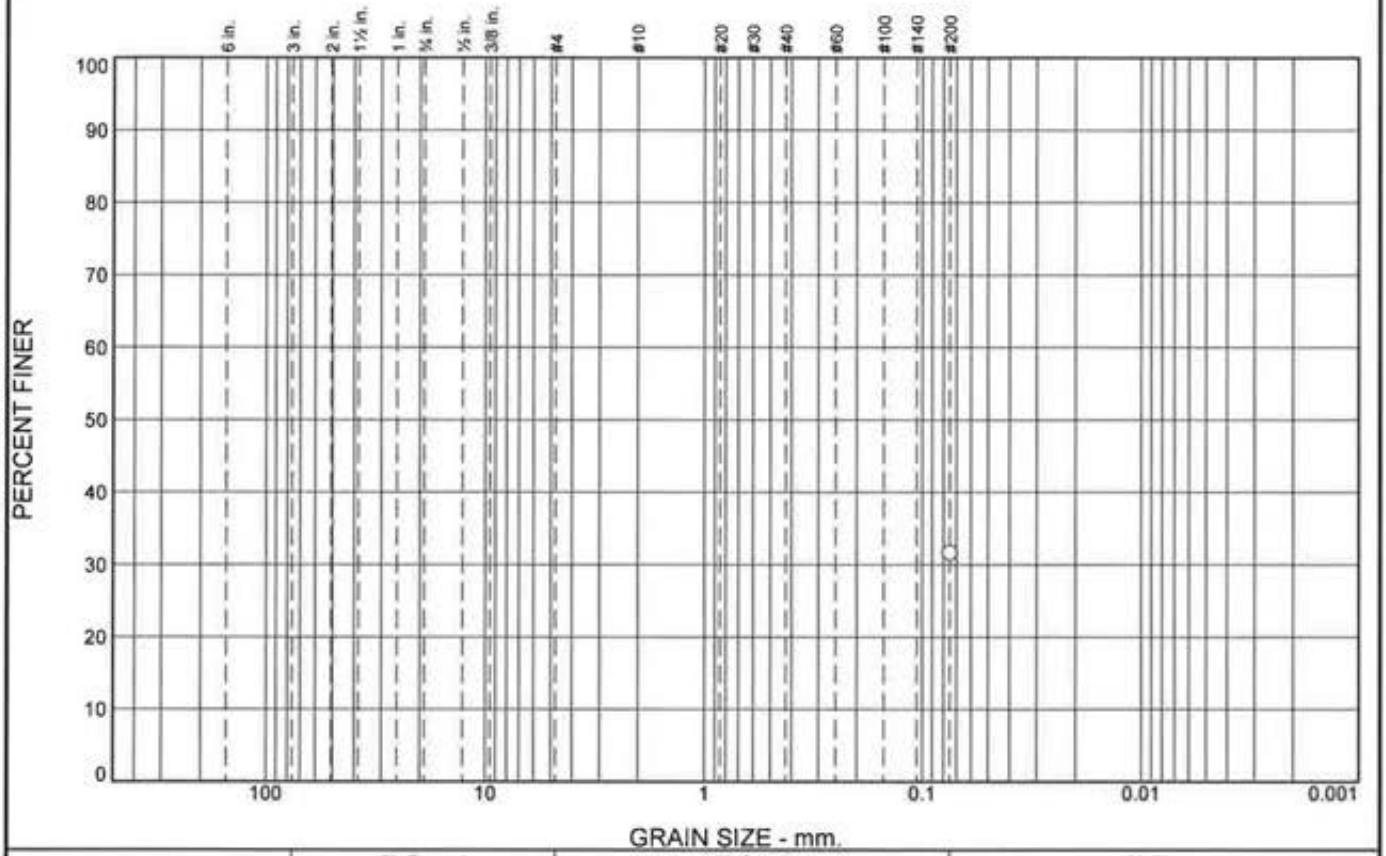
Location: 4-1
Sample Number: 12 **Depth:** 4.0'

Date: 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-003

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						32	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	32		

* (no specification provided)

Material Description

Light Brown Clayey Sand (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO=

Remarks

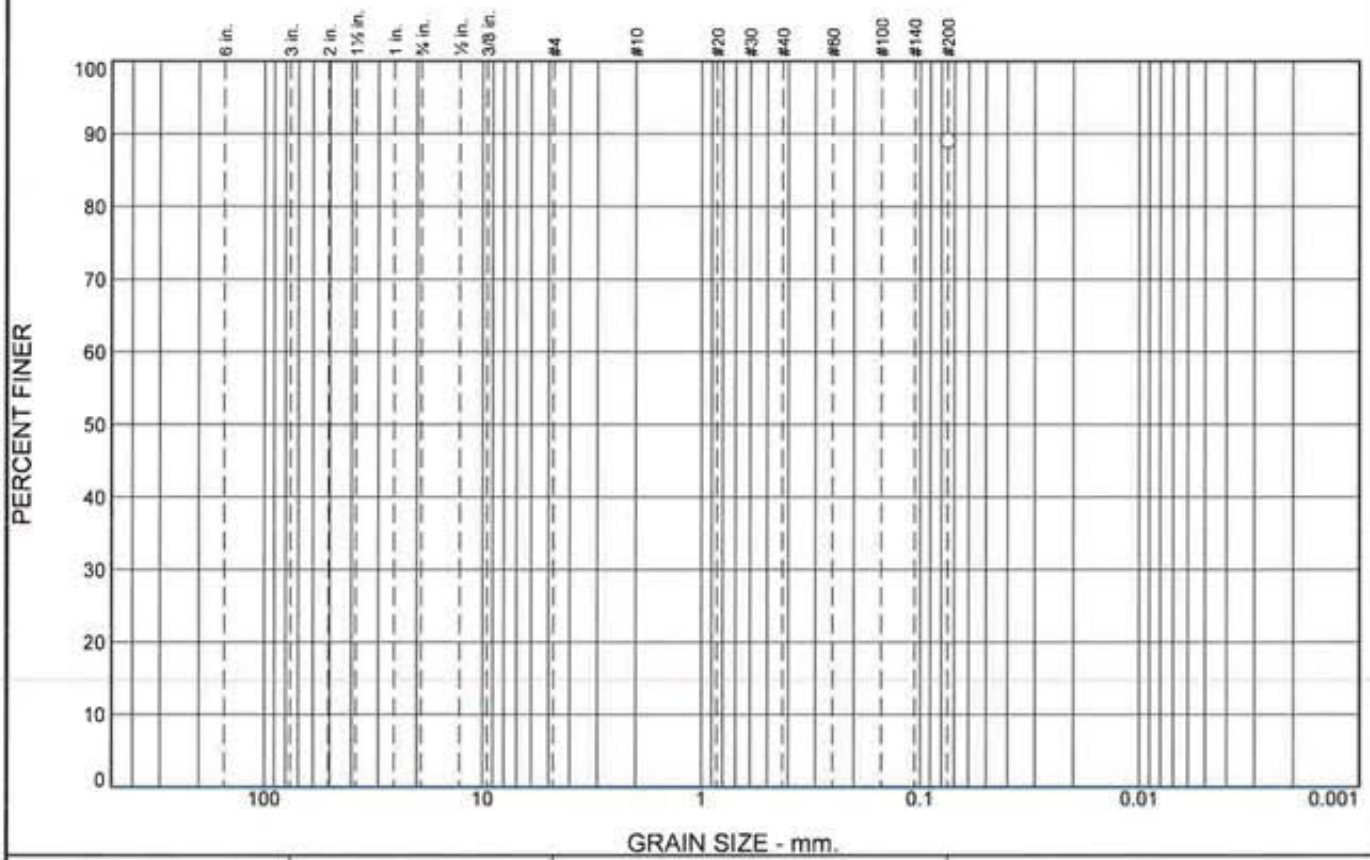
Material tested in accordance with ASTM D1140.

Location: 4-3
Sample Number: 14 **Depth:** 19.5 **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-004

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						89	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	89		

* (no specification provided)

Material Description

Light Brown Clay (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

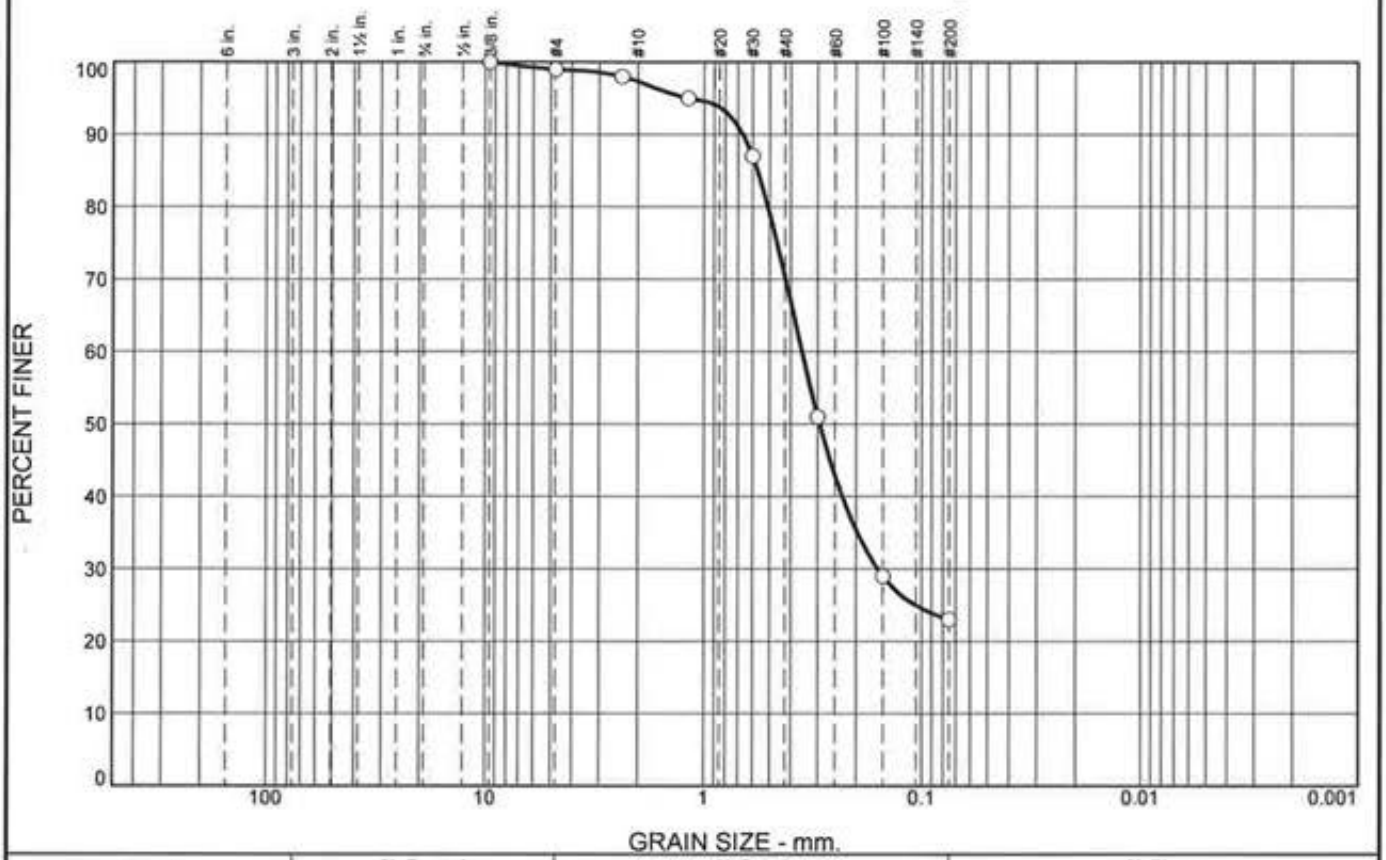
Material tested in accordance with ASTM D1140.

Location: 5-3
Sample Number: 17 **Depth:** 14.5' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-005

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	1	2	27	47	23	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100		
#4	99		
#8	98		
#16	95		
#30	87		
#50	51		
#100	29		
#200	23		

* (no specification provided)

Material Description

Light Brown Clayey Sand (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= 0.6647 D_{85}= 0.5686 D_{60}= 0.3544
D_{50}= 0.2940 D_{30}= 0.1588 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO=

Remarks

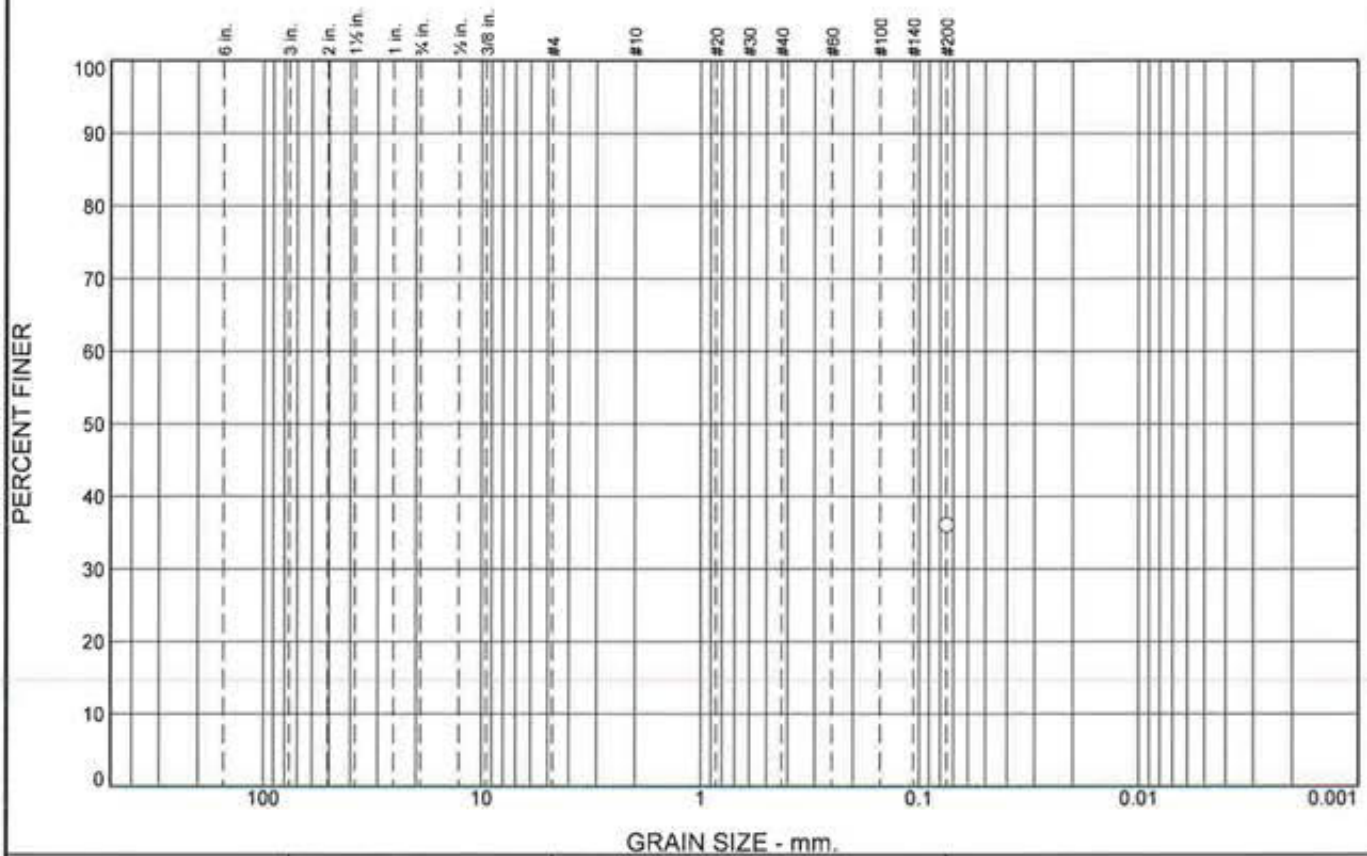
Material tested in accordance with ASTM D6913.

