APPENDIX 8
GEOTECHNICAL INFILTRATION

GeoTek, Inc.
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June 29, 2023
Project No. 3579-CR

Transtech
413 Mackey Drive
San Bernardino, California 92408

Attention: Mr. David Mlynarski

Subject: **Infiltration Evaluation**
Proposed Container Storage Yard
Assessor's Parcel Number (APN) 0438-163-24-0000
9233 Deep Creek Road
Apple Valley area of San Bernardino County, California

References: See Page 6

Dear Mr. Mlynarski:

As requested, and authorized, GeoTek, Inc. (GeoTek) has performed an Infiltration Evaluation in order to provide infiltration testing for a proposed container storage yard to be constructed in Apple Valley, San Bernardino County, California. The intent of this study is to evaluate the infiltration properties of the subsurface soils within, and adjacent to, the proposed container storage yard. This report presents the results of the evaluation performed by GeoTek.

Site Description

The approximate 24.4-acre irregular-shaped project site is located at the eastern terminus of Outpost Road, east of Deep Creek Road, in an unincorported area of San Bernardino County, near Apple Valley, California. Access to the site is available off Deep Creek Road via Outpost Road, a private unpaved gravel road that trends through the center of the parcel.

Topographically, site topography ranges from hillside terrain on the northeastern corner of the property to gently slopping terrain across of the majority of the proposed development site areas in the southern and western portions of the site. Site grades vary between 2,926 feet above mean sea level (amsl) towards the northeastern region and 2,885 feet amsl to the southwest. The site slopes down toward the southwest.

The the site is currently undeveloped land but used to store steel storage container units. A Burlington Northern Santa Fe (BNSF) railroad track runs adjacent to the eastern property line of the site. Site vegetation in the majority of the site consists of weeds, grasses and scattered brush. The site appears to have been disced in the past for vegetation control. A Site Location Map is presented as Figure 1 of this report.

Project Description

Based upon review of the *Conceptual Site Plan, Container Storage Yard* provided by Red Brick Solutions (Sheet 2 of 2, dated 2022), GeoTek understands that proposed site improvements are to consist of the construction of a container storage yard.

Field Exploration

Six (6) percolation test borings, Borings I-1 through I-6, were excavated with a track-mounted hollow stem auger drill rig. The tests were performed at depths ranging from five (5) to seven (7) feet below existing grade. Additionally, one (1) deep exploratory boring (Boring B-1) was excavated within the project area to a depth of approximately 15 feet for determination of depth of groundwater, if any, and for observation of any hardpan or impermeable layers. The approximate locations of the borings are indicated on the attached Boring Location Map, Figure 2.

All borings were approximately 8-inches in diameter. Four-inch diameter slotted PVC pipes encapsulated in filter sock were inserted into the six (6) percolation test holes. The annular space between the test hole sidewalls and PVC pipe was filled with gravel.

Soil/Geologic Conditions

The geologic units encountered in all borings consisted of alluvium. The alluvial soils consisted of silty sand and sand (SM and SP soil types based upon the Unified Soil Classification System). The logs of the borings are presented in Appendix A.

Groundwater

Groundwater or perched water was not encountered nor observed in any of the borings excavated for this evaluation. Based on a review of groundwater depths noted on the State Department of Water Resources Water Data Library website (https://wdl.water.ca.gov/waterdatalibrary) , it is estimated a historic high groundwater depth in excess of 80 feet below existing grade exists at the site.

It is possible that seasonal variations (temperature, rainfall, etc.) will cause fluctuations in the groundwater level. Additionally, perched water may be encountered at shallow depths following extensive rain events, especially at soil/bedrock contacts or within the bedrock.

Infiltration Testing

Subsequent to pre-soaking the test holes in general conformance with the referenced document (County of San Bernardino, 2011), percolation testing was performed in the lower approximate 22 inches in each of the percolation borings. The percolation testing was conducted in general conformance with the referenced document prepared by the County of San Bernardino. The percolation rates were converted to an infiltration rate via the Porchet Method.

The infiltration rate for each of the tests is presented in the following table after the water level had stabilized.

Boring No.	Infiltration Rate (inches per hour)	Depth of Boring (feet)
Boring I-1	12.28	5
Boring I-2	20.31	5
Boring I-3	9.39	5
Boring I-4	16.42	5
Boring I-5	9.88	5
Boring I-6	2.18	7

Copies of the percolation data sheets and infiltration conversion sheets (Porchet Method) are included in Appendix B.

The reported infiltration rates are the measured rate without any factor of safety applied. Over the lifetime of the water quality facility, the infiltration rates may be affected by silt build up and biological activities, as well as local variations in near surface soil conditions. A suitable factor of safety should be applied to the field rates in design of the infiltration systems.

It should be noted that the infiltration rates provided above were performed in relatively undisturbed site materials. Infiltration rates will vary and are mostly dependent on the underlying consistency of the site soil and relative density. Infiltration rates will be impacted by weight of equipment travelling over the soil, placement of engineered fill and other various factors. GeoTek, Inc. assumes no responsibility or liability for the ultimate design or performance of the storm water facilities.

LIMITATIONS

The earth materials observed on the project site appear to be representative of the tested areas; however, soil materials vary in character between excavations and natural outcrops or conditions exposed during site construction. Site conditions may vary due to seasonal changes or other factors. GeoTek, Inc. assumes no responsibility or liability for work, testing or recommendations performed or provided by others.

GeoTek's conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

The opportunity to be of service on this project is sincerely appreciated. If you should have any questions, please do not hesitate to contact GeoTek.

Respectfully submitted,
GeoTek, Inc.

Edward H. LaMont
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Principal Geologist

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Anna M. Scott
Project Geologist

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Staff Engineer

Enclosures: Figure 1 – Site Location Map
Figure 2 – Boring Location Map
Appendix A – Logs of Exploratory Borings
Appendix B – Percolation Data Sheets and Conversion Sheets (Porchet Method)

Distribution: (1) Addressee via email (PDF file)

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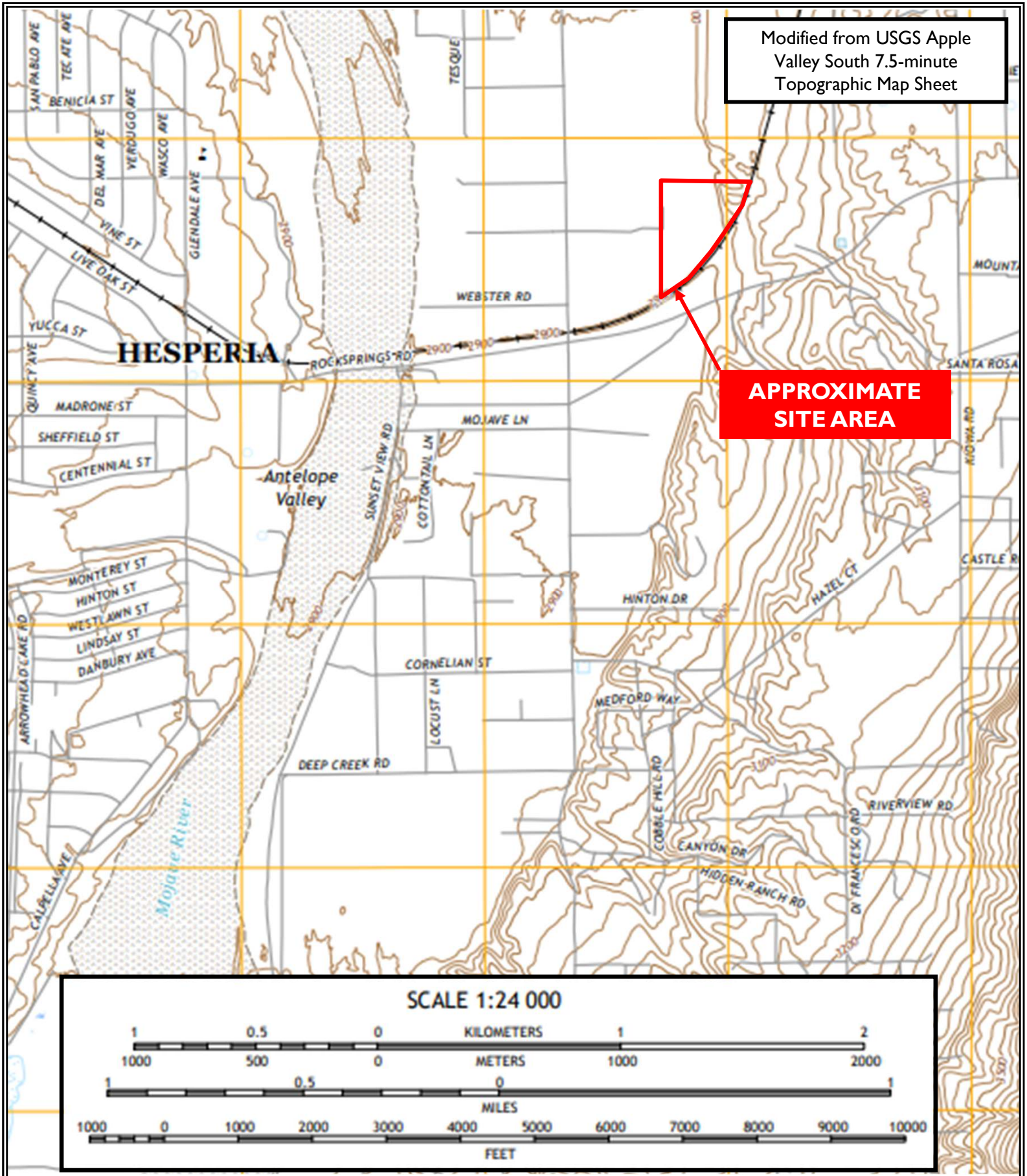
REFERENCES

Dibblee, T.W., 1973, "Geologic Map of the Lake Arrowhead Quadrangle", Open-File Report OF-73-56.

Red Brick Solution, 2022, "Conceptual Site Plan, Container Storage Yard, San Bernardino County, California", 1 sheet.

San Bernardino County, 2011, "Infiltration Rate Evaluation Protocol and Factor of Safety Recommendations," dated May 19.



