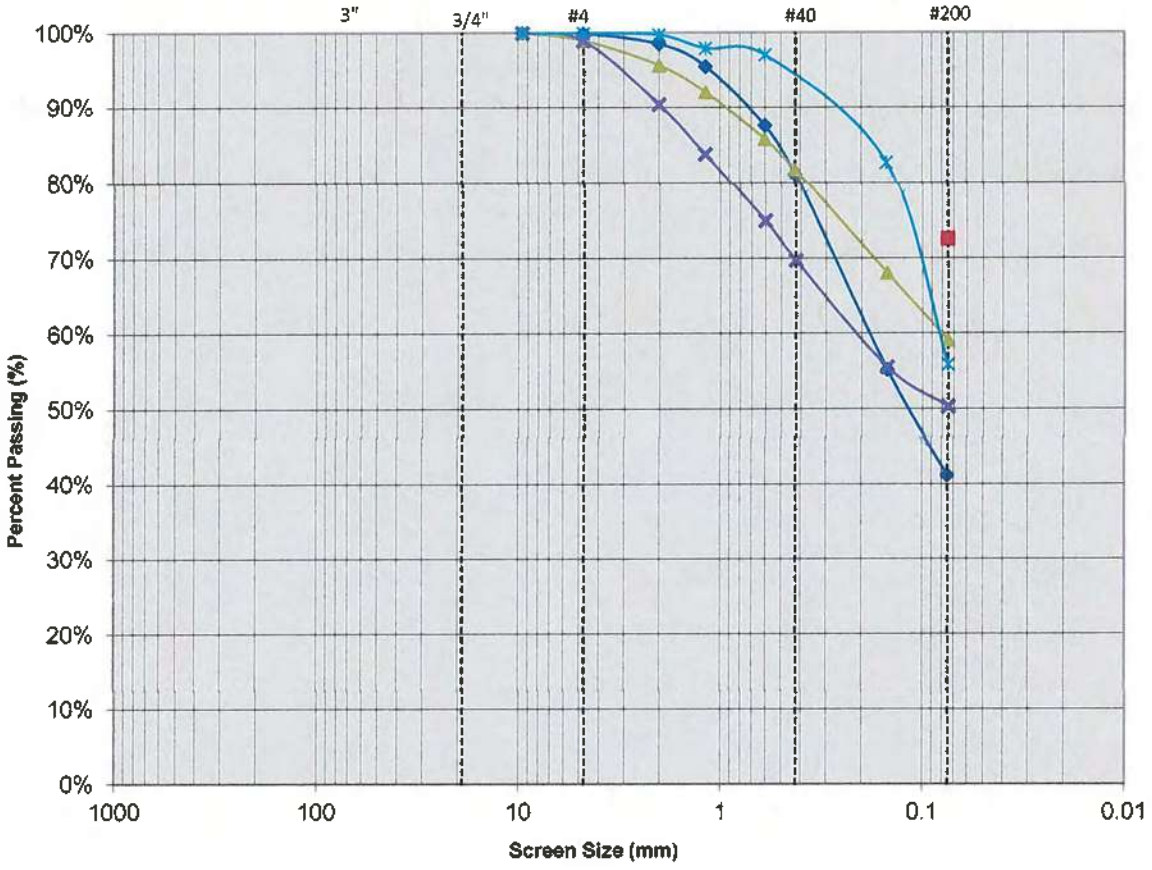
Resource Concepts Inc
4010 Technology, Unit D, Carson City, NV 89703
Office:775-883-1600 Fax: 775-888-9904

Project: Lompa Ranch Project
Project No: 16-174.1
Location: Lompa Ranch, Carson City NV
Date Sampled: 9/27/2016

Sandy Clay, CL

GRAIN SIZE DISTRIBUTION



Sample Number	USCS Classification	LL	PL	Cc	Cu
BH 5 2.9 - 4.0	Clayey Sand, SC				
BH5 @ 5.5-6.0	Sandy Clay, CL				
BH5 @ 8.1-8.5	Sandy Silt w/ Clay, ML				
BH5 @ 10.5-11.5	Sandy Clay, CL				
BH5 @ 15.6-16.5	Sandy Silt, ML				