Location: 7-3
Sample Number: 23 **Depth:** 16.0' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-006

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						36	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	36		

* (no specification provided)

Material Description

1/2 & 1/2 Light Brown Clay and Sand with Gravel (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

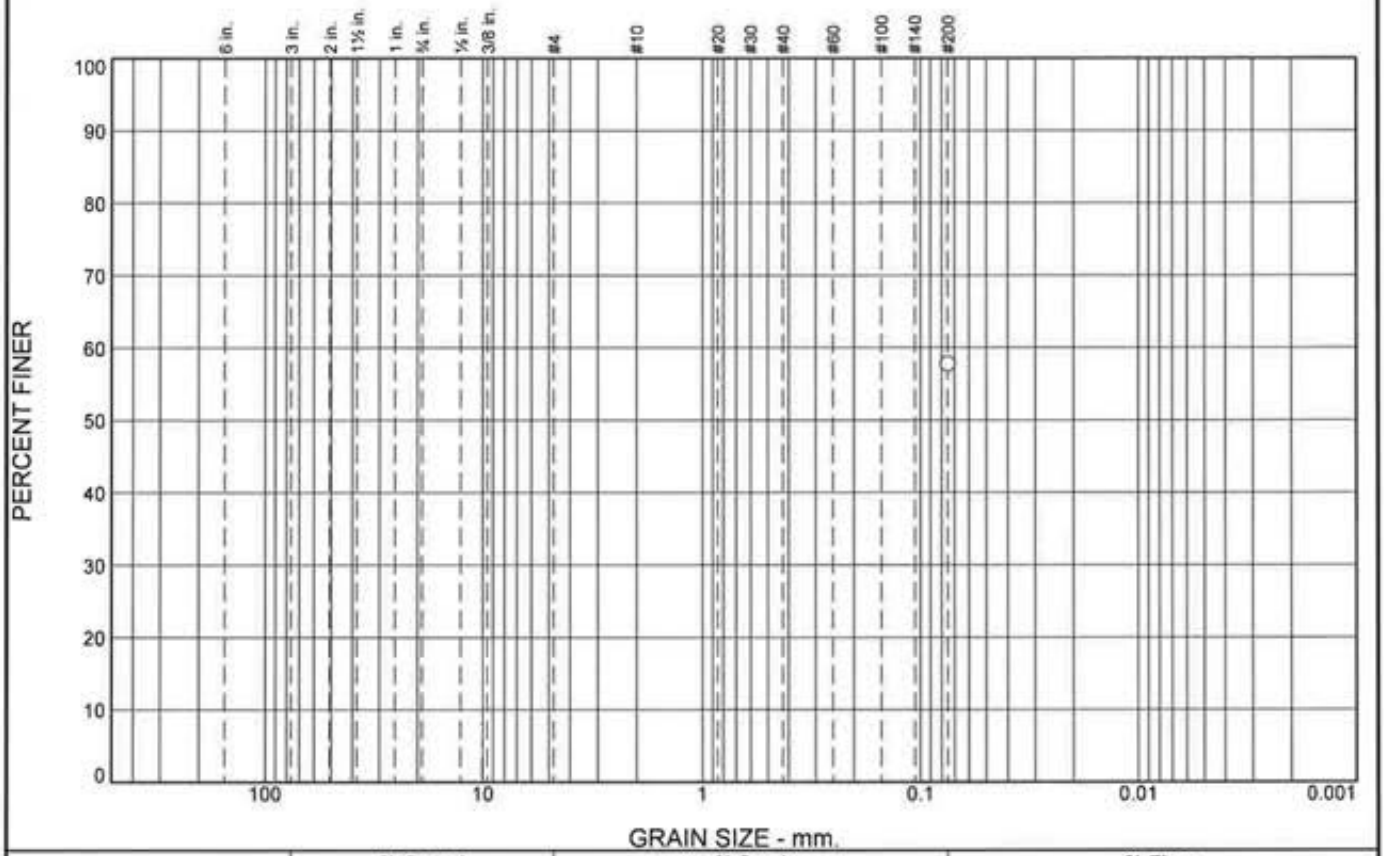
Material tested in accordance with ASTM D1140.

Location: 7-5
Sample Number: 24 **Depth:** 39.5' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-007

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						58	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	58		

* (no specification provided)

Material Description

Light Brown Sandy Clay (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

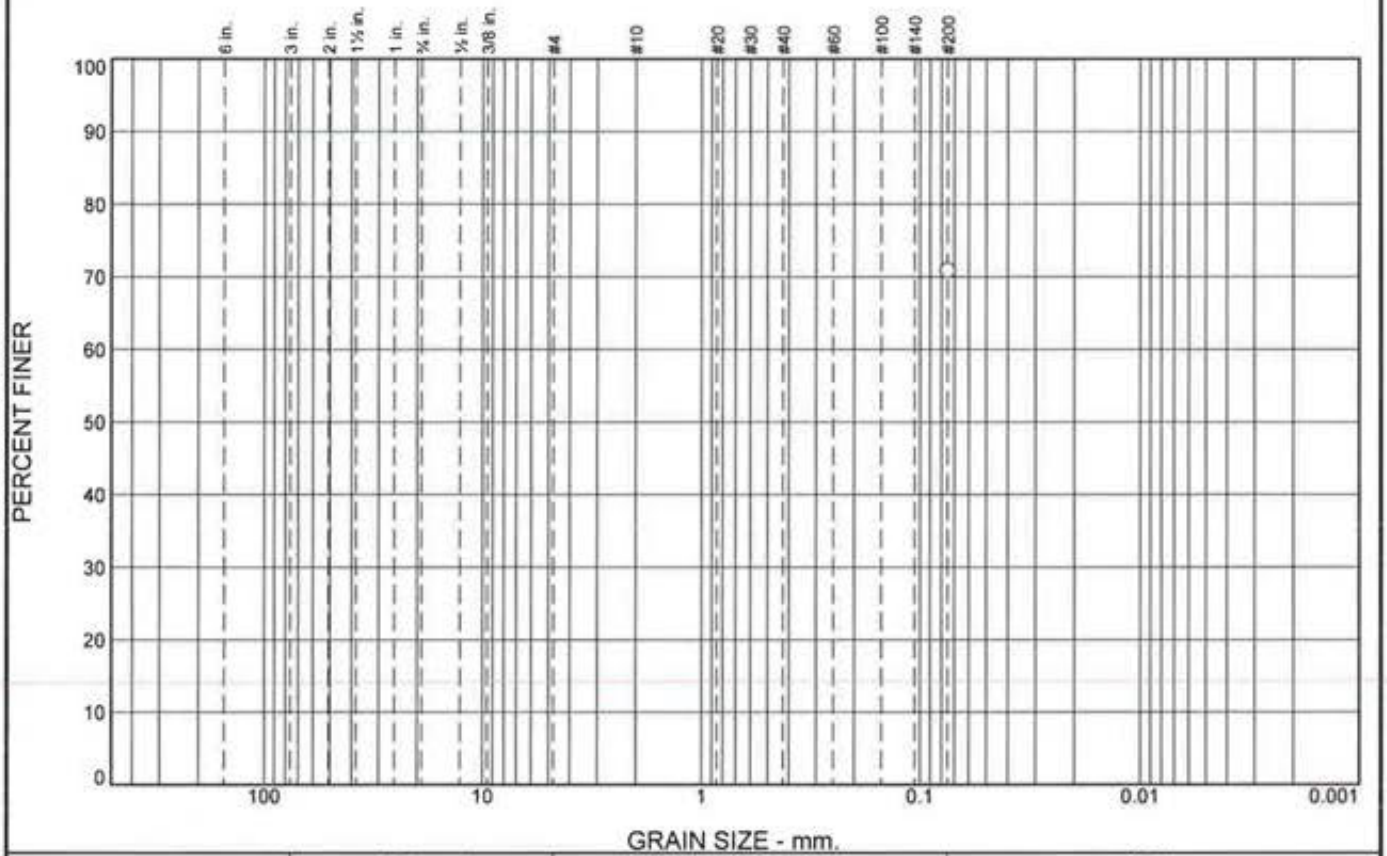
Material tested in accordance with ASTM D1140.

Location: 11-3
Sample Number: 36 **Depth:** 15.0' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-008

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						71	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	71		

* (no specification provided)

Material Description

Light Brown Clay with Sand (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

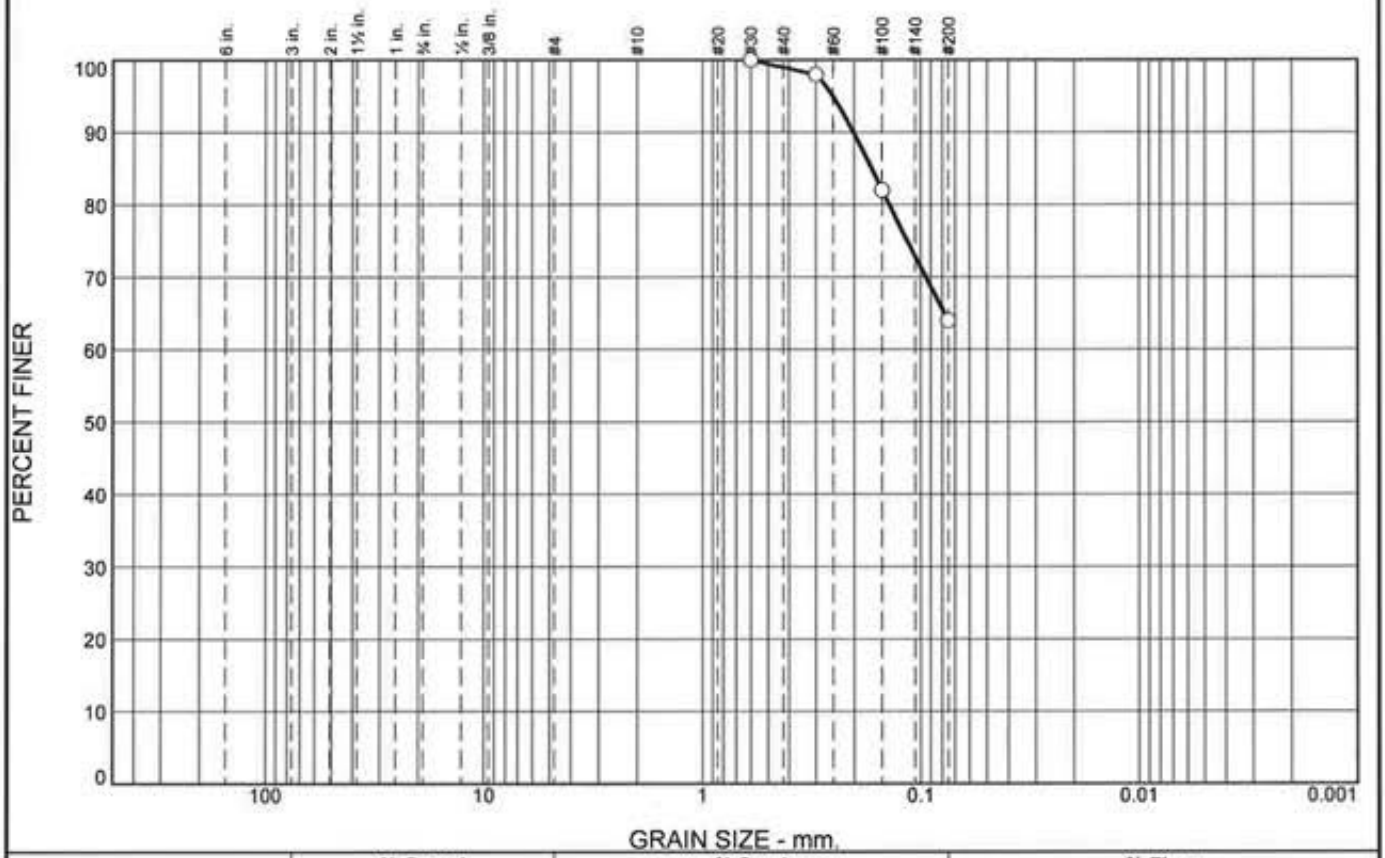
Material tested in accordance with ASTM D1140.