Transtech
APN 0438-163-24-0000
Apple Valley, San Bernardino County, California

Project No. 3579-CR

NORTH

Figure 1

Site Location Map

GEOTEK

Transtech APN 0438-163-24-0000 Apple Valley, San Bernardino County, California GeoTek Project No. 3579-CR	**Figure 2** **Boring Location Map**	NORTH	GEOTEK

APPENDIX A

LOGS OF EXPLORATORY BORINGS

APN 0438-163-24-0000
Outpost Road and Deep Creek Road
Apple Valley, San Bernardino County, California
Project No. 3579-CR

GEOTEK

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Transtech	**DRILLER:**	2R Drilling	**LOGGED BY:**	C.Diaz
PROJECT NAME:	APN 0438-163-24-0000	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Victor
PROJECT NO.:	3579-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	Track CME 75
LOCATION:	Apple Valley, CA			**DATE:**	6/23/2023

Boring No.: B-1

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Alluvium:**			
				SP	F-m SAND, tan, slightly moist, loose			
					F-m SAND, grayish brown, slightly moist, loose			
5				SM	Silty f SAND, tan, slightly moist, medium dense			
10				SM-SP	Silty f SAND to f-m SAND, tan, slightly moist, medium dense			
15					**BORING TERMINATED AT 15 FEET**			
					No groundwater encountered Boring backfilled with soil cuttings			
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Transtech	**DRILLER:**	2R Drilling	**LOGGED BY:**	C.Diaz
PROJECT NAME:	APN 0438-163-24-0000	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Victor
PROJECT NO.:	3579-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	Track CME 75
LOCATION:	Apple Valley, CA			**DATE:**	6/23/2023

Boring No.: I-1

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Alluvium:**			
				SM	Silty f-m SAND, grey brown, slightly moist, loose			
				SP	F-m SAND, grey brown, slightly moist, loose			
5					**BORING TERMINATED AT 5 FEET**			
					No groundwater encountered Boring set with pipe, sock, and gravel			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing:

AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test
SR = Sulfate/Resisitivity Test	SH = Shear Test	HC= Consolidation	MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Transtech	**DRILLER:**	2R Drilling	**LOGGED BY:**	C.Diaz
PROJECT NAME:	APN 0438-163-24-0000	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Victor
PROJECT NO.:	3579-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	Track CME 75
LOCATION:	Apple Valley, CA			**DATE:**	6/23/2023

Boring No.: I-2

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Alluvium:**			
				SP	F-m SAND, tan, slightly moist, loose			
5					**BORING TERMINATED AT 5 FEET**			
					No groundwater encountered Boring set with pipe, sock, and gravel			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Transtech	**DRILLER:**	2R Drilling	**LOGGED BY:**	C.Diaz
PROJECT NAME:	APN 0438-163-24-0000	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Victor
PROJECT NO.:	3579-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	Track CME 75
LOCATION:	Apple Valley, CA			**DATE:**	6/23/2023

Boring No.: I-3

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Alluvium:**			
				SM	Silty f SAND, grey brown, slightly moist, loose			
				SP	F-m SAND, tan brown, slightly moist, loose			
5					**BORING TERMINATED AT 5 FEET** No groundwater encountered Boring set with pipe, sock, and gravel			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Transtech	**DRILLER:**	2R Drilling	**LOGGED BY:**	C.Diaz
PROJECT NAME:	APN 0438-163-24-0000	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Victor
PROJECT NO.:	3579-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	Track CME 75
LOCATION:	Apple Valley, CA			**DATE:**	6/23/2023

Boring No.: I-4

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Alluvium:**			
				SP	F-m SAND, tan, slightly moist, loose			
5					**BORING TERMINATED AT 5 FEET**			
					No groundwater encountered Boring set with pipe, sock, and gravel			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Transtech	**DRILLER:**	2R Drilling	**LOGGED BY:**	C.Diaz
PROJECT NAME:	APN 0438-163-24-0000	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Victor
PROJECT NO.:	3579-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	Track CME 75
LOCATION:	Apple Valley, CA			**DATE:**	6/23/2023

Boring No.: I-5

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Alluvium:**			
				SP	F-m SAND, slightly moist, brown, loose			
5					**BORING TERMINATED AT 5 FEET**			
					No groundwater encountered Boring set with pipe, sock, and gravel			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Transtech	**DRILLER:**	2R Drilling	**LOGGED BY:**	C.Diaz
PROJECT NAME:	APN 0438-163-24-0000	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Victor
PROJECT NO.:	3579-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	Track CME 75
LOCATION:	Apple Valley, CA			**DATE:**	6/23/2023

Boring No.: I-6

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Alluvium:**			
				SM	Silty F-m SAND, brown. slightly moist, loose			
5				SP	F-c SAND, brown, slightly moist, loose			
					BORING TERMINATED AT 7 FEET			
					No groundwater encountered Boring set with pipe, sock, and gravel			
10								
15								
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

APPENDIX B

PERCOLATION DATA AND CONVERSION SHEETS

APN 0438-163-24-0000

Outpost Road and Deep Creek Road

Apple Valley, San Bernardino County, California

Project No. 3579-CR

GEOTEK

PERCOLATION DATA SHEET

Project: Transtech - APN 0438-163-24-0000, Apple Valley **Job No.:** 3579-CR

Test Hole No.: I-1 **Tested By:** CD **Date:** 6/23/2023

Depth of Hole As Drilled: 60" **Before Test:** 60" **After Test:** 60"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ in Water Level (Inches)	Rate (Minutes per Inch)	Comments
1	1:34 PM		60	22				
	1:59 PM	25			0	22	1.14	
2	2:01 PM		60	22				
	2:26 PM	25			0.75	21.25	1.18	
1	2:28 PM		60	22				
	2:38 PM	10			3.5	18.5	0.54	
2	2:40 PM		60	22				
	2:50 PM	10			4.5	17.5	0.57	
3	2:52 PM		60	22				
	3:02 PM	10			5	17	0.59	
4	3:04 PM		60	22				
	3:14 PM	10			5.5	16.5	0.61	
5	3:16 PM		60	22				
	3:26 PM	10			5.75	16.25	0.62	
6	3:28 PM		60	22				
	3:38 PM	10			5.75	16.25	0.62	

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PERCOLATION DATA SHEET

Project: Transtech - APN 0438-163-24-0000, Apple Valley **Job No.:** 3579-CR

Test Hole No.: I-2 **Tested By:** CD **Date:** 6/23/2023

Depth of Hole As Drilled: 60" **Before Test:** 60" **After Test:** 60"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ in Water Level (Inches)	Rate (Minutes per Inch)	Comments
1	1:30 PM		60	22				
	1:55 PM	25			0	22	1.14	
2	1:57 PM		60	22				
	2:22 PM	25			0	22	1.14	
1	2:24 PM		60	22				
	2:34 PM	10			0	22	0.45	
2	2:36 PM		60	22				
	2:46 PM	10			0	22	0.45	
3	2:48 PM		60	22				
	2:58 PM	10			0	22	0.45	
4	3:00 PM		60	22				
	3:10 PM	10			0	22	0.45	
5	3:12 PM		60	22				
	3:22 PM	10			0	22	0.45	
6	3:24 PM		60	22				
	3:34 PM	10			0	22	0.45	

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PERCOLATION DATA SHEET

Project: Transtech - APN 0438-163-24-0000, Apple Valley **Job No.:** 3579-CR

Test Hole No.: I-3 **Tested By:** CD **Date:** 6/23/2023

Depth of Hole As Drilled: 60" **Before Test:** 60" **After Test:** 60"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ in Water Level (Inches)	Rate (Minutes per Inch)	Comments
1	1:39 PM		60	22				
	2:04 PM	25			0	22	1.14	
2	2:06 PM		60	22				
	2:31 PM	25			0.75	21.25	1.18	
1	2:33 PM		60	22				
	2:43 PM	10			5	17	0.59	
2	2:45 PM		60	22				
	2:55 PM	10			6.25	15.75	0.63	
3	2:57 PM		60	22				
	3:07 PM	10			7.25	14.75	0.68	
4	3:09 PM		60	22				
	3:19 PM	10			7.75	14.25	0.70	
5	3:21 PM		60	22				
	3:31 PM	10			8.25	13.75	0.73	
6	3:33 PM		60	22				
	3:43 PM	10			8.5	13.5	0.74	

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PERCOLATION DATA SHEET

Project: Transtech - APN 0438-163-24-0000, Apple Valley **Job No.:** 3579-CR

Test Hole No.: I-4 **Tested By:** CD **Date:** 6/23/2023

Depth of Hole As Drilled: 60" **Before Test:** 60" **After Test:** 60"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ in Water Level (Inches)	Rate (Minutes per Inch)	Comments
1	9:10 AM		60	22				
	9:35 AM	25			0	22	1.14	
2	9:37 AM		60	22				
	10:02 AM	25			0	22	1.14	
1	10:04 AM		60	22				
	10:14 AM	10			0	22	0.45	
2	10:16 AM		60	22				
	10:26 AM	10			1	21	0.48	
3	10:28 AM		60	22				
	10:38 AM	10			1	21	0.48	
4	10:40 AM		60	22				
	10:50 AM	10			2	20	0.50	
5	10:52 AM		60	22				
	11:02 AM	10			2.25	19.75	0.51	
6	11:04 AM		60	22				
	11:14 AM	10			2.5	19.5	0.51	

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PERCOLATION DATA SHEET

Project: Transtech - APN 0438-163-24-0000, Apple Valley **Job No.:** 3579-CR

Test Hole No.: I-5 **Tested By:** CD **Date:** 6/23/2023

Depth of Hole As Drilled: 60" **Before Test:** 60" **After Test:** 60"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ in Water Level (Inches)	Rate (Minutes per Inch)	Comments
1	11:22 AM		60	22				
	11:47 AM	25			0.75	21.25	1.18	
2	11:49 AM		60	22				
	12:14 PM	25			2.5	19.5	1.28	
1	12:16 PM		60	22				
	12:26 PM	10			7	15	0.67	
2	12:28 PM		60	22				
	12:38 PM	10			7	15	0.67	
3	12:40 PM		60	22				
	12:50 PM	10			7.5	14.5	0.69	
4	12:52 PM		60	22				
	1:02 PM	10			7.75	14.25	0.70	
5	1:04 PM		60	22				
	1:14 PM	10			8	14	0.71	
6	1:16 PM		60	22				
	1:26 PM	10			8	14	0.71	

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PERCOLATION DATA SHEET

Project: Transtech - APN 0438-163-24-0000, Apple Valley **Job No.:** 3579-CR

Test Hole No.: I-6 **Tested By:** CD **Date:** 6/23/2023

Depth of Hole As Drilled: 84" **Before Test:** 84" **After Test:** 84"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ in Water Level (Inches)	Rate (Minutes per Inch)	Comments
1	7:00 AM		84	22				
	7:25 AM	25			9.5	12.5	2.00	
2	7:27 AM		84	22				
	7:52 AM	25			11	11	2.27	
1	7:54 AM		84	22				
	8:04 AM	10			17	5	2.00	
2	8:06 AM		84	22				
	8:16 AM	10			17	5	2.00	
3	8:18 AM		84	22				
	8:28 AM	10			17	5	2.00	
4	8:30 AM		84	22				
	8:40 AM	10			18	4	2.50	
5	8:42 AM		84	22				
	8:52 AM	10			18	4	2.50	
6	8:54 AM		84	22				
	9:04 AM	10			18	4	2.50	

GEOTEK

Client:	**Transtech**
Project:	**APN 0438-163-24-0000**
Project No:	**3579-CR**
Date:	**6/26/2023**

Boring No. **I-1**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10
Final Depth to Water, D_F =	54.25
Test Hole Radius, r =	4
Initial Depth to Water, D_O =	38
Total Test Hole Depth, D_T =	60

Equation - $I_t = \dfrac{\Delta H\ (60r)}{\Delta t\ (r+2H_{avg})}$

$H_O = D_T - D_O$ =	22
$H_F = D_T - D_F$ =	5.75
$\Delta H = \Delta D = H_O - H_F$ =	16.25
$H_{avg} = (H_O+H_F)/2$ =	13.875

I_t = 12.28 **Inches per Hour**

GEOTEK

Client:	**Transtech**
Project:	**APN 0438-163-24-0000**
Project No:	**3579-CR**
Date:	**6/26/2023**

Boring No. **I-2**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10
Final Depth to Water, D_F =	60
Test Hole Radius, r =	4
Initial Depth to Water, D_O =	38
Total Test Hole Depth, D_T =	60

Equation - $I_t = \dfrac{\Delta H\ (60r)}{\Delta t\ (r+2H_{avg})}$

$H_O = D_T - D_O$ =	22
$H_F = D_T - D_F$ =	0
$\Delta H = \Delta D = H_O - H_F$ =	22
$H_{avg} = (H_O+H_F)/2$ =	11

I_t = 20.31 **Inches per Hour**

GEOTEK

Client:	**Transtech**
Project:	**APN 0438-163-24-0000**
Project No:	**3579-CR**
Date:	**6/26/2023**

Boring No. **I-3**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10
Final Depth to Water, D_F =	51.5
Test Hole Radius, r =	4
Initial Depth to Water, D_O =	38
Total Test Hole Depth, D_T =	60

Equation - $I_t = \dfrac{\Delta H\ (60r)}{\Delta t\ (r+2H_{avg})}$

$H_O = D_T - D_O$ =	22
$H_F = D_T - D_F$ =	8.5
$\Delta H = \Delta D = H_O - H_F$ =	13.5
$H_{avg} = (H_O+H_F)/2$ =	15.25

I_t = 9.39 **Inches per Hour**

GEOTEK

Client:	**Transtech**
Project:	**APN 0438-163-24-0000**
Project No:	**3579-CR**
Date:	**6/26/2023**

Boring No. **I-4**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10
Final Depth to Water, D_F =	57.5
Test Hole Radius, r =	4
Initial Depth to Water, D_O =	38
Total Test Hole Depth, D_T =	60

Equation - $I_t = \dfrac{\Delta H\ (60r)}{\Delta t\ (r+2H_{avg})}$

$H_O = D_T - D_O$ =	22
$H_F = D_T - D_F$ =	2.5
$\Delta H = \Delta D = H_O - H_F$ =	19.5
$H_{avg} = (H_O+H_F)/2$ =	12.25

I_t = 16.42 **Inches per Hour**

GEOTEK

Client:	**Transtech**
Project:	**APN 0438-163-24-0000**
Project No:	**3579-CR**
Date:	**6/26/2023**

Boring No. **I-5**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10
Final Depth to Water, D_F =	52
Test Hole Radius, r =	4
Initial Depth to Water, D_O =	38
Total Test Hole Depth, D_T =	60

Equation - $I_t = \dfrac{\Delta H\ (60r)}{\Delta t\ (r+2H_{avg})}$

$H_O = D_T - D_O$ =	22
$H_F = D_T - D_F$ =	8
$\Delta H = \Delta D = H_O - H_F$ =	14
$H_{avg} = (H_O+H_F)/2$ =	15

I_t = 9.88 **Inches per Hour**

GEOTEK

Client:	**Transtech**
Project:	**APN 0438-163-24-0000**
Project No:	**3579-CR**
Date:	**6/26/2023**

Boring No. **I-6**

Infiltration Rate (Porchet Method)

Time Interval, Δt =	10
Final Depth to Water, D_F =	66
Test Hole Radius, r =	4
Initial Depth to Water, D_O =	62
Total Test Hole Depth, D_T =	84

Equation - $I_t = \dfrac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$

$H_O = D_T - D_O$ =	22
$H_F = D_T - D_F$ =	18
$\Delta H = \Delta D = H_O - H_F$ =	4
$H_{avg} = (H_O+H_F)/2$ =	20

I_t = 2.18 **Inches per Hour**

GEOTEK

GeoTek, Inc.
1548 North Maple Street, Corona, California 92878
(951) 710-1160 Office (951) 710-1167 Fax www.geotekusa.com

August 23, 2023
Project No. 3579-CR

Transtech
413 Mackay Drive
San Bernardino, California 92408

Attention: Mr. David Mlynarski

Subject: **Limited Pavement Evaluation**
Deep Creek Road Adjacent 9201 and 9233 Deep Creek Road
Apple Valley, San Bernardino County, California

Dear Mr. Mlynarski:

As requested, GeoTek, Inc. (GeoTek) has prepared this Limited Pavement Evaluation for Deep Creek Road, adjacent to 9201 and 9233 Deep Creek Road, located in Apple Valley, San Bernardino County, California. The purpose of this evaluation was to assess the existing pavement sections within the subject study area and to provide recommendations for new pavement sections, if required.

Site and Project Description

The subject area evaluated for this assessment consists of Deep Creek Road, adjacent to 9201 and 9233 Deep Creek Road (see Figure 1, Site Location Map and Figure 2, Exploration Location Map). This portion of Deep Creek Road was visually assessed to be in relatively good condition.

The scope of work included coring the existing pavement sections at a total of four (4) locations within the subject portion of the roadway. Two (2) samples of the underlying subgrade soils were also collected and transported to a laboratory for the determination of the R-value of the soils per California Test Method 301.

Field Exploration and Laboratory Testing

Borings were performed at four (4) locations within the subject portion of Deep Creek Road (see Figure 2) to assess the thickness of the existing asphalt concrete (AC) and aggregate base (AB).

The borings were each extended to a depth of about three (3) feet to determine the existing pavement section, to visually classify the underlying soils and to collect representative samples of the underlying subgrade materials. The approximate boring locations are presented on Figure 2, Exploration Location Map.

The AC and underlying AB thicknesses were measured at each of the boring locations as summarized in the following table:

Boring No.	Thickness AC (inches)	Thickness AB (inches)	Predominant Subgrade Soil Description
1	8	8	Sand (SP)
2	6	7	Sand (SP)
3	8	8	Sand (SP)
4	4	8	Sand (SP)

Representative samples of the subgrade soil immediately below the AB layer were obtained at two (2) locations. These soil samples were subsequently delivered to GeoTek's subconsultant (LaBelle•Marvin) to determine the Resistance value (R-value) of the soils in accordance with California Test Method 301. Additionally, sieve analyses and sand equivalent tests were performed in accordance with California Test Method 302 and California Test Method 217, respectively. The results of the laboratory testing are attached in Appendix A.

Pavement Thickness Evaluation

The results of the field exploration indicate that the existing AC thickness at the boring locations ranges from about 4 to 8 inches and is underlain by AB ranging from approximately 7 to 8 inches in thickness. It is GeoTek's understanding that San Bernardino County has not provided a Traffic Index (TI) for this roadway. Based on experience, GeoTek has utilized a Traffic Index of 8.0 for this portion of Deep Creek Road. Based on the results of the R-value testing (Maximum R-value = 50), the existing Deep Creek Road pavement section under the purview of this report appears to be sufficient for the intended use.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to call GeoTek.

Respectfully submitted,
GeoTek, Inc.

Edward H. LaMont
CEG 1892, Exp. 07/31/24
Principal Geologist

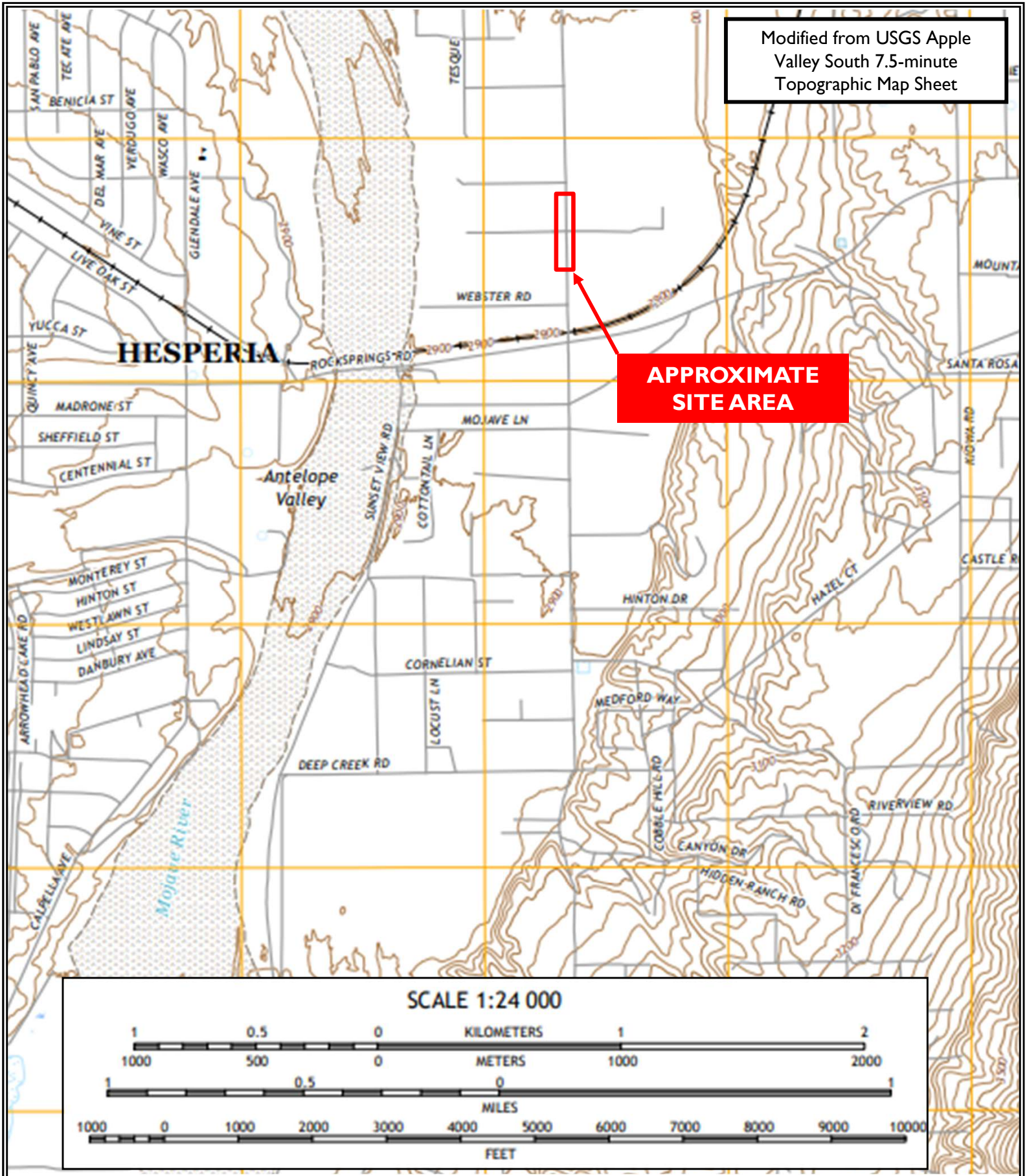
Bruce A. Hick
GE 2284, Exp. 12/31/24
Geotechnical Engineer

Anna M. Scott
Project Geologist

Attachments: Figure 1 – Site Location Map
Figure 2 – Exploration Location Map
Appendix A – Laboratory Test Results

Distribution: (1) Addressee via email

G:\Projects\3551 to 3600\3579CR Transtech APN 0438-163-24-0000 Apple Valley\Limited Pavement Evaluation\3579CR Limited Pavement Evaluation Deep Creek Road.doc



Transtech
APN 0438-163-24-0000
Apple Valley, San Bernardino County, California

Project No. 3579-CR

NORTH

Figure 1

Site Location Map

GEOTEK

Transtech
9233 Deep Creek Road
Apple Valley, San Bernardino County, California

GeoTek Project No. 3579-CR

Figure 2

Exploration Location Map

NORTH

GEOTEK

APPENDIX A

LABORATORY TEST RESULTS

• ANALYSIS
• DESIGN

LaBelle • Marvin
PROFESSIONAL PAVEMENT ENGINEERING
A CALIFORNIA CORPORATION

• SOILS, ASPHALT TECHNOLOGY

June 29, 2023

Mr. Jordan Brucelas
GeoTek Inc.
1548 North Maple Street
Corona, California 92880

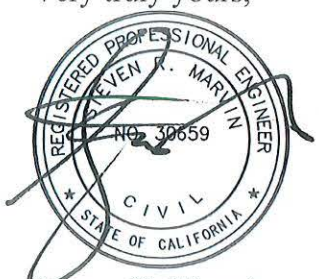
Project No. 49293

Attention Mr. Brucelas:
Laboratory testing of the bulk soil samples delivered to our laboratory on 6/26/2023 have been completed.