Location: 12-3
Sample Number: 39 **Depth:** 15.0' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-009

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	35	64	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#30	100		
#50	98		
#100	82		
#200	64		

* (no specification provided)

Material Description

Light Brown Sandy Clay (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= 0.2022 D_{85}= 0.1675 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

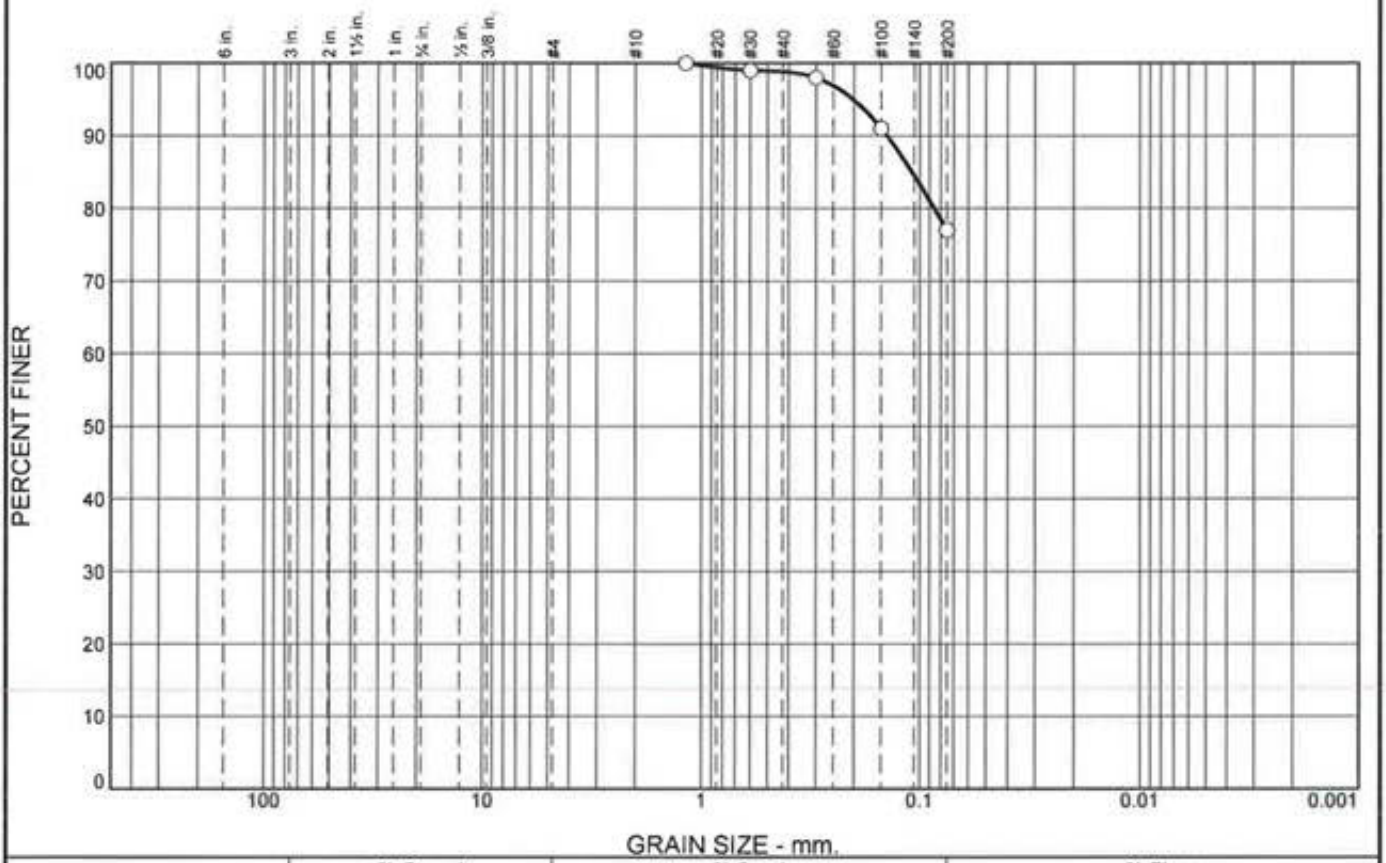
Material tested in accordance with ASTM D6913.

Location: 14-3
Sample Number: 47 **Depth:** 14.0' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-010

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	22	77	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#16	100		
#30	99		
#50	98		
#100	91		
#200	77		

* (no specification provided)

Material Description

Light Brown Clay with Sand (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= 0.1412 D_{85}= 0.1084 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

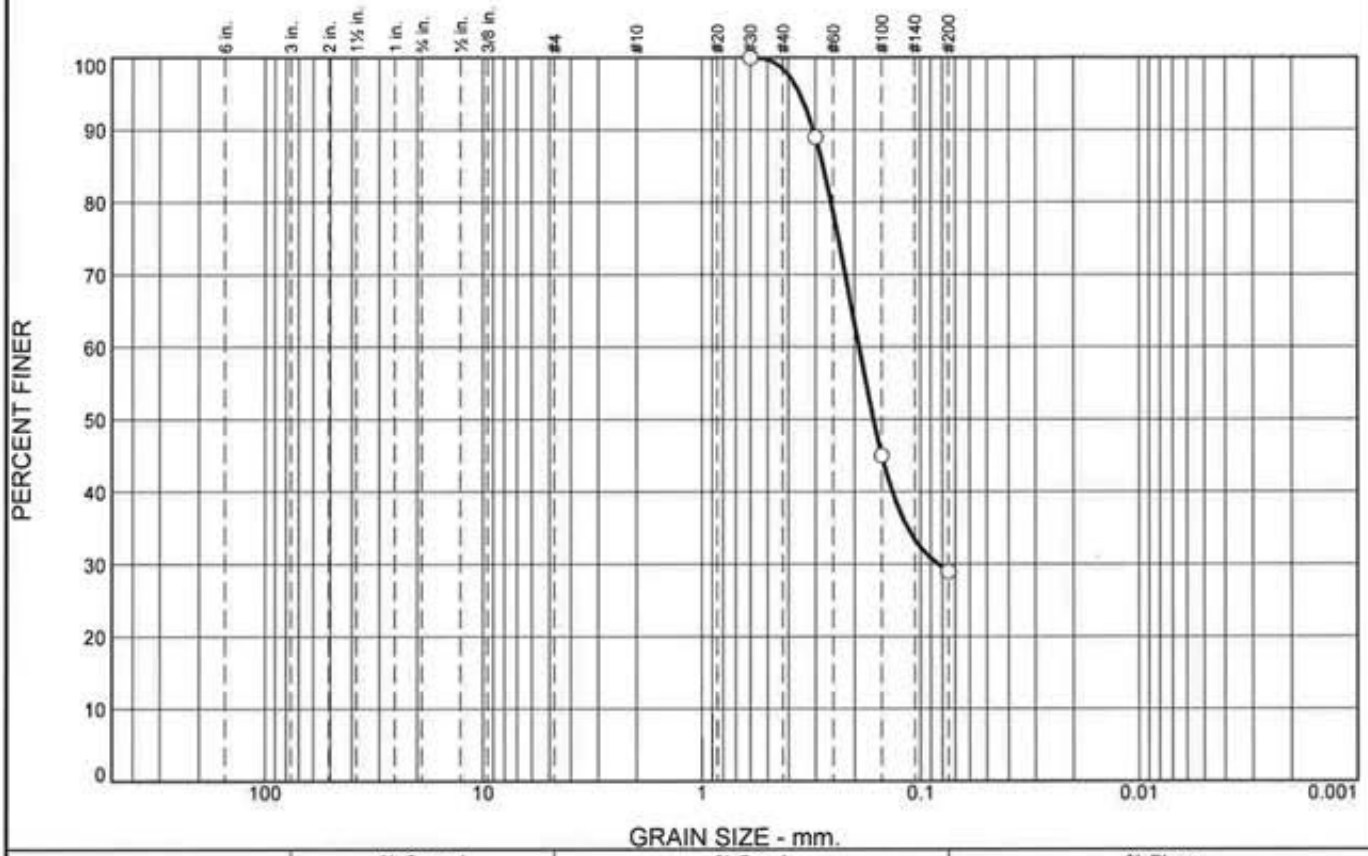
Material tested in accordance with ASTM D6913.

Location: 17-3
Sample Number: 56 **Depth:** 14.5' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-011

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	70	29	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#30	100		
#50	89		
#100	45		
#200	29		

* (no specification provided)

Material Description

Light Brown Clayey Sand (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= 0.3067 D_{85}= 0.2776 D_{60}= 0.1911
D_{50}= 0.1640 D_{30}= 0.0834 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO=

Remarks

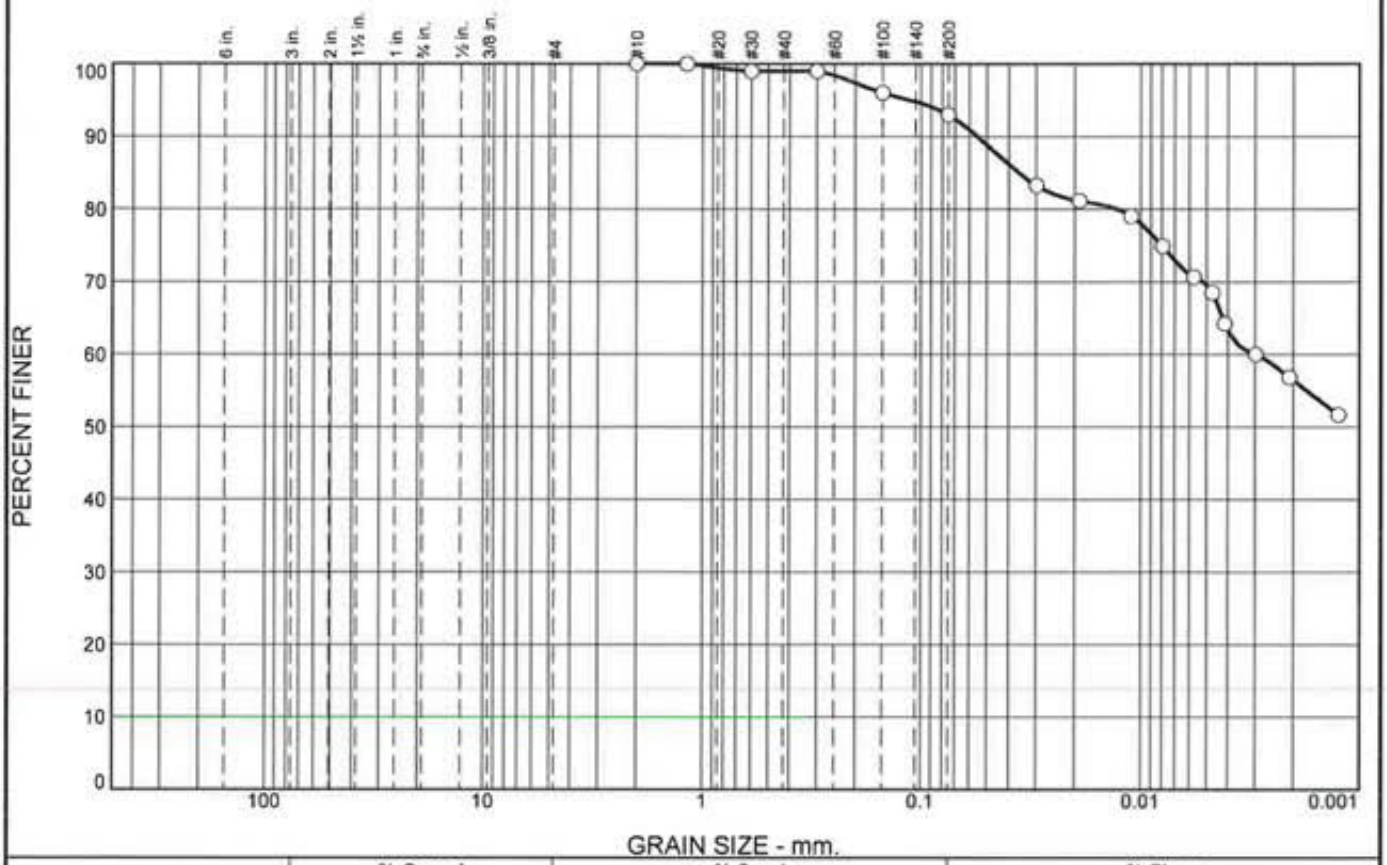
Material tested in accordance with ASTM D6913.