Reference:	W.O. # 3579-CR
Project:	Transtech, APN 0438-163-24-0000, Apple Valley
Samples:	B-3 Bulk @ 1'-3'
	B-4 Bulk @ 1'-3'

Data sheets are transmitted herewith for your use and information. Any untested portion of the samples will be retained for a period of sixty (60) days prior to disposal. The opportunity to be of service is appreciated, and should you have any questions, kindly call.

Very truly yours,



Steven R. Marvin
RCE 30659

SRM:tw
Enclosures

2700 S. GRAND AVENUE • SANTA ANA, CA 92705-5404 • (714) 546-3468 • FAX (714) 546-5841
INFO@LABELLEMARVIN.COM

R - VALUE DATA SHEET

LaBelle Marvin

PROJECT No. 49293

DATE: 6/29/2023

BORING NO. B-3 Bulk @ 1'-3'

Transtech, APN 0438-163-24-0000, Apple Valley

W.O.# 3579-CR

SAMPLE DESCRIPTION: Brown Poorly Graded Sand

R-VALUE TESTING DATA | CA TEST 301			
	SPECIMEN ID		
	a	b	c
Mold ID Number	1	2	3
Water added, grams	57	47	67
Initial Test Water, %	9.6	8.5	10.6
Compact Gage Pressure,psi	350	350	350
Exudation Pressure, psi	612	752	116
Height Sample, Inches	2.59	2.54	2.54
Gross Weight Mold, grams	3016	2997	3020
Tare Weight Mold, grams	1949	1942	1952
Sample Wet Weight, grams	1067	1055	1068
Expansion, Inches x 10exp-4	0	0	0
Stability 2,000 lbs (160psi)	16 / 28	14 / 24	18 / 34
Turns Displacement	5.14	5.09	5.19
R-Value Uncorrected	70	74	64
R-Value Corrected	72	74	64
Dry Density, pcf	113.9	115.9	115.2

DESIGN CALCULATION DATA

Traffic Index	Assumed:	4.0	4.0	4.0
G.E. by Stability		0.29	0.27	0.37
G. E. by Expansion		0.00	0.00	0.00

Equilibrium R-Value	**68** by EXUDATION	Examined & Checked: 6 /29/ 23
REMARKS:	Gf = 1.25 0.5% Retained on the 3/4" Sieve. Baskets Used. Free Drainage.	REGISTERED PROFESSIONAL ENGINEER STEVEN R. MARVIN No. 30659 CIVIL STATE OF CALIFORNIA Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 49293

DATE: 6 /29/ 23

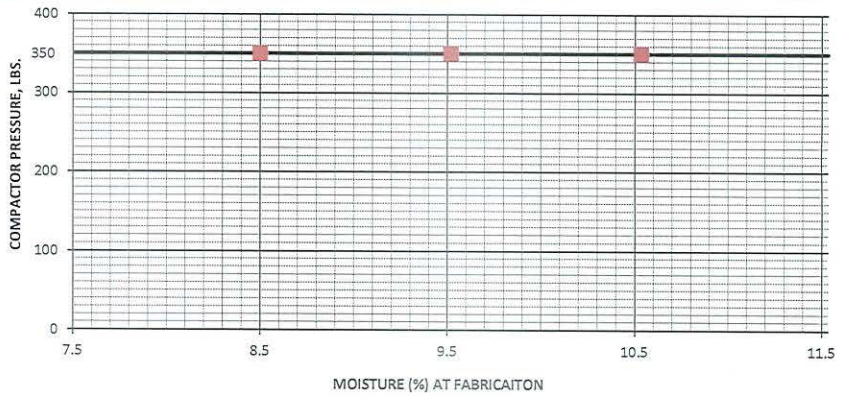
REMARKS:

BORING NO. B-3 Bulk @ 1'-3'

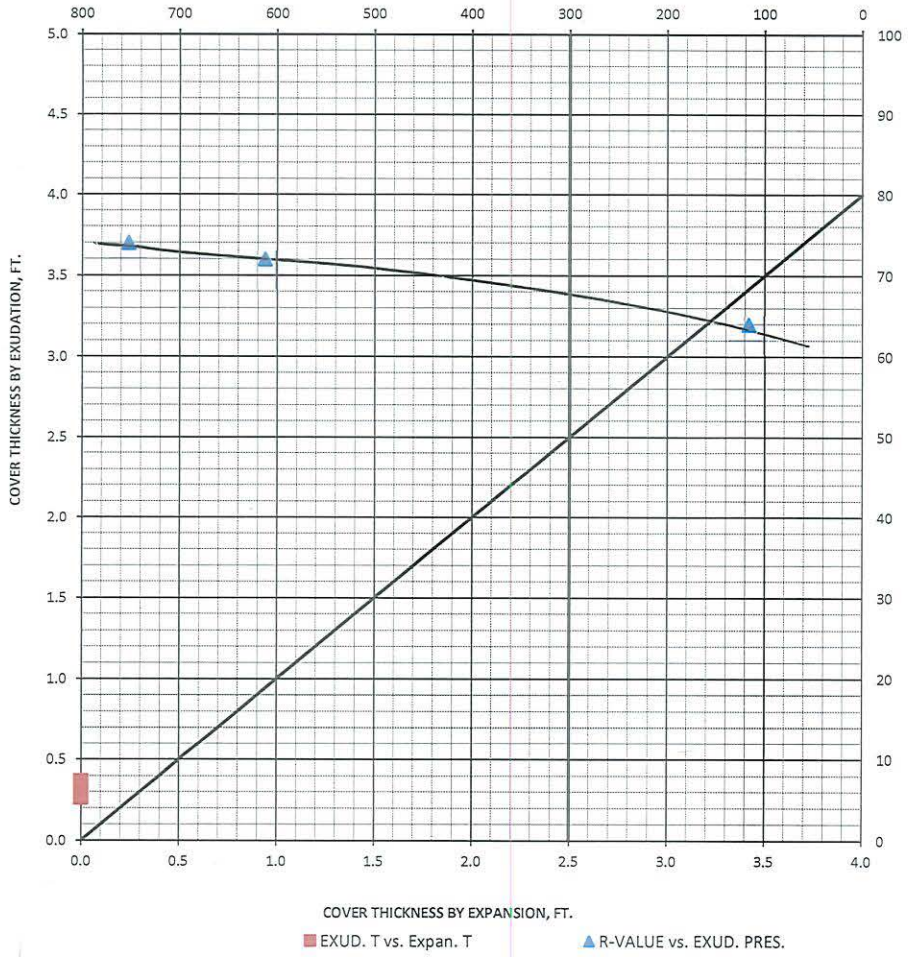
Transtech, APN 0438-163-24-0000, Apple Valley

W.O.# 3579-CR

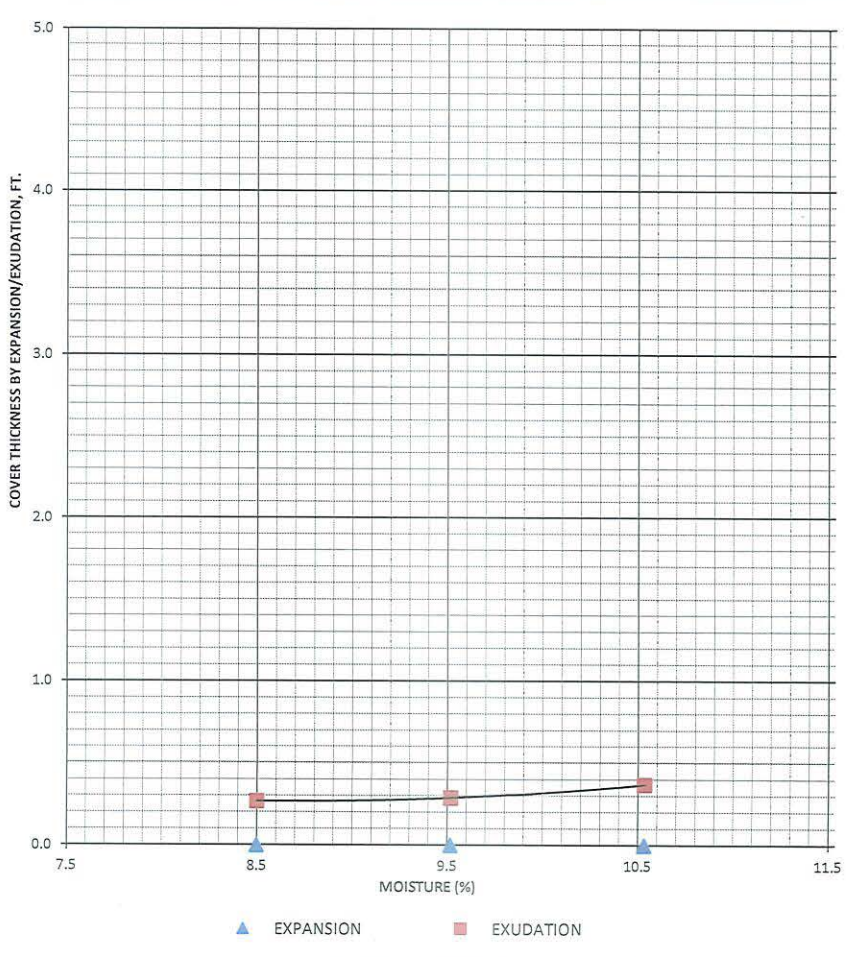
COMPACTOR PRESSURE vs MOISTURE %



COVER THICKNESS BY EXUDATION vs COVER THICKNESS BY EXPANSION



COVER THICKNESS vs MOISTURE %



R - VALUE DATA SHEET

LaBelle Marvin

PROJECT No. 49293

DATE: 6/28/2023

BORING NO. B-4 Bulk @ 1'-3'