Location: 18-4
Sample Number: 60 **Depth:** 29.5' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-012

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	1	6	23	70

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100		
#16	100		
#30	99		
#50	99		
#100	96		
#200	93		

* (no specification provided)

Material Description

Dark Brown Clay

Atterberg Limits

PL= 20 LL= 61 PI= 41

Coefficients

D_{90}= 0.0553 D_{85}= 0.0359 D_{60}= 0.0029
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(42)

Remarks

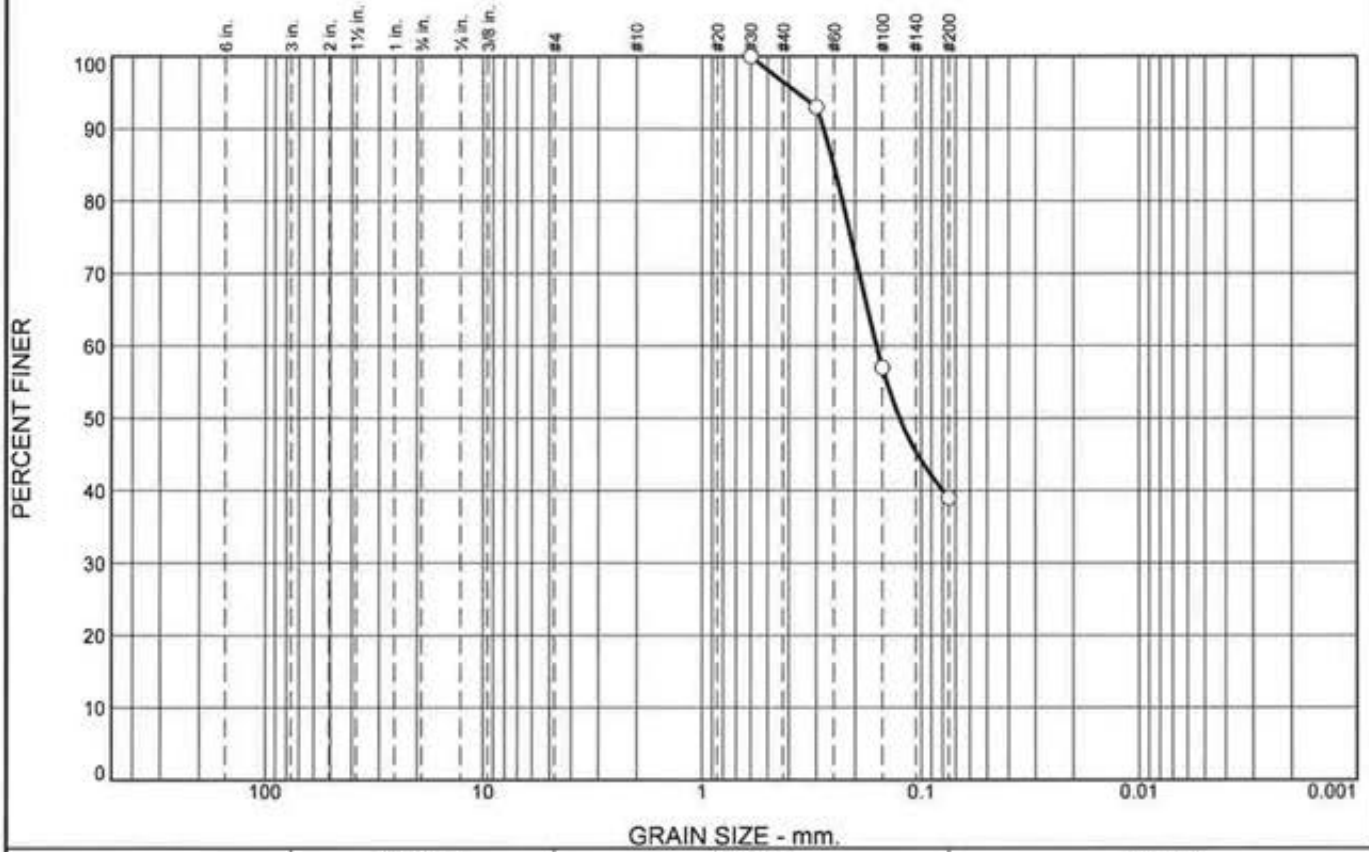
Hydrometer tested in accordance with ASTM D422.
Atterberg Limits tested in accordance with ASTM D4318.

Location: 19-1
Sample Number: 61 **Depth:** 3.0' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-013

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	3	58	39	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#30	100		
#50	93		
#100	57		
#200	39		

* (no specification provided)

Material Description

Light Brown Clayey Sand (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= 0.2782 D_{85}= 0.2505 D_{60}= 0.1597
D_{50}= 0.1250 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO=

Remarks

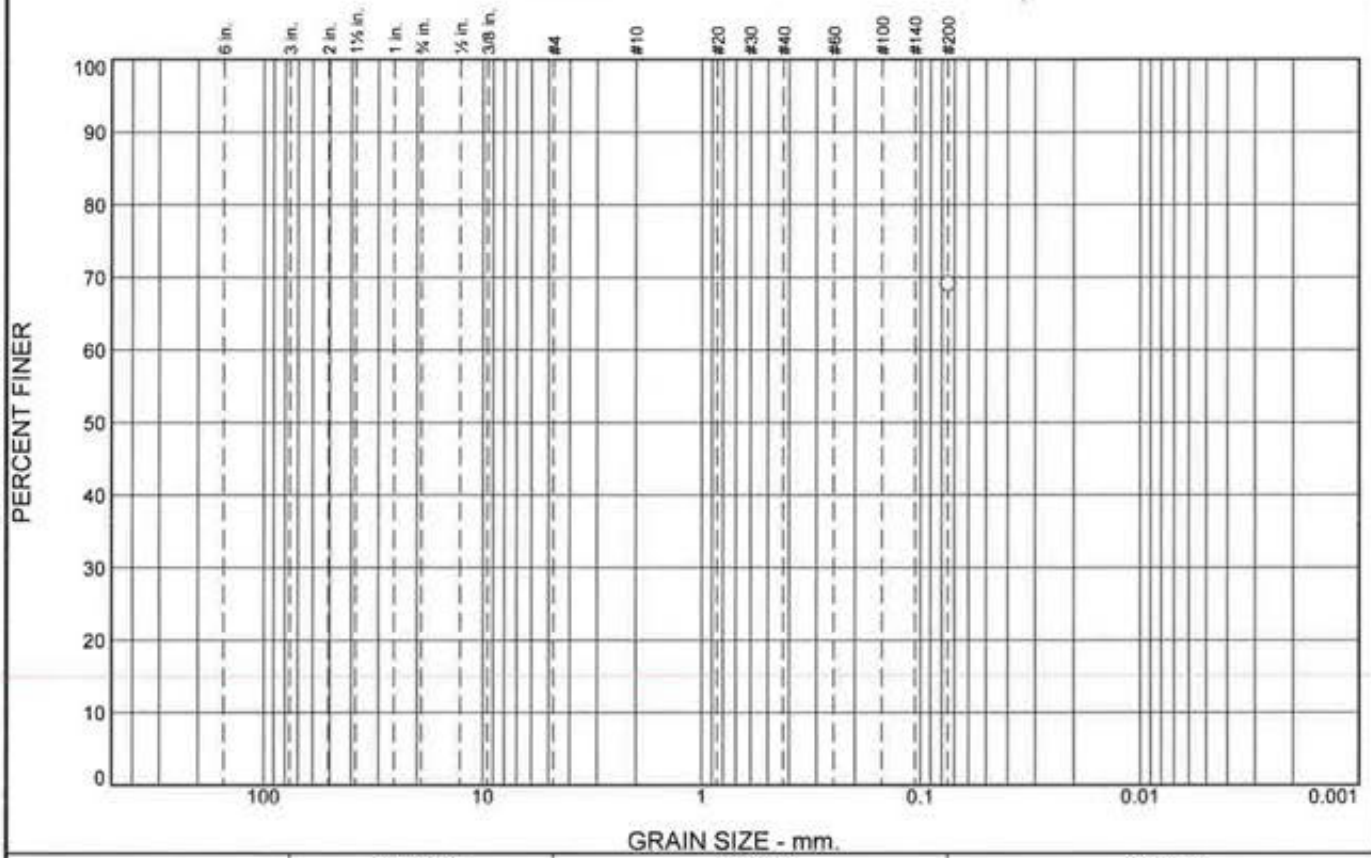
Material tested in accordance with ASTM D6913.

Location: 19-3
Sample Number: 63 **Depth:** 14.5' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-014

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						69	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	69		

* (no specification provided)

Material Description

Brown Silty Clay (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO=

Remarks

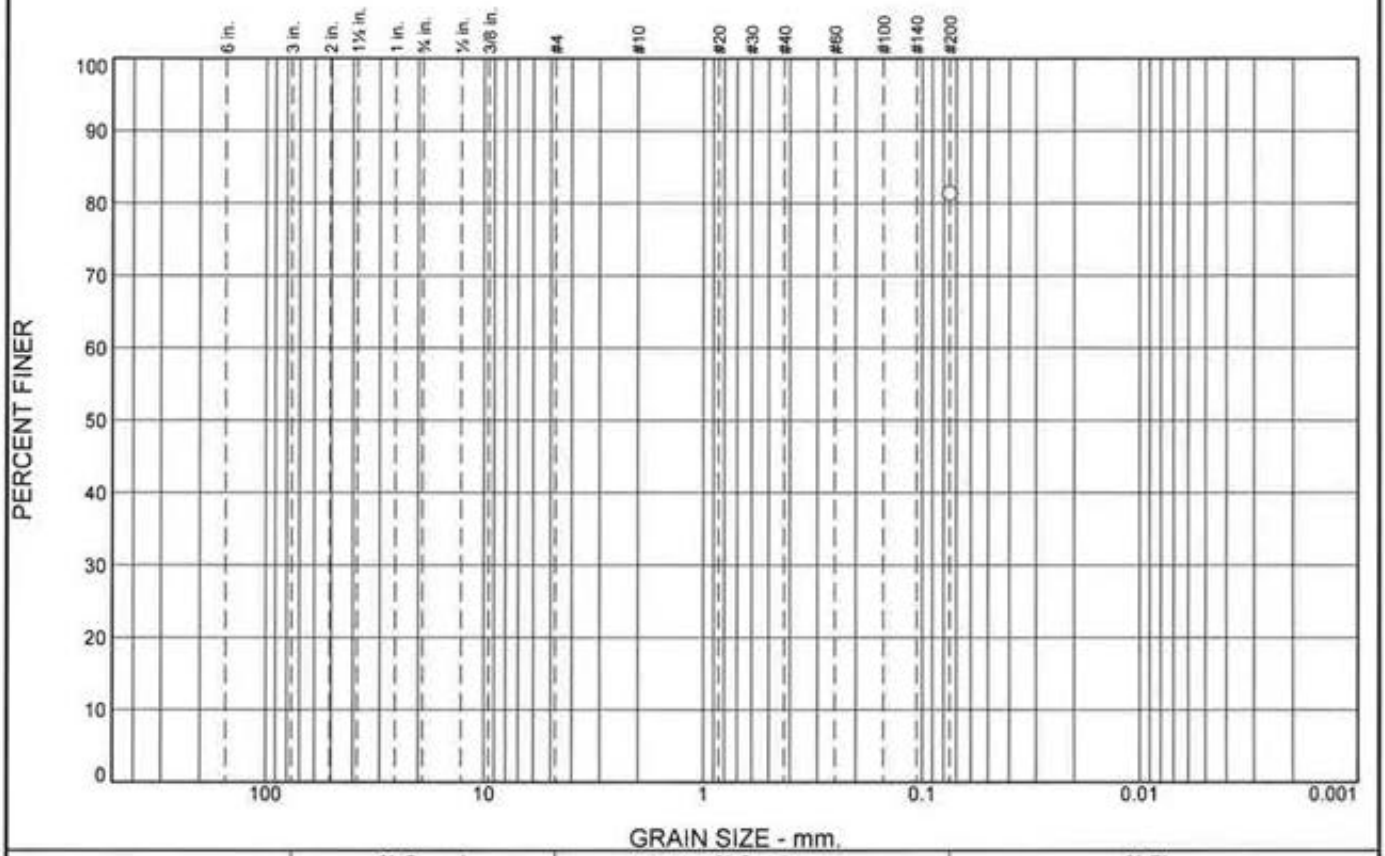
Material tested in accordance with ASTM D1140.

Location: 20-3
Sample Number: 72 **Depth:** 14.5' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-015

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						81	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	81		

* (no specification provided)

Material Description

Light Brown Silty Clay (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO=

Remarks

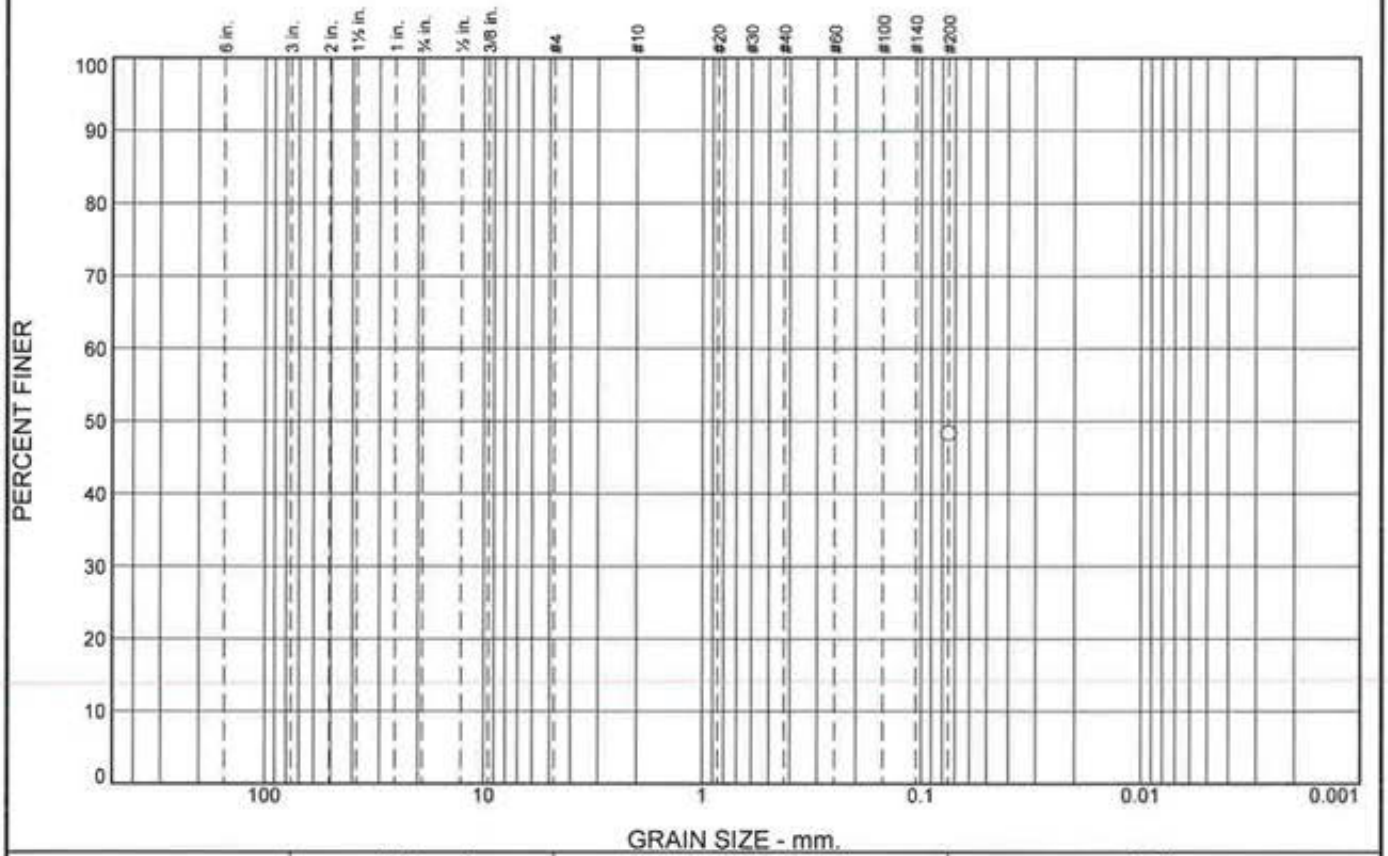
Material tested in accordance with ASTM D1140.

Location: 23-3
Sample Number: 81 **Depth:** 14.5' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-016

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						48	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	48		

* (no specification provided)

Material Description

Light Brown Silty Sand (visual)

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

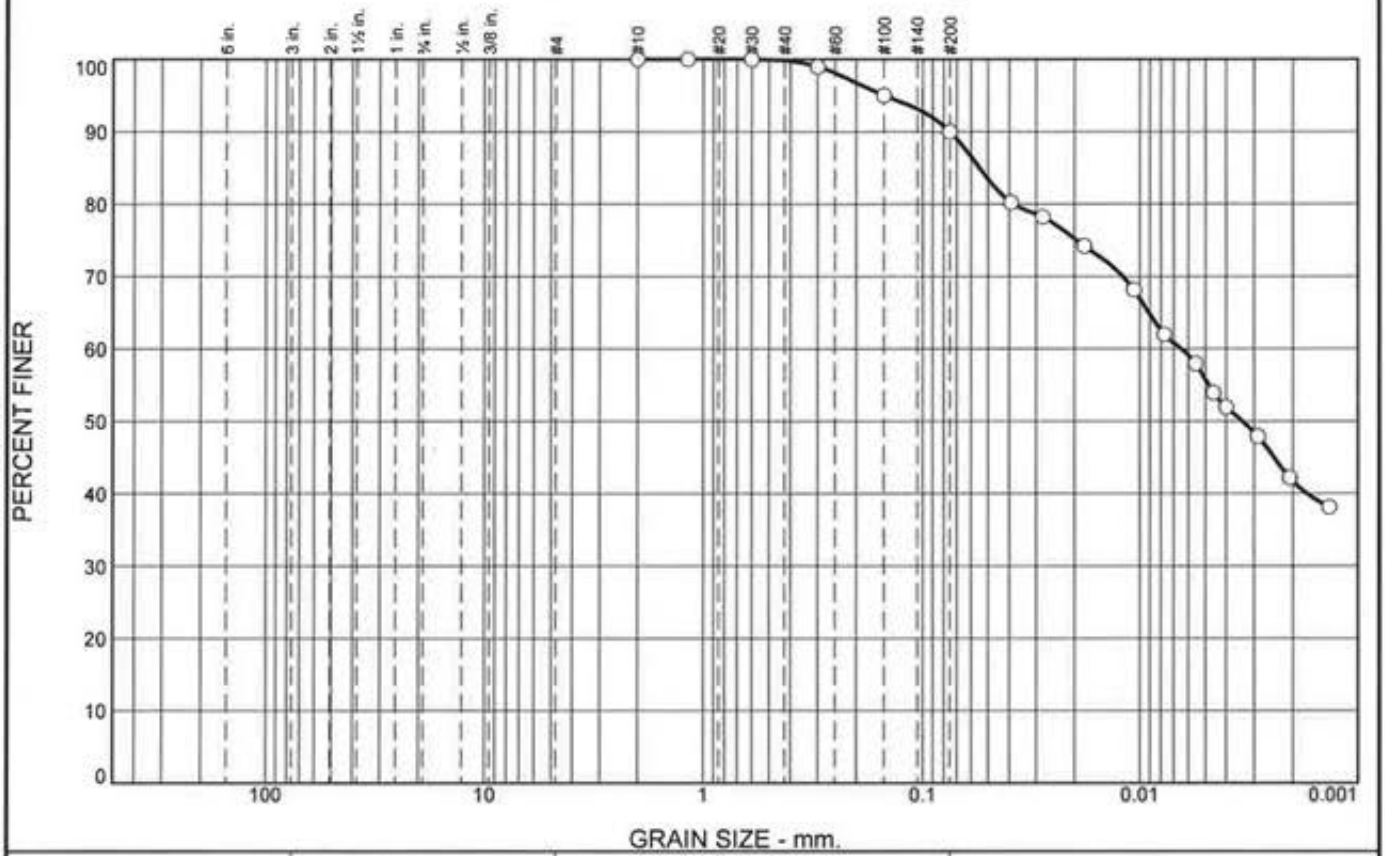
Material tested in accordance with ASTM D1140.

Location: 23-4
Sample Number: 82 **Depth:** 20.0' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-017

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	0	10	34	56

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100		
#16	100		
#30	100		
#50	99		
#100	95		
#200	90		

* (no specification provided)

Material Description

Brown Clay

Atterberg Limits

PL= 14 LL= 47 PI= 33

Coefficients

D_{90}= 0.0750 D_{85}= 0.0549 D_{60}= 0.0064
D_{50}= 0.0034 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(30)

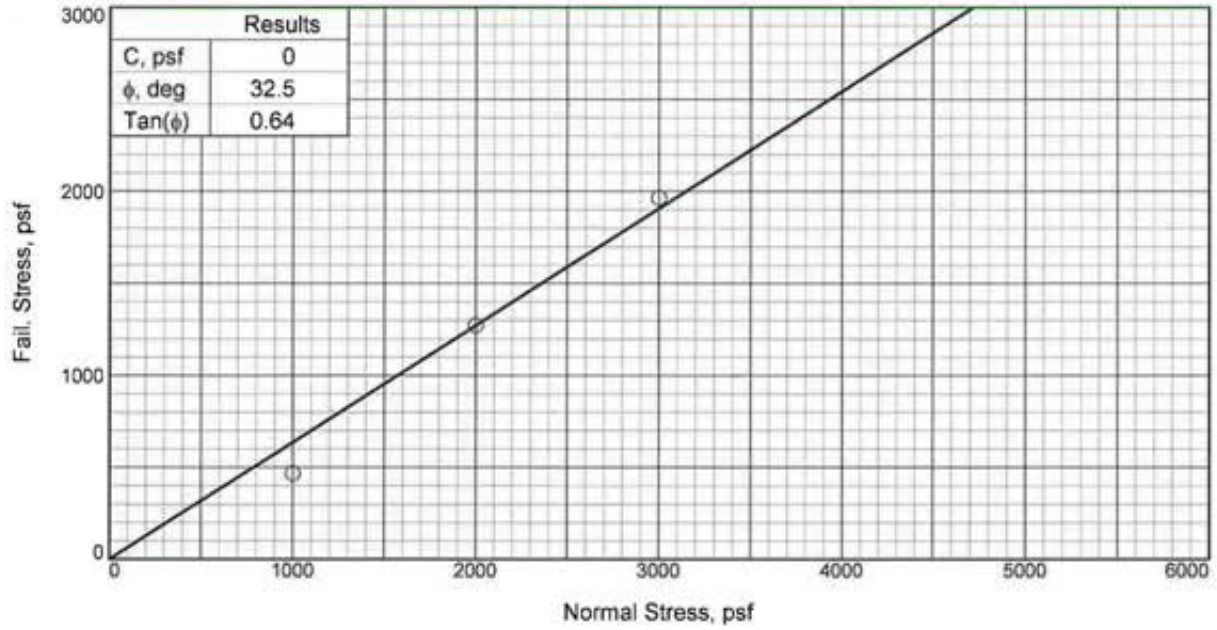
Remarks

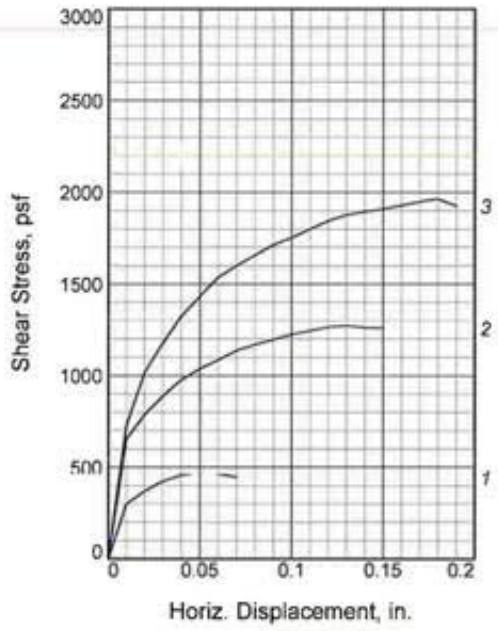
Hydrometer tested in accordance with ASTM D422.
Atterberg Limits tested in accordance with ASTM D4318.

Location: 24-1
Sample Number: 83 **Depth:** 4.0' **Date:** 03/29/16

Materials Testing, Inc.

Client: Sares Regis Group
Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Project No: VV4006-001 **Figure** 0300-018





Sample No.		1	2	3
Initial	Water Content, %	13.6	13.6	13.6
	Dry Density, pcf	109.4	106.4	106.1
	Saturation, %	77.3	70.8	70.1
	Void Ratio	0.4435	0.4842	0.4889
	Diameter, in.	2.41	2.41	2.41
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	21.6	20.3	19.0
	Dry Density, pcf	113.6	116.4	117.6
	Saturation, %	139.7	143.4	140.4
	Void Ratio	0.3905	0.3573	0.3431
	Diameter, in.	2.41	2.41	2.41
	Height, in.	0.96	0.91	0.90
Normal Stress, psf		1000	2000	3000
Fail. Stress, psf		467	1272	1963
Displacement, in.		0.05	0.13	0.18
Ult. Stress, psf				
Displacement, in.				
Strain rate, in./min.		0.00	0.00	0.00

Sample Type: tube
Description: Brown Sandy Clay (visual)

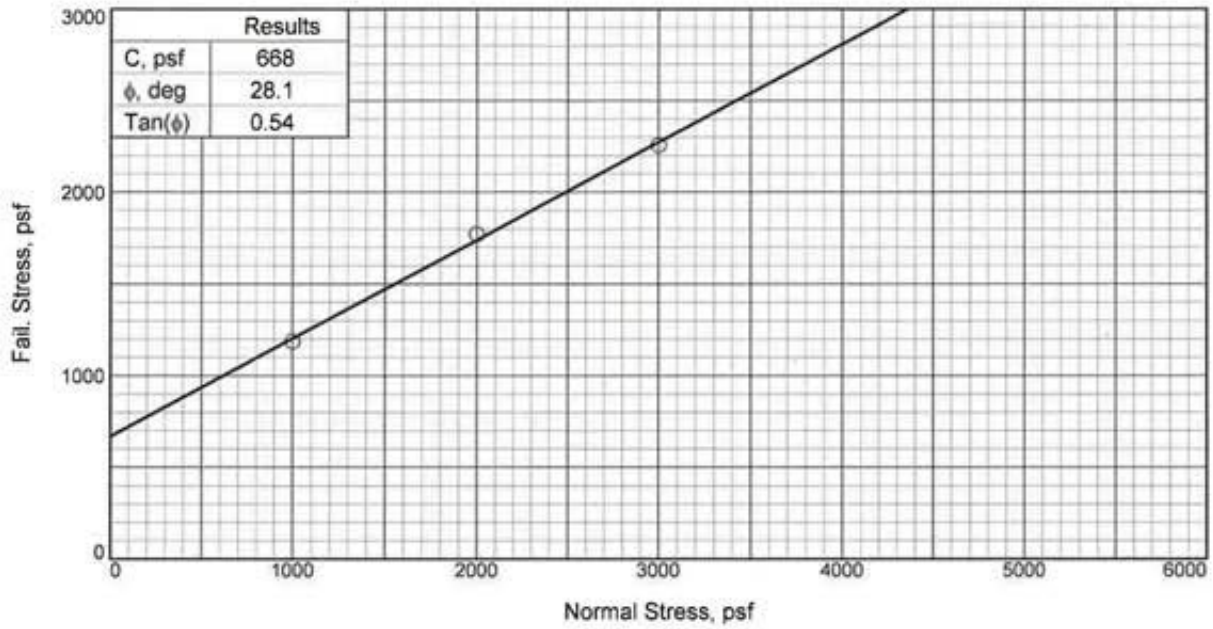
Specific Gravity= 2.53
Remarks: DIRECT SHEAR TEST REPORT
Material tested in accordance with ASTM D3080.

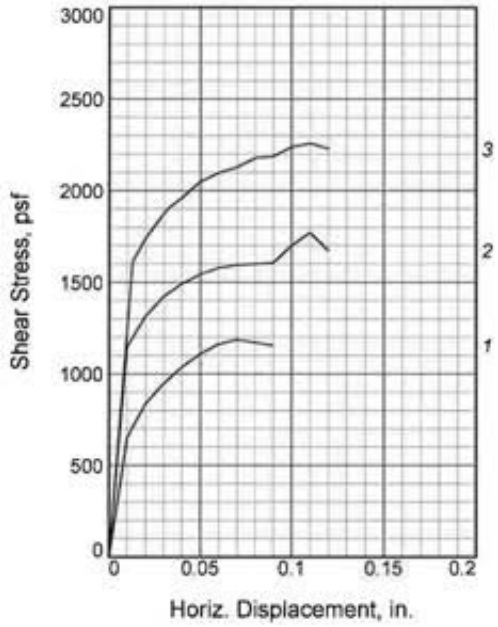
Figure 0300-019

Client: Sares Regis Group

Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Location: 1-1
Sample Number: 1 **Depth:** 4.0'
Proj. No.: VV4006-001 **Date Sampled:** 03/04/16

Materials Testing, Inc.