Transtech, APN 0438-163-24-0000, Apple Valley

W.O.# 3579-CR

SAMPLE DESCRIPTION: Brown Poorly Graded Sand

R-VALUE TESTING DATA | CA TEST 301			
	SPECIMEN ID		
	a	b	c
Mold ID Number	10	11	12
Water added, grams	37	27	18
Initial Test Water, %	9.5	8.5	7.6
Compact Gage Pressure,psi	350	350	350
Exudation Pressure, psi	222	463	571
Height Sample, Inches	2.61	2.61	2.62
Gross Weight Mold, grams	2989	2973	2963
Tare Weight Mold, grams	1953	1948	1943
Sample Wet Weight, grams	1036	1025	1020
Expansion, Inches x 10exp-4	0	0	0
Stability 2,000 lbs (160psi)	17 / 32	16 / 31	15 / 30
Turns Displacement	5.50	5.45	5.40
R-Value Uncorrected	65	66	67
R-Value Corrected	68	68	70
Dry Density, pcf	109.8	109.7	109.7

DESIGN CALCULATION DATA

Traffic Index	Assumed:	4.0	4.0	4.0
G.E. by Stability		0.33	0.33	0.31
G. E. by Expansion		0.00	0.00	0.00

Equilibrium R-Value	**68** by EXUDATION	Examined & Checked: 6 /28/ 23
REMARKS:	Gf = 1.25 2.1% Retained on the 3/4" Sieve. Baskets Used. Free Drainage.	REGISTERED PROFESSIONAL ENGINEER STEVEN R. MARVIN NO. 30659 CIVIL STATE OF CALIFORNIA Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 49293

DATE: 6 /28/ 23

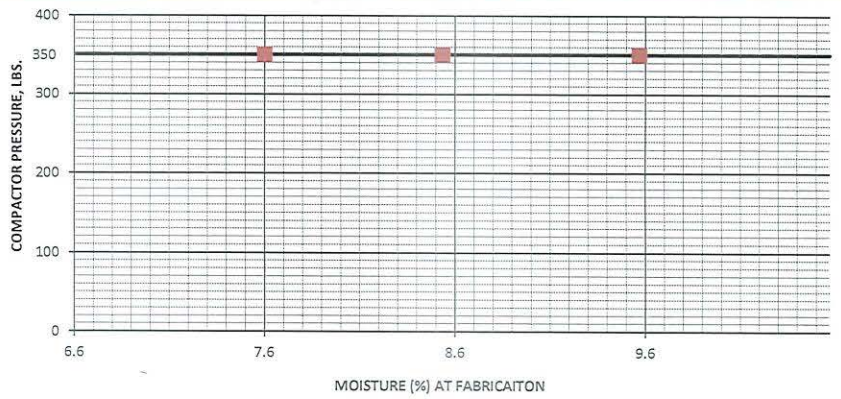
REMARKS:

BORING NO. B-4 Bulk @ 1'-3'

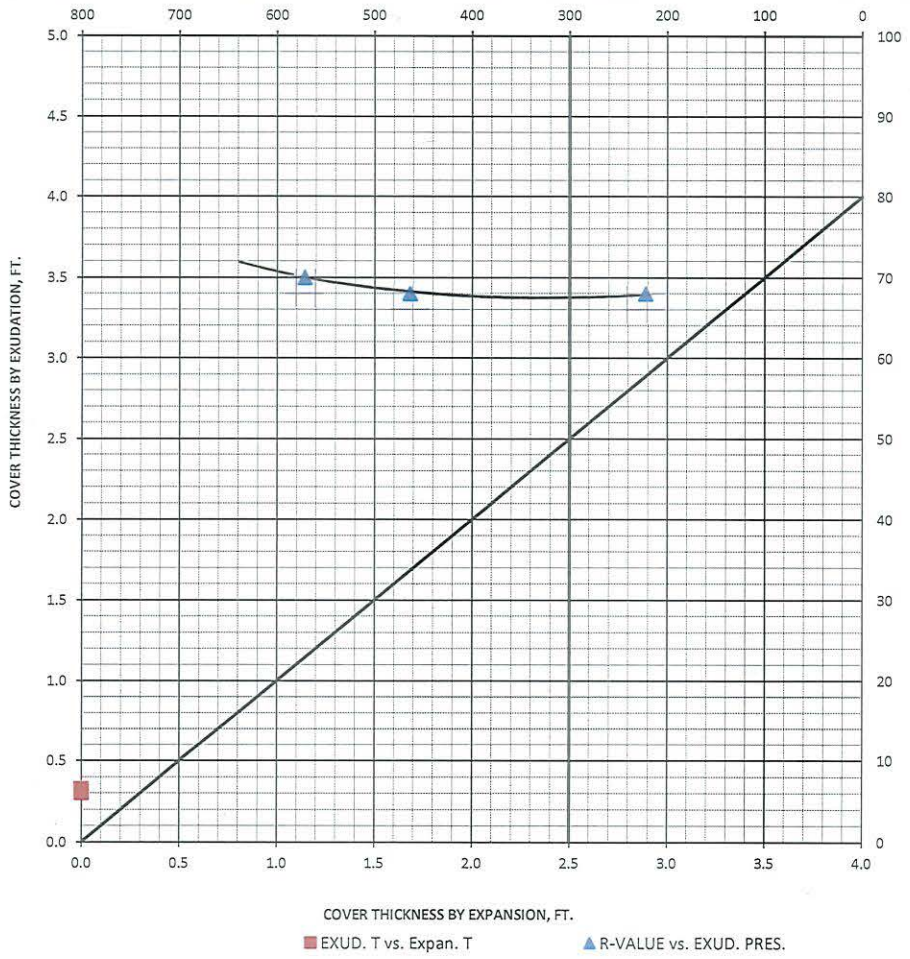
Transtech, APN 0438-163-24-0000, Apple Valley

W.O.# 3579-CR

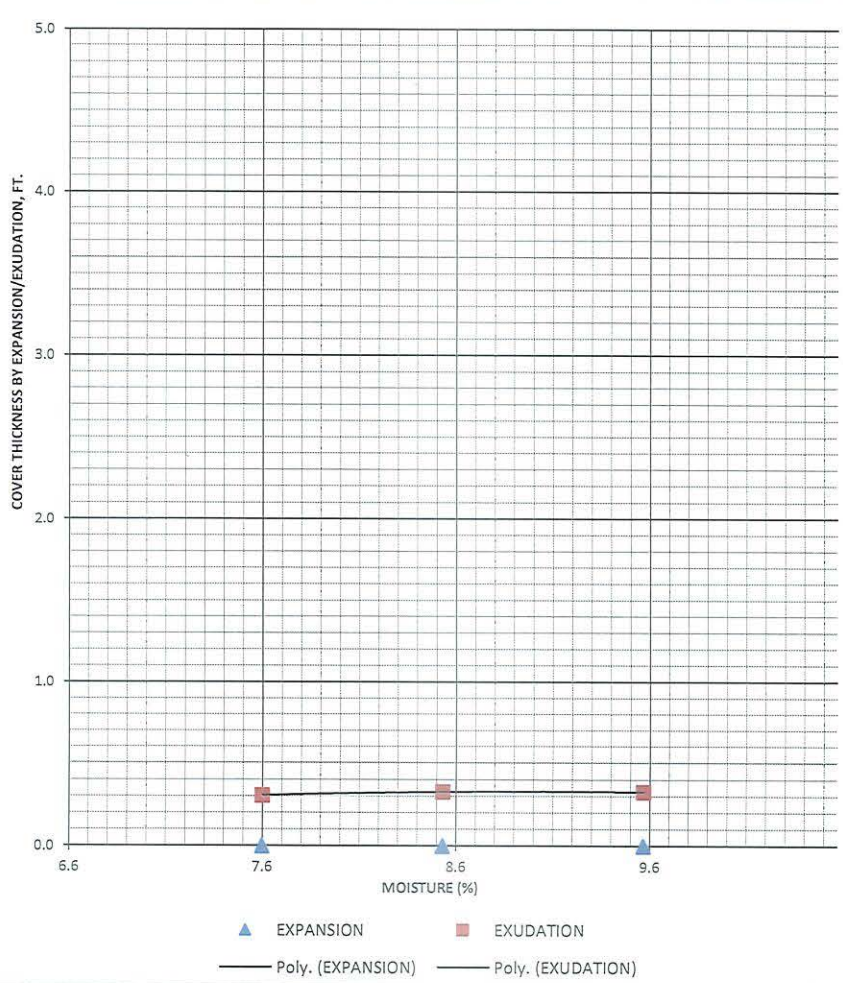
COMPACTOR PRESSURE vs MOISTURE %



COVER THICKNESS BY EXUDATION vs COVER THICKNESS BY EXPANSION



COVER THICKNESS vs MOISTURE %



• ANALYSIS
• DESIGN

LaBelle • Marvin

• SOILS, ASPHALT TECHNOLOGY

PROFESSIONAL PAVEMENT ENGINEERING
A CALIFORNIA CORPORATION

August 8, 2023

Mr. Jordan Brucelas
GeoTek Inc.
1548 North Maple Street
Corona, California 92880

Project No. 49293-1

Attention Mr. Brucelas:
Laboratory testing of the bulk soil samples delivered to our laboratory on 6/26/2023 have been completed.

Reference:	W.O. # 3579-CR
Project:	Transtech, APN 0438-163-24-0000, Apple Valley
Samples:	B-3 Bulk @ 1'-3'
	B-4 Bulk @ 1'-3'

Data sheets are transmitted herewith for your use and information. Any untested portion of the samples will be retained for a period of sixty (60) days prior to disposal. The opportunity to be of service is appreciated, and should you have any questions, kindly call.

Very truly yours,

REGISTERED PROFESSIONAL ENGINEER
STEVEN R. MARVIN
DocuSigned by:
NO. 30659
D9A356504F9B448...
CIVIL
STATE OF CALIFORNIA

Steven R. Marvin
RCE 30659

SRM:tw
Enclosures

2700 S. GRAND AVENUE • SANTA ANA, CA 92705-5404 • (714) 546-3468 • FAX (714) 546-5841
INFO@LABELLEMARVIN.COM

LaBelle Marvin

PAVEMENT ANALYSIS, DESIGN, TESTING, & INSPECTION SERVICES

Date 8/8/2023
Project No. 49293-1
Client Geotek, Inc. W.O.# 3579-CR
Project Info: Transtech, APN 0438-163-24-0000, Apple Valley
Sample ID: B-3 Bulk @ 1'-3'

Date Tested 8/8/2023
Tester: J.Galland

Sieve Analysis CT 202

Start Weight:		578.5	Sieve Analysis		
Sieve Size		Cumulative Weight Retained	Percent Retained	Percent Passing	Specified Limits
37.5 mm	1-1/2"	0.0	0.0	100.0	
25.0 mm	1"	0.0	0.0	100.0	
19.0 mm	3/4"	0.0	0.0	100.0	
12.5 mm	1/2"	8.7	1.5	98.5	
9.5 mm	3/8"	8.7	1.5	98.5	
4.75 mm	No. 4	36.8	6.4	93.6	
2.36 mm	No. 8	115.5	20.0	80.0	
1.18 mm	No. 16	240.4	41.6	58.4	
0.60 mm	No. 30	379.2	65.5	34.5	
0.30 mm	No. 50	493.9	85.4	14.6	
0.15 mm	No. 100	534.0	92.3	7.7	
0.075mm	No. 200	549.0	94.9	5.1	