Sample No.		1	2	3
Initial	Water Content, %	17.9	17.9	17.9
	Dry Density, pcf	112.2	108.9	108.9
	Saturation, %	103.0	94.1	94.1
	Void Ratio	0.4528	0.4956	0.4956
	Diameter, in.	2.41	2.41	2.41
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	19.4	21.1	20.7
	Dry Density, pcf	118.3	112.0	111.7
	Saturation, %	134.2	121.4	118.1
	Void Ratio	0.3768	0.4545	0.4582
	Diameter, in.	2.41	2.41	2.41
	Height, in.	0.95	0.97	0.97
Normal Stress, psf		1000	2000	3000
Fail. Stress, psf		1187	1771	2257
Displacement, in.		0.07	0.11	0.11
Ult. Stress, psf				
Displacement, in.				
Strain rate, in./min.		0.00	0.00	0.00

Sample Type: tube
Description: Dark Brown Sandy Clay (visual)

Specific Gravity= 2.61
Remarks: DIRECT SHEAR TEST REPORT
Material tested in accordance with ASTM D3080.

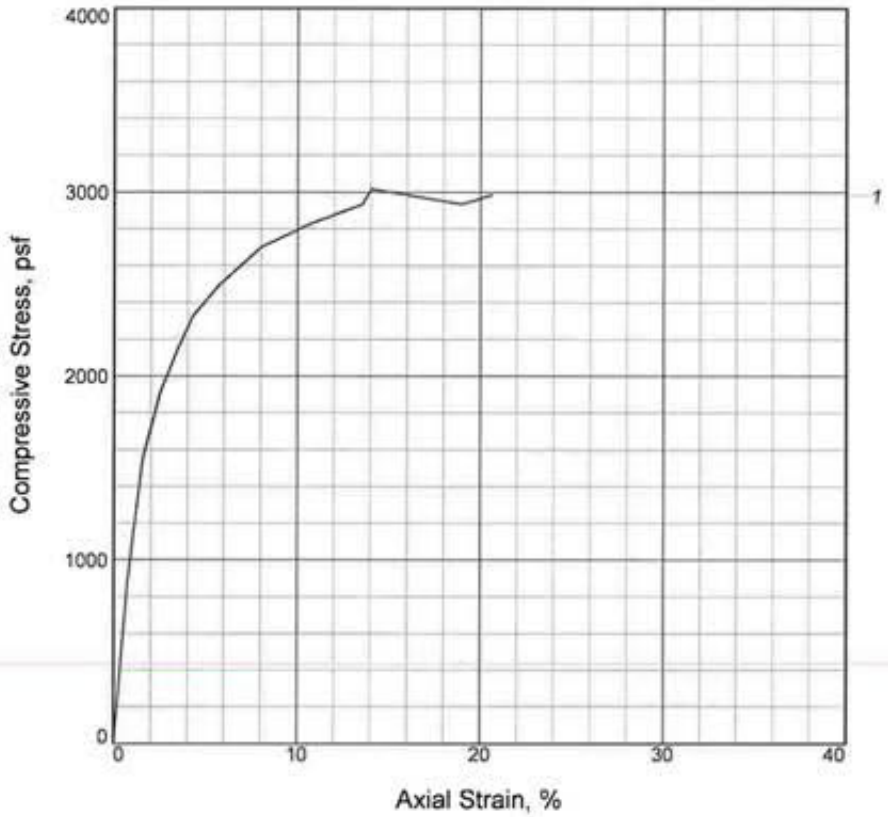
Figure 0300-020

Client: Sares Regis Group

Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Location: 8-1
Sample Number: 25 **Depth:** 3.0'
Proj. No.: VV4006-001 **Date Sampled:** 03/04/16

Materials Testing, Inc.

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	3017			
Undrained shear strength, psf	1508			
Failure strain, %	14.0			
Strain rate, in./min.	N/A			
Water content, %	24.3			
Wet density, pcf	120.4			
Dry density, pcf	96.9			
Saturation, %	89.9			
Void ratio	0.7203			
Specimen diameter, in.	2.41			
Specimen height, in.	5.00			
Height/diameter ratio	2.07			

Description: Brown Sandy Clay (visual)

LL =	PL =	PI =	GS= 2.67	Type: tube

Project No.: VV4006-001
Date Sampled: 03/04/16

Remarks:
Material tested in accordance with ASTM D2166.
Type of Failure: Bulge / Columnar
Exceeds Strain Dial Capacity

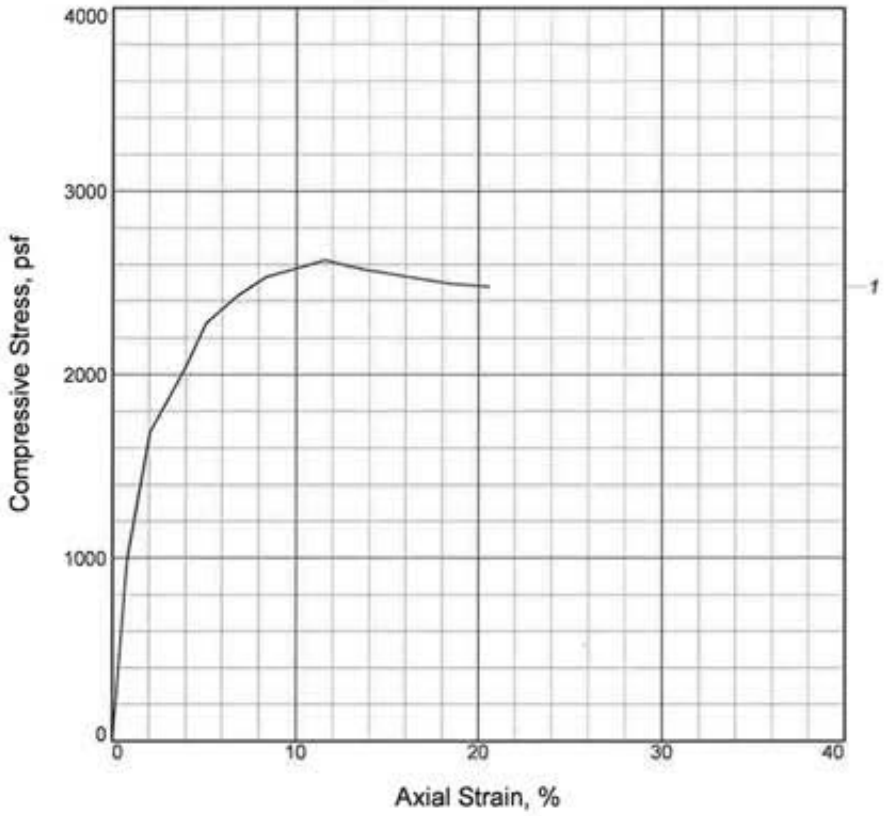
Figure 0300-021

Client: Sares Regis Group

Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Location: 3-1
Sample Number: 9 **Depth:** 2.0'

Materials Testing, Inc.

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	2624			
Undrained shear strength, psf	1312			
Failure strain, %	11.6			
Strain rate, in./min.	N/A			
Water content, %	22.3			
Wet density, pcf	123.0			
Dry density, pcf	100.5			
Saturation, %	88.1			
Void ratio	0.6893			
Specimen diameter, in.	2.41			
Specimen height, in.	5.00			
Height/diameter ratio	2.07			

Description: Light Brown Sandy Clay (visual)

LL =	PL =	PI =	GS= 2.72	Type: tube

Project No.: VV4006-001
Date Sampled: 03/04/16

Remarks:
Material tested in accordance with ASTM D2166.
Type of Failure: Bulge / Columnar
Exceeds Strain Dial Capacity

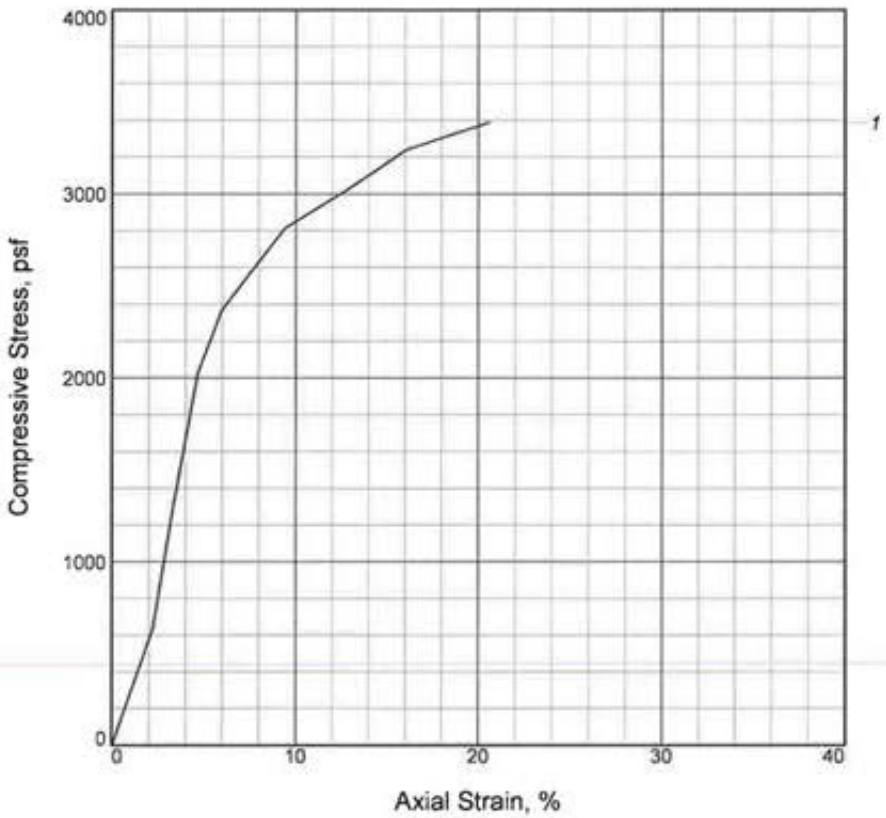
Figure 0300-022

Client: Sares Regis Group

Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Location: 11-1
Sample Number: 34 **Depth:** 3.0'

Materials Testing, Inc.

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	3387			
Undrained shear strength, psf	1694			
Failure strain, %	20.6			
Strain rate, in./min.	N/A			
Water content, %	23.2			
Wet density, pcf	122.1			
Dry density, pcf	99.1			
Saturation, %	94.6			
Void ratio	0.6372			
Specimen diameter, in.	2.41			
Specimen height, in.	5.00			
Height/diameter ratio	2.07			

Description: Brown Sandy Clay (visual)

LL =	PL =	PI =	GS= 2.60	Type: tube

Project No.: VV4006-001
Date Sampled: 03/04/16

Remarks:
Material tested in accordance with ASTM D2166.
Type of Failure: Shear
Exceeds Strain Dial Capacity

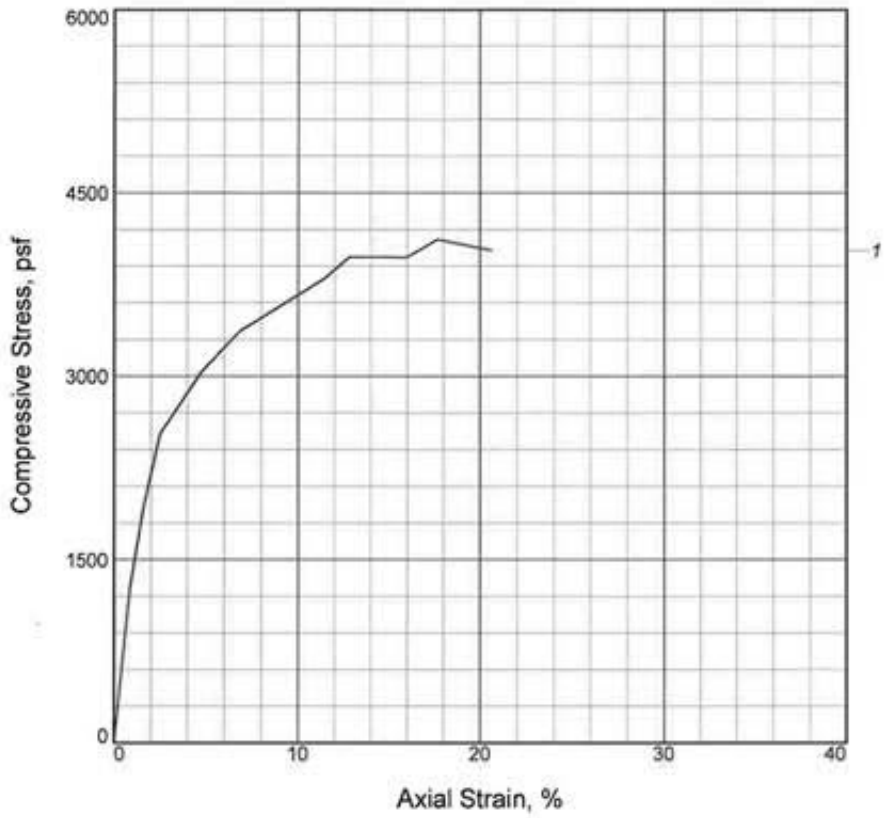
Figure 0300-023

Client: Sares Regis Group

Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Location: 14-1
Sample Number: 45 **Depth:** 3.0'

Materials Testing, Inc.

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	4118			
Undrained shear strength, psf	2059			
Failure strain, %	17.7			
Strain rate, in./min.	N/A			
Water content, %	19.2			
Wet density, pcf	129.6			
Dry density, pcf	108.7			
Saturation, %	94.8			
Void ratio	0.5454			
Specimen diameter, in.	2.41			
Specimen height, in.	5.00			
Height/diameter ratio	2.07			

Description: Light Brown Sandy Clay (visual)

LL =	PL =	PI =	GS= 2.69	Type: tube

Project No.: VV4006-001
Date Sampled: 03/04/16

Remarks:
Material tested in accordance with ASTM D2166.
Type of Failure: Columnar
Exceeds Strain Dial Capacity

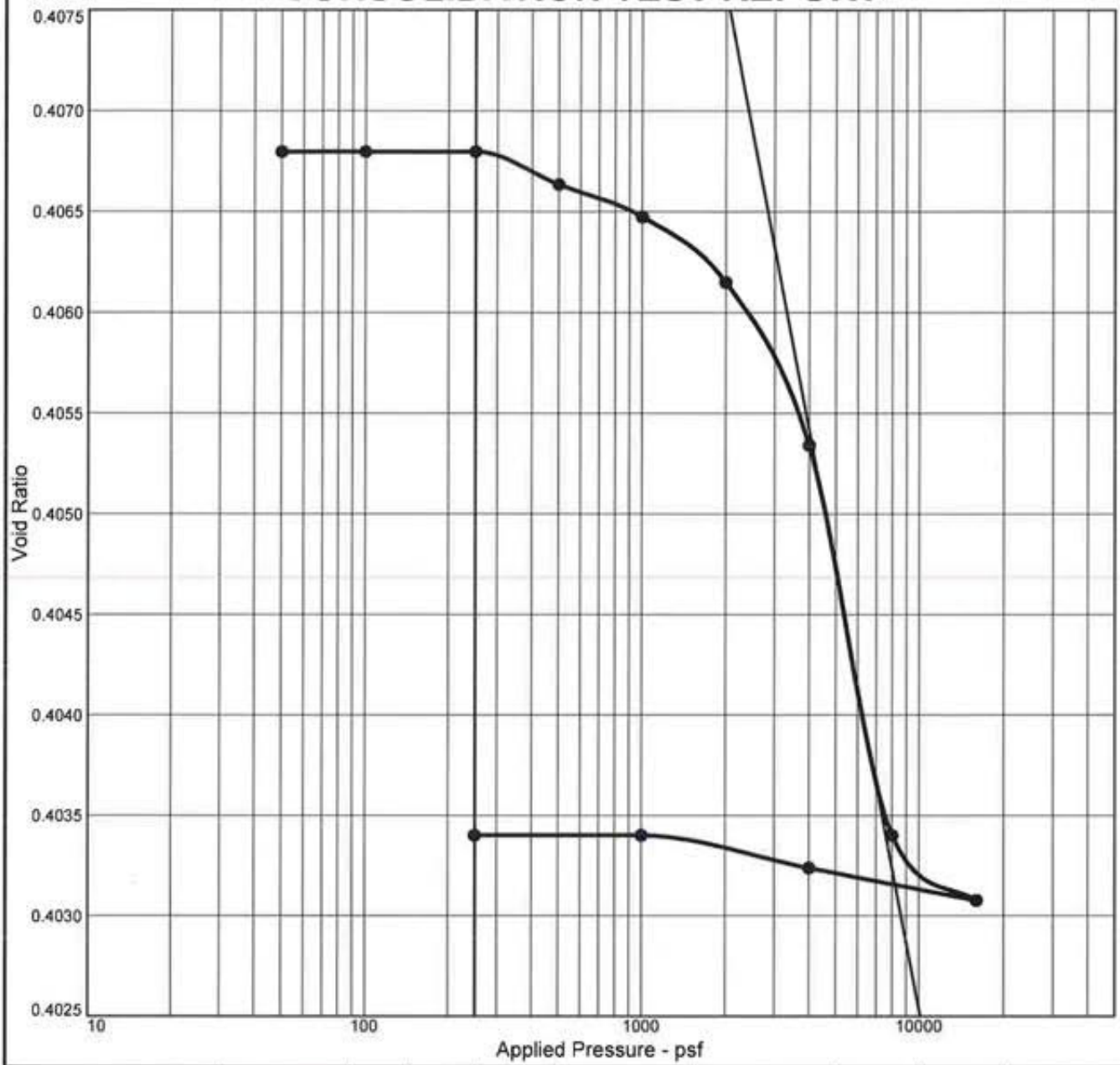
Figure 0300-024

Client: Sares Regis Group

Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA
Location: 16-1
Sample Number: 51 **Depth:** 3.0'

Materials Testing, Inc.

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P_c (psf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
128.3 %	19.6 %	118.0			2.66	2830	2717	0.01	0.00	0.407

MATERIAL DESCRIPTION	USCS	AASHTO
Light Brown Clayey Sand (visual)	SC	

Project No. VV4006- **Client:** Sares Regis Group

Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA

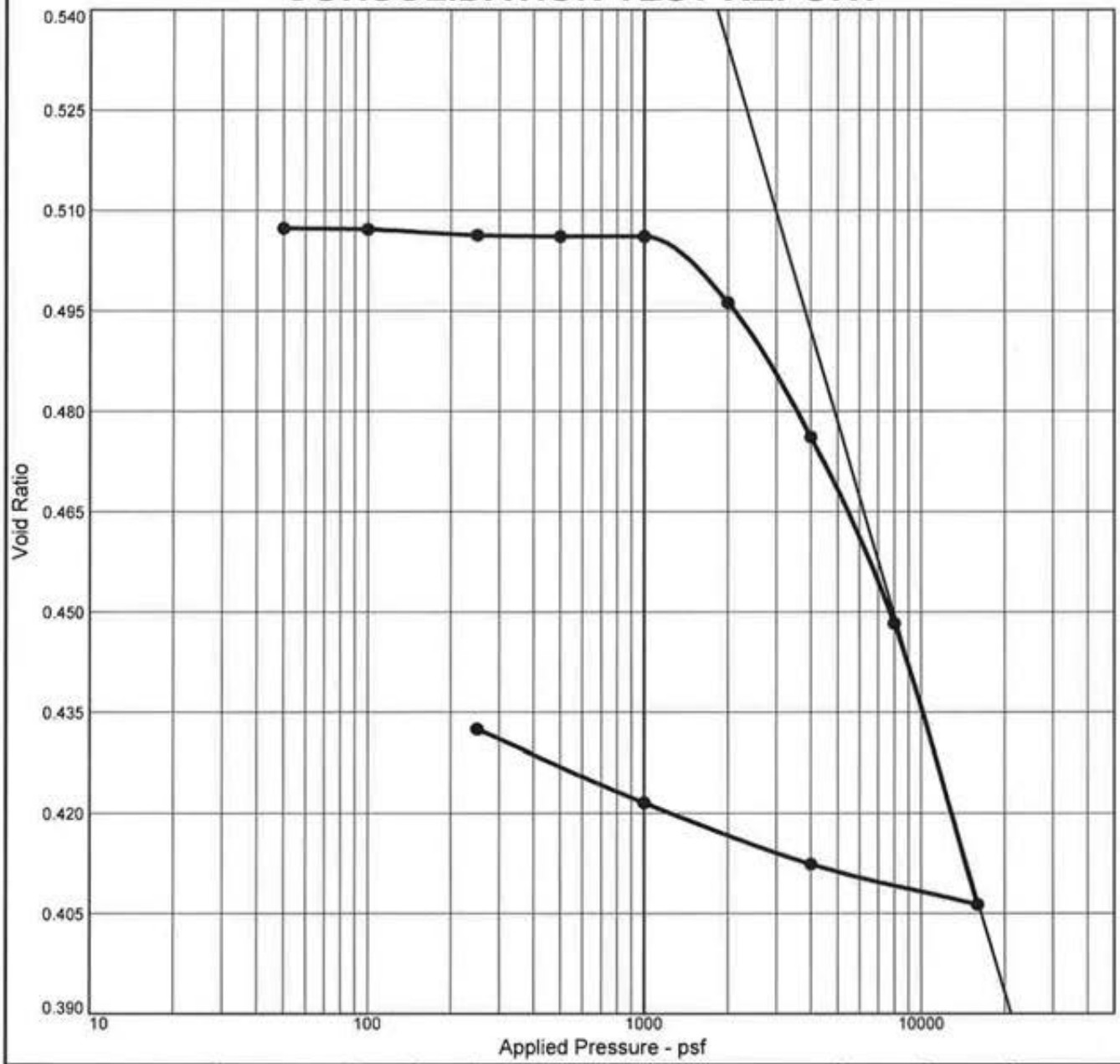
Location: 18-4 **Depth:** 29.5' **Sample Number:** 60

Materials Testing, Inc.

Remarks:
Material tested in accordance with ASTM D2435.

Figure 0300-025

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P_c (psf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
160.4 %	29.9 %	112.7			2.72	1584	3353	0.14	0.02	0.507

MATERIAL DESCRIPTION	USCS	AASHTO
Light Brown Clayey Sand (visual)	SC	

Project No. VV4006- **Client:** Sares Regis Group

Project: Roberts Ranch Subdivision
Leisure Town Rd & Fry Rd - Vacaville, CA

Location: 19-3 **Depth:** 14.5' **Sample Number:** 63

Materials Testing, Inc.

Remarks:
Material tested in accordance with ASTM D2435.

Figure 0300-026

Materials Testing, Inc.

8798 Airport Road
Redding, California 96002
(530) 222-1116, fax 222-1611

865 Cotting Lane, Suite A
Vacaville, California 95688
(707) 447-4025, fax 447-4143

Client: Sares Regis Group
1900 Third Street, Suite 400
Sacramento, CA 95814

Client No: VV4006-001
Report No: 0300-027
Date: 03/29/16

Project: Roberts Ranch Subdivision
Leisure Town Road & Fry Road – Vacaville, CA

Submitted by: KC Engineering

"R" VALUE TEST REPORT
(CTM 301)

Sample:	68
Description:	Brown Sandy Clay
Location:	R-1 @ 0.0' - 3.0'

SIEVE ANALYSIS

Sieve Size	1"	3/4"	1/2"	3/8"	#4
"As Received" (Percent Pass)					100
"As Used" (Percent Pass)					100

RESISTANCE VALUE

Specimen Number	Dry Unit Weight, PCF	Moisture (%)	Exudation Pressure (PSI)	Expansion Pressure Dial Reading & PSF		R-Value
1	106.3	17.0	387	13	56	10
2	96.9	25.4	294	7	30	7
3	94.0	27.4	159	3	13	4

R-Value @ 300 PSI Exudation Pressure = 8
R-Value @ Expansion = ---

Notes:

Materials Testing, Inc.

8798 Airport Road
Redding, California 96002
(530) 222-1116, fax 222-1611

865 Cotting Lane, Suite A
Vacaville, California 95688
(707) 447-4025, fax 447-4143

Client:	Sares Regis Group 1900 Third Street, Suite 400 Sacramento, CA 95814	**Client No:** **Report No:** **Date:**	VV4006-001 0300-028 03/29/16
Project:	Roberts Ranch Subdivision Leisure Town Road & Fry Road – Vacaville, CA	**Submitted by:**	KC Engineering

"R" VALUE TEST REPORT
(CTM 301)

Sample:	69
Description:	Brown Sandy Clay
Location:	R-2 @ 0.0' - 3.0'

SIEVE ANALYSIS

Sieve Size	1"	3/4"	1/2"	3/8"	#4
"As Received" (Percent Pass)					100
"As Used" (Percent Pass)					100

RESISTANCE VALUE

Specimen Number	Dry Unit Weight, PCF	Moisture (%)	Exudation Pressure (PSI)	Expansion Pressure Dial Reading & PSF		R-Value
1	97.2	23.4	519	14	61	7
2	97.5	24.5	318	9	39	5
3	98.1	26.3	186	6	26	4

R-Value @ 300 PSI Exudation Pressure = 5
R-Value @ Expansion = ---

Notes:

Materials Testing, Inc.

8798 Airport Road
Redding, California 96002
(530) 222-1116, fax 222-1611

865 Cotting Lane, Suite A
Vacaville, California 95688
(707) 447-4025, fax 447-4143

Client: Sares Regis Group
1900 Third Street, Suite 400
Sacramento, CA 95814

Client No: VV4006-001
Report No: 0300-029
Date: 03/29/16

Project: Roberts Ranch Subdivision
Leisure Town Road & Fry Road – Vacaville, CA

Submitted by: KC Engineering

"R" VALUE TEST REPORT
(CTM 301)

Sample:	70
Description:	Brown Sandy Clay
Location:	R-3 @ 1.0' - 3.0'

SIEVE ANALYSIS

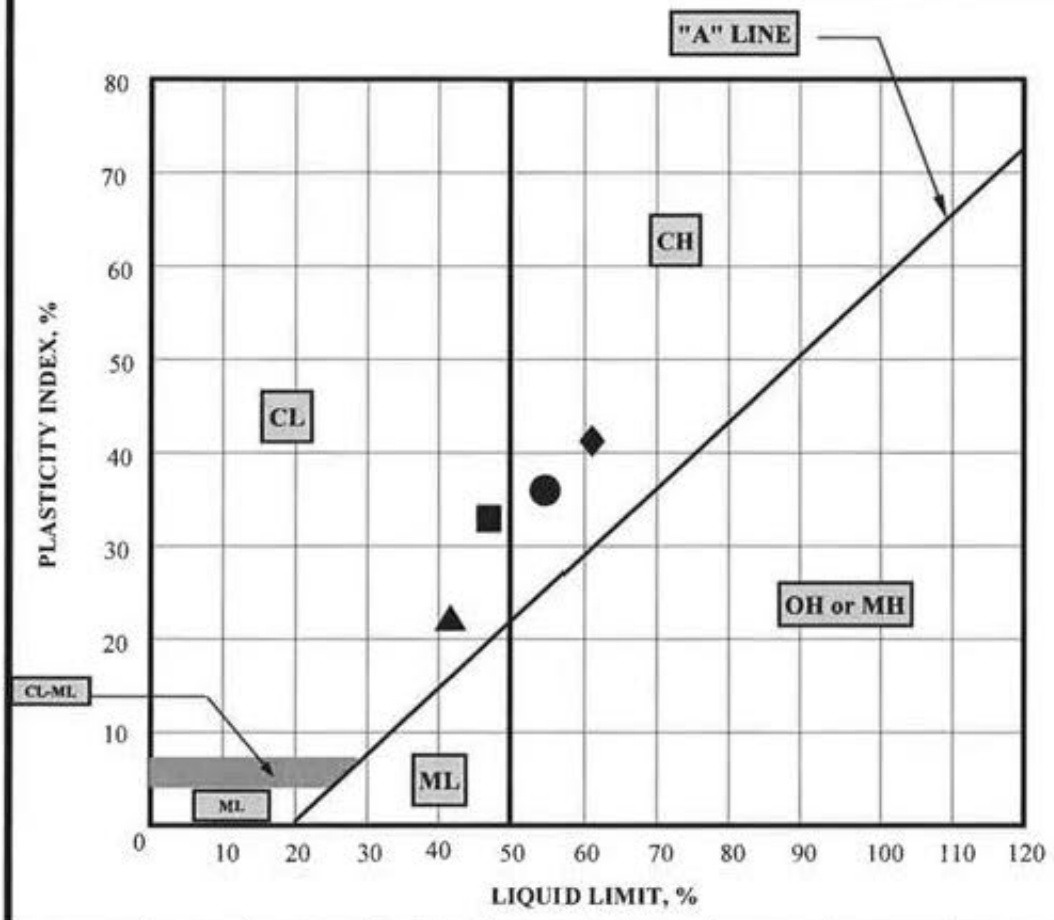
Sieve Size	1"	3/4"	1/2"	3/8"	#4
"As Received" (Percent Pass)					100
"As Used" (Percent Pass)					100

RESISTANCE VALUE

Specimen Number	Dry Unit Weight, PCF	Moisture (%)	Exudation Pressure (PSI)	Expansion Pressure Dial Reading & PSF		R-Value
1	111.8	16.5	610	17	74	10
2	103.6	20.1	351	6	26	7
3	97.7	24.2	213	2	9	5

R-Value @ 300 PSI Exudation Pressure = 6
R-Value @ Expansion = ---

Notes:



KEY SYMBOL	SAMPLE NUMBER	DEPTH	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, LL, %	PLASTIC LIMIT, PL, %	PLASTICITY INDEX, PI, %	LIQUIDITY INDEX	UNIFIED SOIL CLASSIFICATION SYMBOL
●	4-1	4.0'	N/A	55	19	36	N/A	CH
▲	7-1	3.0'	N/A	42	20	22	N/A	CL
◆	19-1	3.0'	N/A	61	20	41	N/A	CH
■	24-1	4.0'	N/A	47	14	33	N/A	CL

Materials Testing, Inc.