Sand Equivalent CT 217

Tube	1	2	3
Clay	4.1	4.0	4.2
Sand	3.2	3.2	3.3
Sand Equivalent	79	80	79

		Specification
Average Sand Equivalent	79	

LaBelle Marvin

PAVEMENT ANALYSIS, DESIGN, TESTING, & INSPECTION SERVICES

Date 8/8/2023
Project No. 49293-1
Client Geotek, Inc. W.O.# 3579-CR
Project Info: Transtech, APN 0438-163-24-0000, Apple Valley
Sample ID: B-4 Bulk @ 1'-3'

Date Tested 8/8/2023
Tester: J.Galland

Sieve Analysis CT 202

Start Weight:		789.2	Sieve Analysis		
Sieve Size		Cumulative Weight Retained	Percent Retained	Percent Passing	Specified Limits
37.5 mm	1-1/2"	0.0	0.0	100.0	
25.0 mm	1"	0.0	0.0	100.0	
19.0 mm	3/4"	0.0	0.0	100.0	
12.5 mm	1/2"	10.7	1.4	98.6	
9.5 mm	3/8"	32.1	4.1	95.9	
4.75 mm	No. 4	94.4	12.0	88.0	
2.36 mm	No. 8	241.7	30.6	69.4	
1.18 mm	No. 16	445.6	56.5	43.5	
0.60 mm	No. 30	615.9	78.0	22.0	
0.30 mm	No. 50	738.0	93.5	6.5	
0.15 mm	No. 100	772.2	97.8	2.2	
0.075mm	No. 200	779.6	98.8	1.2	

Sand Equivalent CT 217

Tube	1	2	3
Clay	3.6	3.6	3.7
Sand	3.4	3.4	3.5
Sand Equivalent	95	95	95

		Specification
Average Sand Equivalent	95	

ENE SERVICES

P.O. Box 402983
Hesperia, CA 92340-2983

Phone: (760) 244-9936
Fax: (760) 513-9199

December 21, 2022

Earl Graham
9233 Deep Creek Road.
Apple Valley, CA 92308

Project #: 22433.C

Subject: Compaction Test Report
Existing Fire Truck Access Road
9233 Deep Creek Road & Outpost Road
Apple Valley, CA

Attached is a summary report of compaction tests made at Outpost Rd Going East of Deep Creek Road, Apple Valley, CA. Our firm was hired to perform compaction tests only. The compaction tests were made in conformance to in-place Density per ASTM D-1556 testing procedure during the period of December 19, 2022. This report is understood to be valid at the time of making compaction test after the grading operation has been done. We did not perform any observation of grading process, including but not limited to import or removal of soils, over-excavation, survey staking and grade control, etc.

The test made to date has been found to conform to requirements of the City/County approved plans and specifications (95% minimum relative compaction as compared to the optimum density). Stationing and/or paced distances from physical features on the site indicate approximate locations of the tests. A legend is included with this report to identify abbreviations and maximum density determinations used in the report summary.

REGISTERED PROFESSIONAL ENGINEER
DAVE G. FISHER
No. 75727
exp 6/30/24
CIVIL
STATE OF CALIFORNIA
12/22/22

Sincerely,
ENE Services

Dave Fisher, P.E.
Civil Engineer # 75727

ENE Services
P.O. Box 402983
Hesperia, CA 92340-2983

Summary of Laboratory Test Results Project #: 22433.C

Earl Graham Address: 9233 Deep Creek Rd
Apple Valley, CA

SOIL TYPE

Description	Max. (pcf)	Opt. %
1. Yellowish Brown Silty, Fine Medium Sand W/Rock	128.0	9.0

Legend for Summary Sheet

Test No. Column

S = Sanitary Sewer
W = Water Line
Plain Number = Mass Fill
SD =Storm Drain
E = Electrical
J = Joint Trench
SG = Road Subgrade
AB = Road Aggregate Subgrade
SW = Sidewalk
AC = Asphaltic Concrete
G = Gas
P = Plumbing Trench
I = Irrigation Line Backfill
RW = Retaining Wall Backfill
B = Structural Backfill
F = Footing Base
DW = Driveway
SF = Surface

Note Column

P = Pass
F = Fail

Test Type Column

N = Nuclear Gauge
S = Sand Cone

ENE Services
P.O. Box 402983
Hesperia, CA 92340-2983

Compaction Test Report

Earl Graham

Project #: 22433.C

Address: 9233 Deep Creek Rd
Apple Valley, CA

Test No.	Test Date	Test Location	Mat Type	Test Elev./Datum Below	Dry Density Field (pcf)	Field MC (%)	Relative Comp (%)	Note	Test Type
1	12/19/22	Fire Truck Access Road-Outpost Road Subgrade-1400' East of Deep Creek Road	1	SF	122.6	7.8	95.8	P	S
2	12/19/22	Fire Truck Access Road-Outpost Road Subgrade-1000' East of Deep Creek Road	1	SF	123.4	7.2	96.4	P	S
3	12/19/22	Fire Truck Access Road-Outpost Road Subgrade-750' East of Deep Creek Road	1	SF	122.9	7.4	96.0	P	S
4	12/19/22	Fire Truck Access Road-Outpost Road Subgrade-400' East of Deep Creek Road	1	SF	122.0	7.3	95.3	P	S
5	12/19/22	Fire Truck Access Road-Outpost Road Subgrade-100' East of Deep Creek Road	1	SF	122.2	7.2	95.4	P	S

GeoTek, Inc.
1548 North Maple Street, Corona, California 92878
(951) 710-1160 Office (951) 710-1167 Fax www.geotekusa.com

October 3, 2022
Project No. 3354-CR

Transtech
413 Mackay Drive
San Bernardino, California 92408

Attention: Mr. David Mlynarski

Subject: **Fire Truck Access Road Pavement Design**
Existing Composting Facility
Assessor's Parcel Number 0457-161-84-0000
17900 Sheep Creek Road
El Mirage, San Bernardino County, California

Dear Mr. Mlynarski:

As requested, GeoTek, Inc. (GeoTek) has prepared this letter to provide pavement design recommendations for fire truck access roads associated with the subject site.

It is GeoTek's understanding that based on review comments provided by the San Bernardino County Fire Department, "If the access roads are not to be paved with a permanent, all-weather surface such as asphalt or concrete, fire department access road shall comply to SBCoFD Standard A-1, Ref: Surfaces. Fire access roadways, shall be compacted and capable of vehicle support to 80,000 lbs. And roads may be constructed with native materials or gravel, compacted to 85% compaction."

Field density (compaction) tests were performed at random locations along Parkdale Road and Bartlett Avenue which are located adjacent the subject site. Both roadways are existing and unpaved. The field density (compaction) testing was performed using a nuclear gauge in general accordance with ASTM D 6938 test procedures along both roadways. The results of the field density (compaction) tests are included in the attached Table 1. The approximate locations of the field density (compaction) tests are shown on the enclosed Density Test Location Map (Plates 1 and 2).

The laboratory maximum dry density and optimum moisture content for the soil types were determined in general accordance with ASTM D 1557 test procedures. The table below presents the soil types used for the project.

SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS (ASTM D 1557)

Soil Type	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
A	Sand to silty sand (SM)	119.0	9.5
B	Sandy to silty sand (SM)	119.0	7.5

GeoTek, Inc. (GeoTek) has also collected representative samples of the on-site soils. The samples were subsequently submitted to GeoTek's subconsultant (LaBelle•Marvin) to determine the Resistance Value (R-value) of the collected samples. The testing was performed in accordance with California Test Method 301 and the results of that testing (R-Values = 68 and 70) are attached.

Based on the information provided above, including the field density test results and the R-Values of the on-site soils, it is GeoTek's opinion that the currently graded roadway surface areas are suitable for use as fire access roadways and are capable of supporting 80,000-pound vehicles.

Periodic maintenance to the exposed surfaces will be needed, especially after storm events. Maintenance may innclude occasional moisture treatment and surface recompaction of the surface areas that have been subject to weathering and/or ravelling.

Should you have any questions after reviewing this letter, please feel free to contact this office at your convenience.

Respectfully submitted,
GeoTek, Inc.

Edward H. LaMont
CEG 1892, Exp. 7/31/24
Principal Geologist

Bruce A. Hick
GE 2284, Ex. 12/31/22
Geotechnical Engineer

Anna M. Scott
Project Geologist

Enclosures: Table 1 – Summary of Field Density Tests
Plates 1 and 2 – Density Test Location Map
R-Value Laboratory Test Results

Distribution: (1) Addressee via email

G:\Projects\3354 to 3404\3354CR Transtech 17900 Sheep Creek Road El Mirage\Report\3354CR Pavement Recommendations Fire Access 17900 Sheep Creek Road.docx

TABLE I
SUMMARY OF FIELD DENSITY TESTS

Date	Test No.	Location	Elev	Moisture Content (%)	Dry Density (pcf)	Soil Type	Maximum Density (pcf)	Optimum Moisture Content (%)	Test Type	Relative Compaction (%)
09/26/22	1	Parkdale Road	FS	1.4	126.0	A	119.0	9.5	ND	106
09/26/22	2	Parkdale Road	FS	1.2	113.7	A	119.0	9.5	ND	96
09/26/22	3	Parkdale Road	FS	0.7	119.2	A	119.0	9.5	ND	100
09/26/22	4	Parkdale Road	FS	1.4	113.9	A	119.0	9.5	ND	96
09/26/22	5	Parkdale Road	FS	1.2	116.6	A	119.0	9.5	ND	98
09/26/22	6	Parkdale Road	FS	1.0	118.2	A	119.0	9.5	ND	99
09/26/22	7	Parkdale Road	FS	1.1	119.5	A	119.0	9.5	ND	100
09/26/22	8	Parkdale Road	FS	1.3	110.7	A	119.0	9.5	ND	93
09/26/22	9	Parkdale Road	FS	7.0	111.1	A	119.0	9.5	ND	93
09/26/22	10	Parkdale Road	FS	1.5	114.2	A	119.0	9.5	ND	96
09/26/22	11	Bartlett Avenue	FS	0.7	121.8	B	119.0	7.5	ND	102
09/26/22	12	Bartlett Avenue	FS	1.1	121.0	B	119.0	7.5	ND	102
09/26/22	13	Bartlett Avenue	FS	1.6	120.4	B	119.0	7.5	ND	101
09/26/22	14	Bartlett Avenue	FS	0.5	117.1	B	119.0	7.5	ND	98
09/26/22	15	Bartlett Avenue	FS	0.6	111.6	B	119.0	7.5	ND	94
09/26/22	16	Bartlett Avenue	FS	1.2	112.5	B	119.0	7.5	ND	95
09/26/22	17	Bartlett Avenue	FS	1.0	113.2	B	119.0	7.5	ND	95
09/26/22	18	Bartlett Avenue	FS	1.0	114.9	B	119.0	7.5	ND	97
09/26/22	19	Bartlett Avenue	FS	0.8	117.4	B	119.0	7.5	ND	99
09/26/22	20	Bartlett Avenue	FS	0.5	121.2	B	119.0	7.5	ND	102

Legend:
ND = Nuclear Densometer Test
FS = Finish Surface
All elevations are approximate