PLASTICITY CHART AND DATA

Roberts Ranch Subdivision

Leisure Town Road & Fry Road - Vacaville, CA

Client No:	Date:	Report No:
VV4006	3/29/2016	0300-030

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 03/09/2016
Date Submitted 03/04/2016

To: David Cymanski
K.C. Engineering
865 Cotting Lane Suite A
Vacaville, CA 95688

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager \

The reported analysis was requested for the following location:
Location : VV4006 **Site ID :** C-1 @0-5FT.
Thank you for your business.

* For future reference to this analysis please use SUN # 71370-148794.

EVALUATION FOR SOIL CORROSION

Soil pH	7.06		
Minimum Resistivity	1.63 ohm-cm (x1000)		
Chloride	8.6 ppm	00.00086	%
Sulfate	13.6 ppm	00.00136	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 03/09/2016
Date Submitted 03/04/2016

To: David Cymanski
K.C. Engineering
865 Cotting Lane Suite A
Vacaville, CA 95688

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : VV4006 Site ID : C-2 @0-4FT.
Thank you for your business.

* For future reference to this analysis please use SUN # 71370-148795.

EVALUATION FOR SOIL CORROSION

Soil pH	6.99	
Minimum Resistivity	1.02 ohm-cm (x1000)	
Chloride	11.1 ppm	00.00111 %
Sulfate	14.2 ppm	00.00142 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 03/09/2016
Date Submitted 03/04/2016

To: David Cymanski
K.C. Engineering
865 Cotting Lane Suite A
Vacaville, CA 95688

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : VV4006 Site ID : C-3 @0-5FT.
Thank you for your business.

* For future reference to this analysis please use SUN # 71370-148796.

EVALUATION FOR SOIL CORROSION

Soil pH	7.56	
Minimum Resistivity	0.99 ohm-cm (x1000)	
Chloride	16.7 ppm	00.00167 %
Sulfate	27.8 ppm	00.00278 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 03/09/2016
Date Submitted 03/04/2016

To: David Cymanski
K.C. Engineering
865 Cotting Lane Suite A
Vacaville, CA 95688

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : VV4006 Site ID : C-4 @0-4FT.
Thank you for your business.

* For future reference to this analysis please use SUN # 71370-148797.

EVALUATION FOR SOIL CORROSION

Soil pH	7.51	
Minimum Resistivity	1.07 ohm-cm (x1000)	
Chloride	9.2 ppm	00.00092 %
Sulfate	15.8 ppm	00.00158 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

USGS Design Maps Summary Report

User–Specified Input

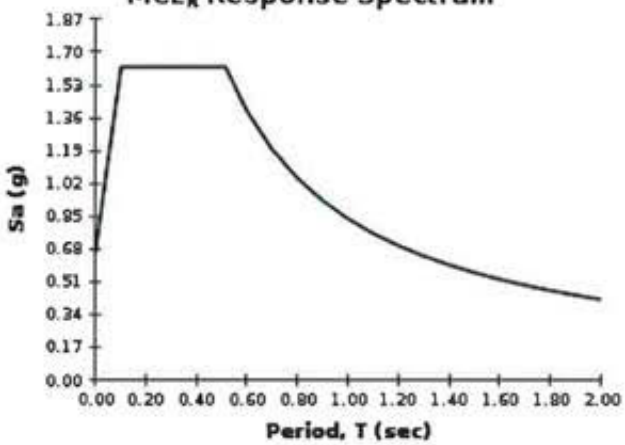
Report Title	Prop. Roberts Ranch Subdivision, Vacaville Fri April 8, 2016 17:10:21 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	38.341°N, 121.9252°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

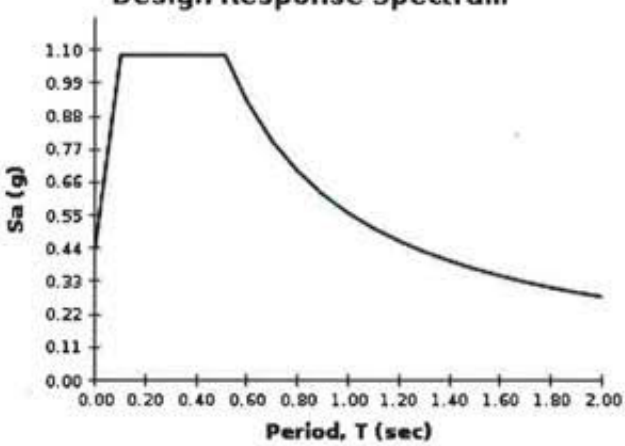
S_S =	1.624 g	S_{MS} =	1.624 g	S_{DS} =	1.083 g
S_1 =	0.558 g	S_{M1} =	0.837 g	S_{D1} =	0.558 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

USGS Design Maps Detailed Report

ASCE 7-10 Standard (38.341°N, 121.9252°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1] $S_S = 1.624$ g

From Figure 22-2 [2] $S_1 = 0.558$ g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk-Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4-1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_S

For Site Class = D and S_S = 1.624 g, F_a = 1.000

Table 11.4-2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1-s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.558 g, F_v = 1.500

Equation (11.4–1): $S_{MS} = F_a S_S = 1.000 \times 1.624 = 1.624$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.500 \times 0.558 = 0.837$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

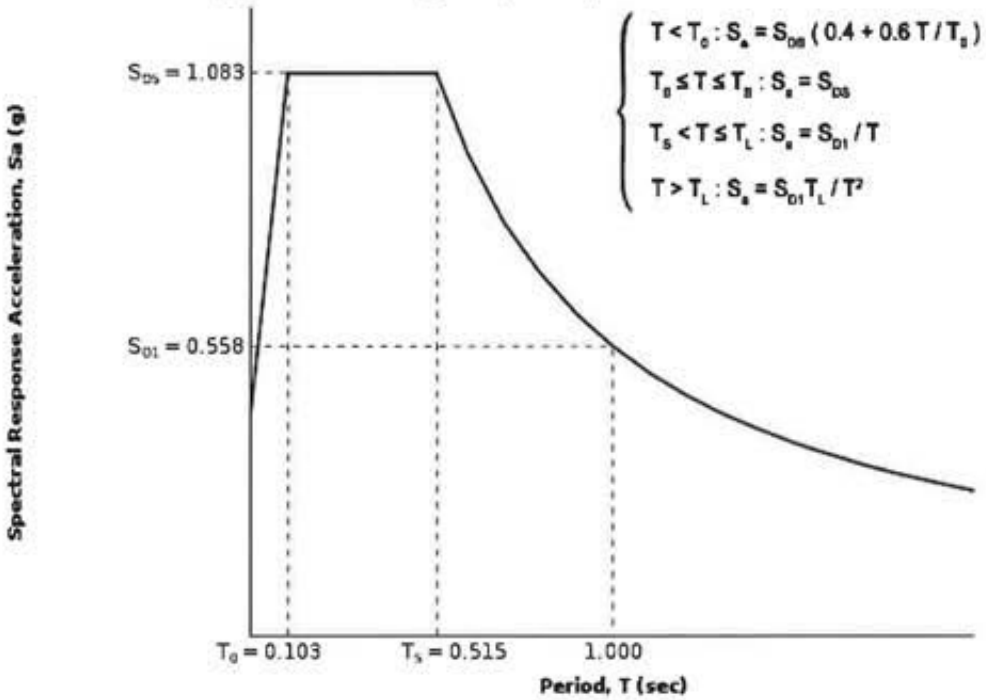
Equation (11.4–3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.624 = 1.083$ g

Equation (11.4–4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.837 = 0.558$ g

Section 11.4.5 — Design Response Spectrum

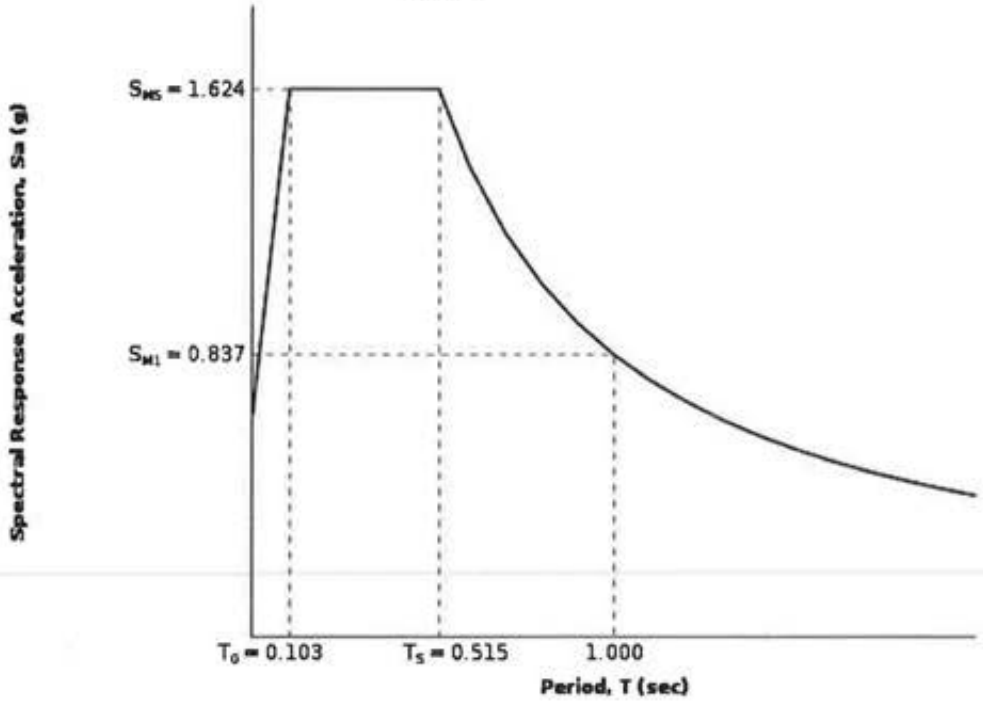
From Figure 22-12 [3] $T_L = 8$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.604

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.604 = 0.604$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.604 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 - Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.981

From Figure 22-18 [6] C_{R1} = 1.021

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 1.083 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.558 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

APPENDIX C

Phase I Environmental Site Assessment

PHASE I ENVIRONMENTAL SITE ASSESSMENT
on
ROBERTS' RANCH SUBDIVISION
APNS 0138-030-090, -100, -110, & -120
Leisure Town Road and Fry Road
Vacaville, Solano County, California
for
SARES REGIS GROUP

By

KC ENGINEERING COMPANY

Project No. VV4006

15 March 2016

865 Cotting Lane, Suite A
Vacaville, California 95688
(707) 447-4025, fax 447-4143

8798 Airport Road
Redding, California 96002
(530) 222-0832, fax 222-1611

KC ENGINEERING COMPANY
A SUBSIDIARY OF MATERIALS TESTING, INC.

Project No. VV4006
15 March 2016

Mr. Bob Holmes
Sares Regis Group
1900 Third Street, Suite 400
Sacramento, California 95814

Subject: Roberts' Ranch Subdivision
APNS 0138-030-090, -100, -110, and -120
Leisure Town Road and Fry Road
Vacaville, Solano County, California
PHASE I ENVIRONMENTAL SITE ASSESSMENT

Dear Mr. Holmes:

In accordance with your authorization, **KC ENGINEERING COMPANY** has completed a Phase I Environmental Site Assessment (ESA) of the approximate 240-acre property identified as Assessor's Parcel Numbers (APNS) 0138-030-090, -100, -110, and -120, located at the northeast intersection of Leisure Town Road and Fry Road in Vacaville, Solano County, California. The property currently consists of agricultural fields.

The accompanying report presents our conclusions and recommendations based on our investigation and review. Should you have any questions relating to the contents of this report, or should you require additional information, please contact our office at your convenience.

Respectfully Submitted,
KC ENGINEERING CO.

Reviewed by:

David V. Cymanski, G.E.
Principal Engineer

Amy E. Lee, R.E.P.A. #157732
Environmental Assessor

Copies: 3 to Sares Regis Group

TABLE OF CONTENTS