GEOTEK

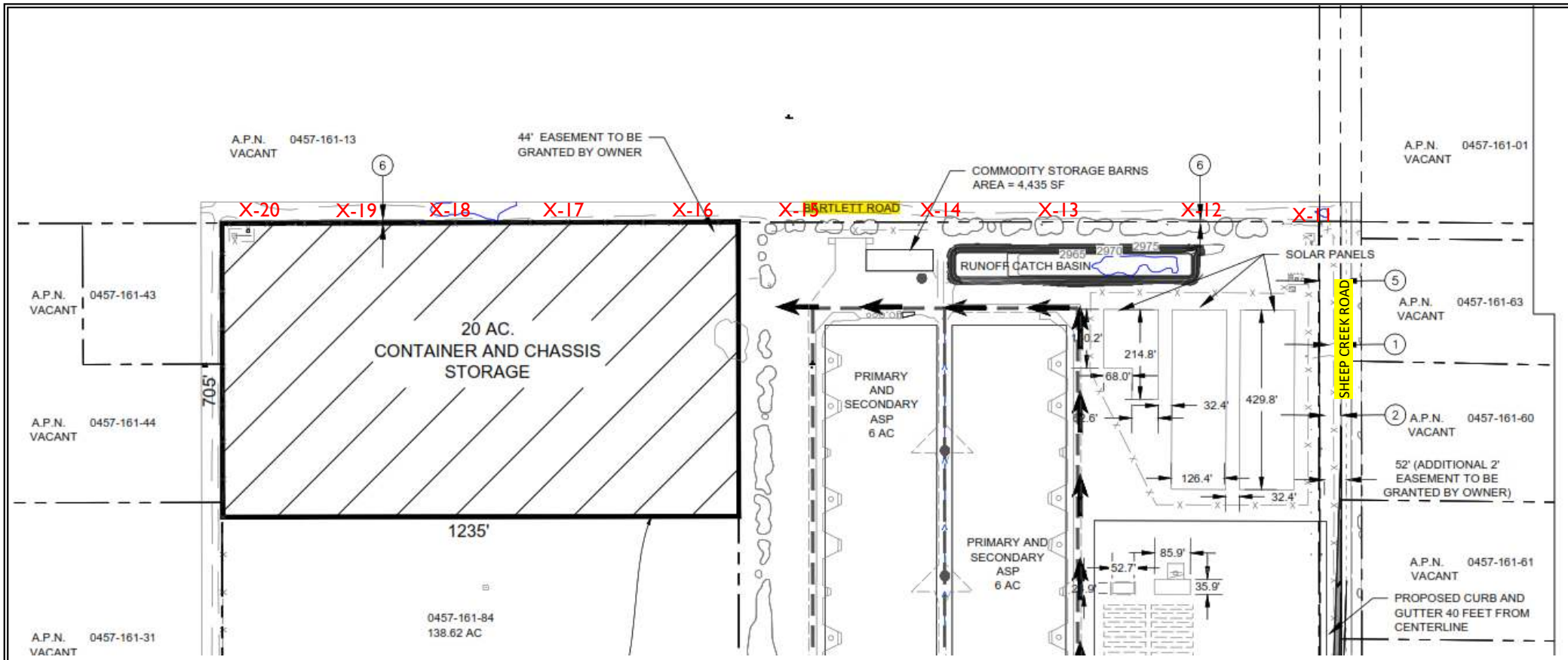


Plate 1

Density Test Location Map

Transtech
17900 Sheep Creek Road
El Mirage, San Bernardino County, California

GeoTek Project No. 3354-CR

200' 0' 100' 200' 400'

NORTH

LEGEND

X-20 Approximate Location of Density Test

GEOTEK

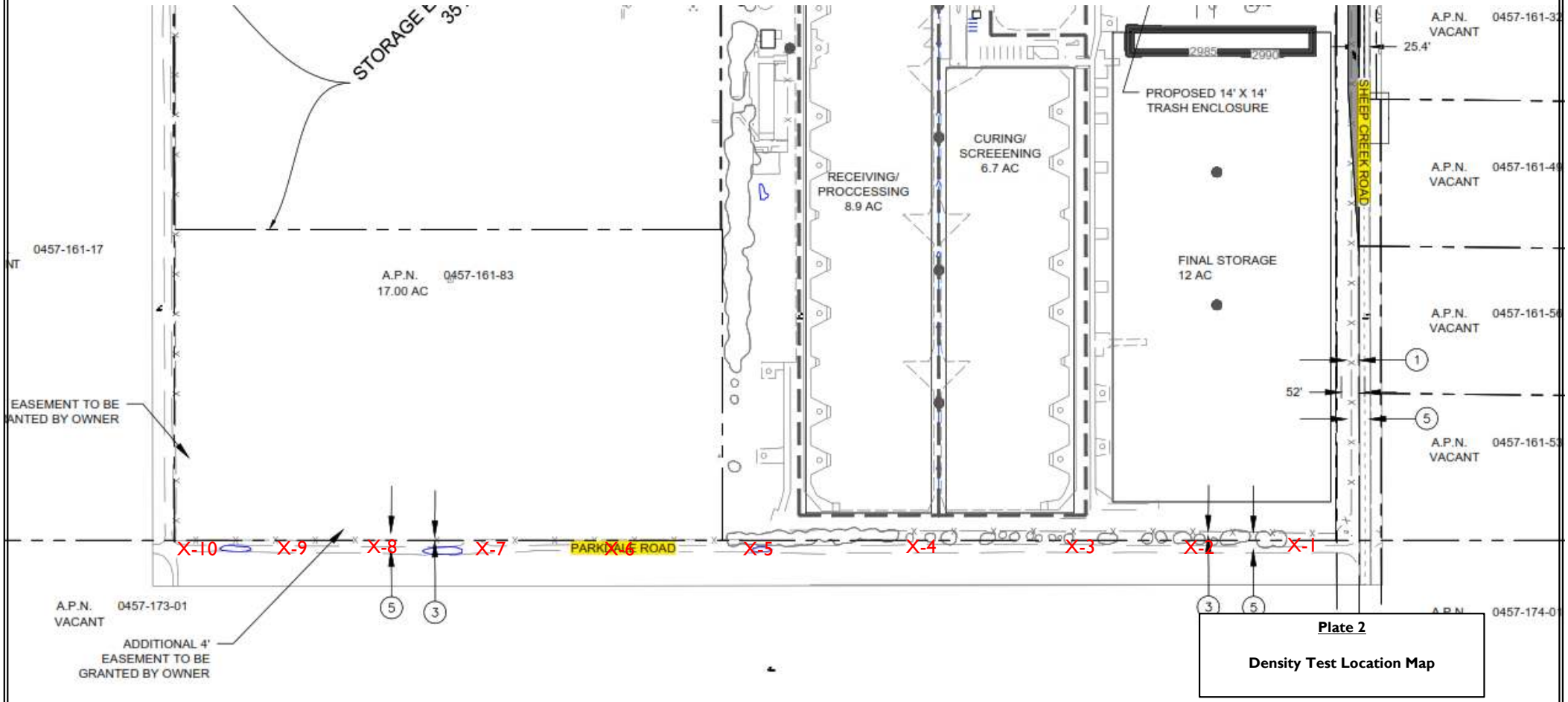


Plate 2

Density Test Location Map

Transtech
17900 Sheep Creek Road
El Mirage, San Bernardino County, California

GeoTek Project No. 3354-CR

200' 0' 100' 200' 400'

NORTH

LEGEND

X-20 Approximate Location of Density Test

GEOTEK

• ANALYSIS
• DESIGN

LaBelle • Marvin

• SOILS, ASPHALT TECHNOLOGY

PROFESSIONAL PAVEMENT ENGINEERING
A CALIFORNIA CORPORATION

September 28, 2022

Ms. Anna Scott
GeoTek Inc.
1548 North Maple Street
Corona, California 92880

Project No. 48720

Attention Ms. Scott:
Laboratory testing of the bulk soil samples delivered to our laboratory on 9/27/2022 has been completed.

Reference:	W.O. # 3354-CR
Project:	Transtech, 17900 Sheep Creek Road, El Mirage, CA
Samples:	Bartlett Avenue, Sta. 5+00
	Parkdale Road, Sta. 10+00

Data sheets are transmitted herewith for your use and information. Any untested portion of the samples will be retained for a period of sixty (60) days prior to disposal. The opportunity to be of service is appreciated, and should you have any questions, kindly call.

Very truly yours,

REGISTERED PROFESSIONAL ENGINEER
STEVEN R. MARVIN
NO. 30659
CIVIL
STATE OF CALIFORNIA

Steven R. Marvin
RCE 30659

SRM:tw
Enclosures

2700 S. GRAND AVENUE • SANTA ANA, CA 92705-5404 • (714) 546-3468 • FAX (714) 546-5841
INFO@LABELLEMARVIN.COM

R - VALUE DATA SHEET

LaBelle Marvin

PROJECT No. 48720

DATE: 9/28/2022

BORING NO. Bartlett Avenue, Sta. 5+00
17900 Sheep Creek Road, El Mirage, CA
W.O.# 3354-CR

SAMPLE DESCRIPTION: Brown Slightly Silty Sand

R-VALUE TESTING DATA | CA TEST 301			
	SPECIMEN ID		
	a	b	c
Mold ID Number	7	8	9
Water added, grams	60	53	66
Initial Test Water, %	9.6	8.9	10.2
Compact Gage Pressure,psi	350	350	350
Exudation Pressure, psi	368	755	140
Height Sample, Inches	2.49	2.55	2.50
Gross Weight Mold, grams	3045	3030	2869
Tare Weight Mold, grams	1950	1946	1770
Sample Wet Weight, grams	1095	1084	1099
Expansion, Inches x 10exp-4	3	4	2
Stability 2,000 lbs (160psi)	18 / 28	17 / 27	19 / 35
Turns Displacement	4.49	4.44	4.57
R-Value Uncorrected	72	74	66
R-Value Corrected	72	74	66
Dry Density, pcf	121.6	118.3	120.9

DESIGN CALCULATION DATA

Traffic Index	Assumed:	4.0	4.0	4.0
G.E. by Stability		0.29	0.27	0.35
G. E. by Expansion		0.10	0.13	0.07

Equilibrium R-Value	**70** by EXUDATION	Examined & Checked: 9 /28/ 22
REMARKS:	Gf = 1.25 0.9% Retained on the 3/4" Sieve. Partial Free Drainage.	REGISTERED PROFESSIONAL ENGINEER STEVEN R. MARVIN NO. 30659 CIVIL STATE OF CALIFORNIA Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 48720

DATE: 9 /28/ 2022

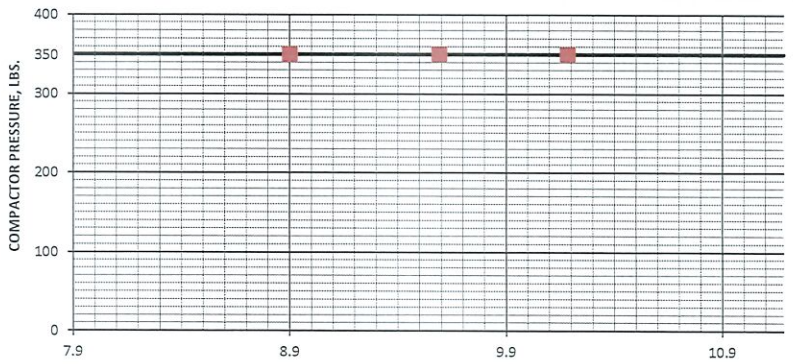
REMARKS:

BORING NO. Bartlett Avenue, Sta. 5+00

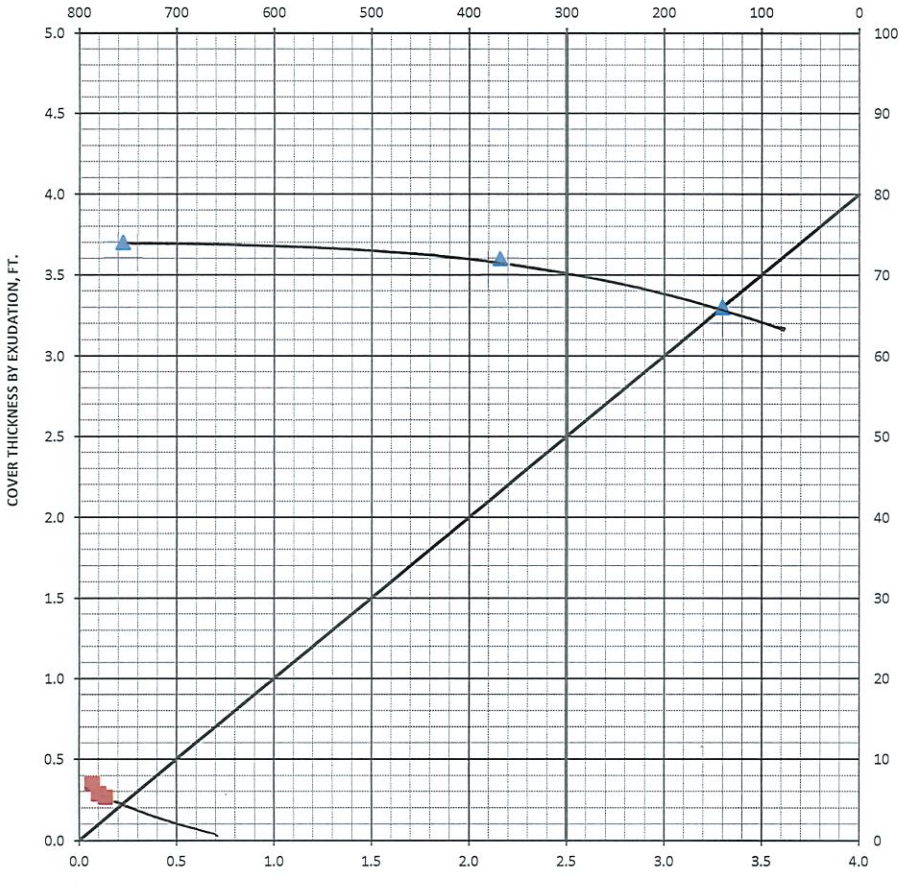
17900 Sheep Creek Road, El Mirage, CA

W.O.# 3354-CR

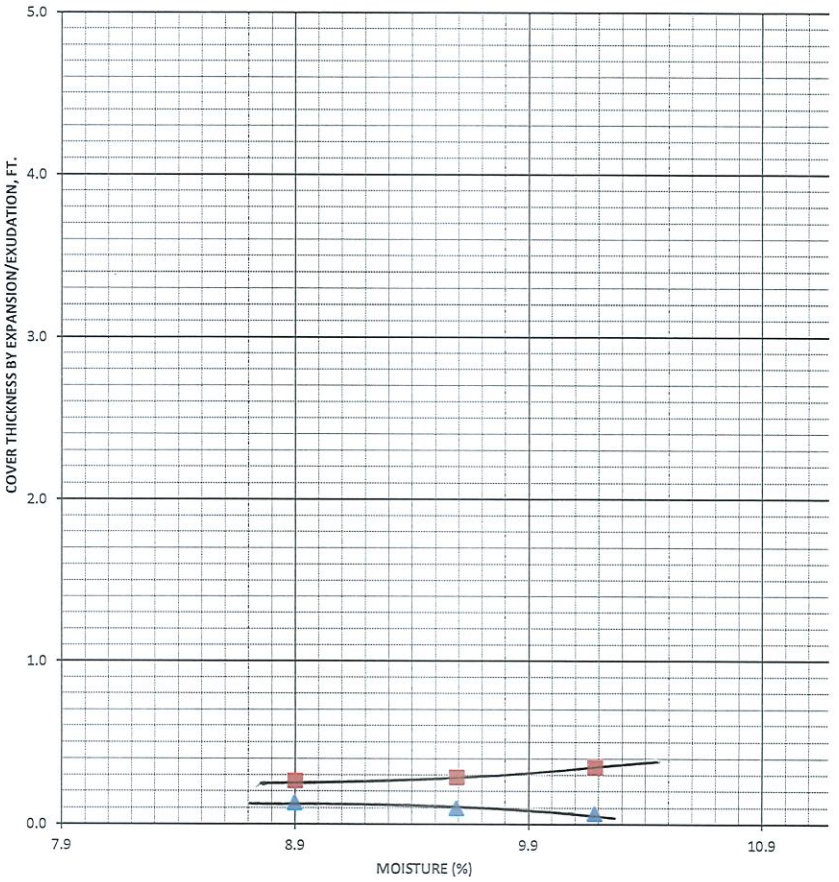
COMPACTOR PRESSURE vs MOISTURE %



COVER THICKNESS BY EXUDATION vs COVER THICKNESS BY EXPANSION



COVER THICKNESS vs MOISTURE %



R - VALUE DATA SHEET

LaBelle Marvin

PROJECT No. 48720

DATE: 9/28/2022

BORING NO. Parkdale Road, Sta. 10+00
17900 Sheep Creek Road, El Mirage, CA
W.O.# 3354-CR

SAMPLE DESCRIPTION: Brown Slightly Silty Sand

R-VALUE TESTING DATA | CA TEST 301			
	SPECIMEN ID		
	a	b	c
Mold ID Number	4	5	6
Water added, grams	70	80	60
Initial Test Water, %	9.8	10.8	8.8
Compact Gage Pressure,psi	350	350	350
Exudation Pressure, psi	408	196	602
Height Sample, Inches	2.60	2.58	2.57
Gross Weight Mold, grams	3057	3053	3044
Tare Weight Mold, grams	1953	1940	1951
Sample Wet Weight, grams	1104	1113	1093
Expansion, Inches x 10exp-4	1	0	2
Stability 2,000 lbs (160psi)	18 / 34	19 / 36	17 / 30
Turns Displacement	4.63	4.68	4.52
R-Value Uncorrected	67	65	71
R-Value Corrected	69	67	72
Dry Density, pcf	117.2	118.0	118.4

DESIGN CALCULATION DATA

Traffic Index	Assumed:	4.0	4.0	4.0
G.E. by Stability		0.32	0.34	0.29
G. E. by Expansion		0.03	0.00	0.07

Equilibrium R-Value	**68** by EXUDATION	Examined & Checked: 9 /28/ 22
REMARKS:	Gf = 1.25 0.1% Retained on the 3/4" Sieve. Partial Free Drainage.	REGISTERED PROFESSIONAL ENGINEER STEVEN R. MARVIN NO. 30659 CIVIL STATE OF CALIFORNIA Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 48720

DATE: 9 /28/ 2022

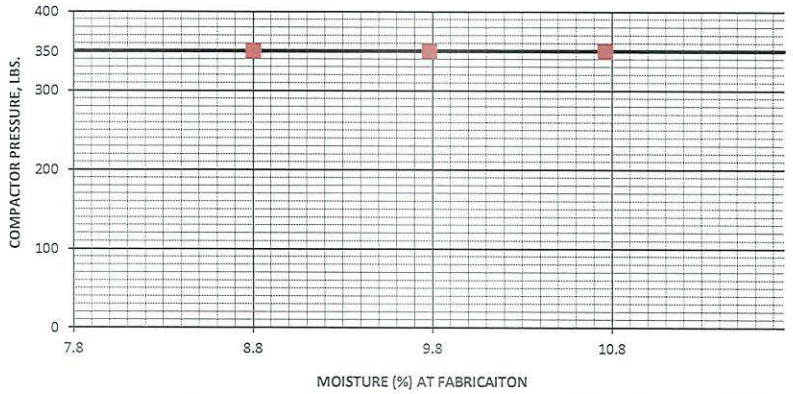
REMARKS:

BORING NO. Parkdale Road, Sta. 10+00

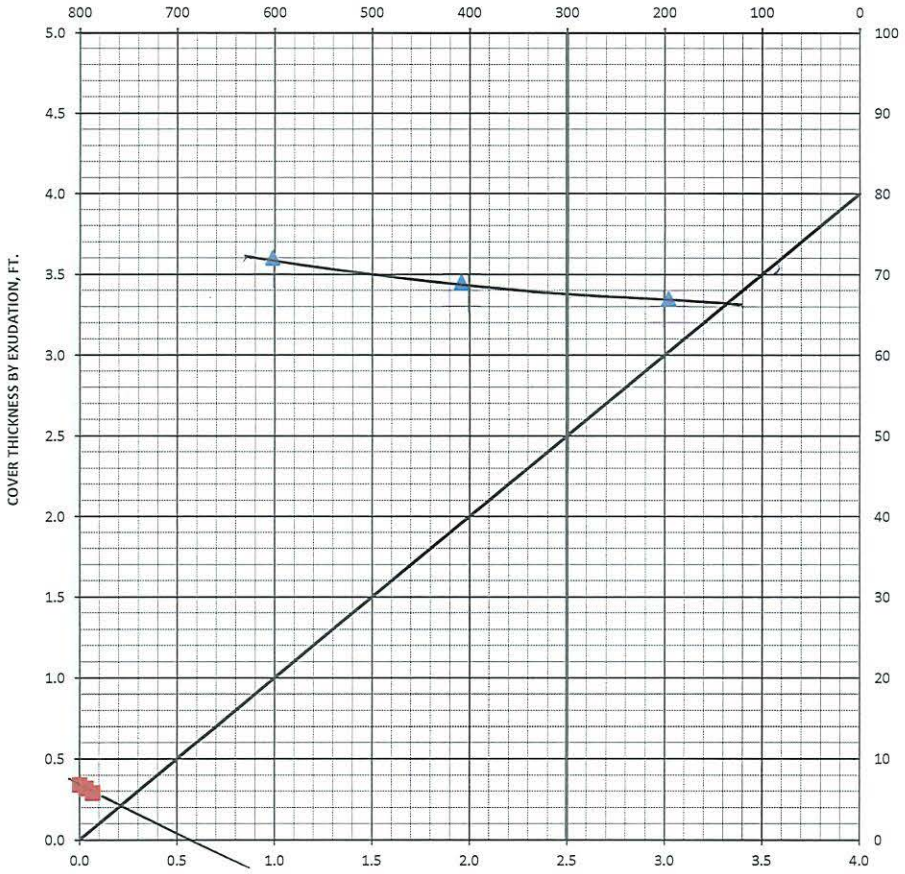
17900 Sheep Creek Road, El Mirage, CA

W.O.# 3354-CR

COMPACTOR PRESSURE vs MOISTURE %



COVER THICKNESS BY EXUDATION vs COVER THICKNESS BY EXPANSION



COVER THICKNESS vs MOISTURE %