Sample Number	D100	D60	D30	D10	% Moisture	% Gravel	% Sand	% Silt/Clay
BH 5 2.9 - 4.0					8.1%	0.1%	58.8%	41.1%
BH5 @ 5.5-6.0					8.4%	0.0%	27.4%	72.6%
BH5 @ 8.1-8.5					29.2%	1.0%	39.9%	59.1%
BH5 @ 10.5-11.5					10.0%			50.3%
BH5 @ 15.6-16.5					30.1%	0.1%	44.1%	55.9%

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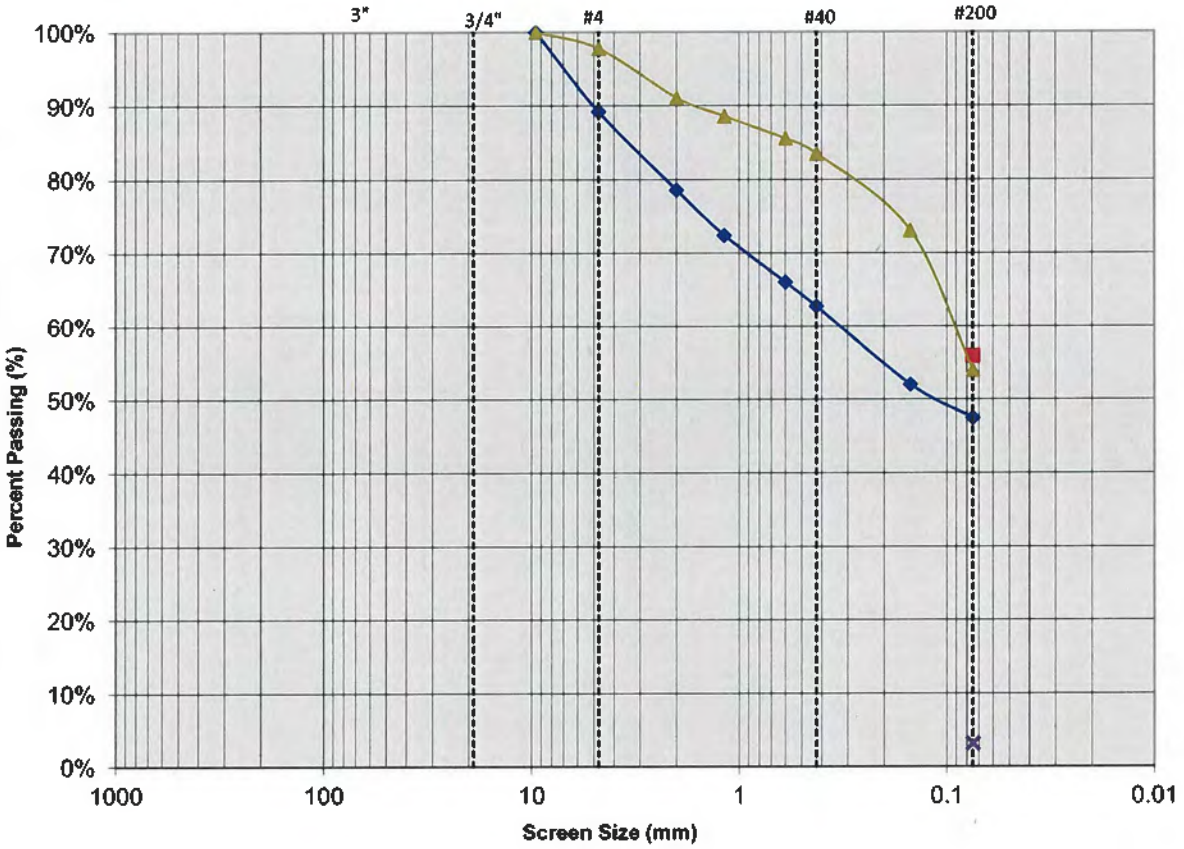
Project: Lompa Ranch Project
Project No: 16-174.1
Location: Lompa Ranch, Carson City NV
Date Sampled: 9/27/2016

GRAIN SIZE DISTRIBUTION



Sample Number	USCS Classification	LL	PL	Cc	Cu
BH-5 @ 20.5-21.5	Silty Sand, SM				
BH-5 @ 25.4-26.5	Sandy Clay, CL				
BH-5 @ 30.3-31.2	Sandy Clay, CL				
BH5 @ 31.2-31.5	Sand, SP				

Sample Number	D100	D60	D30	D10	% Moisture	% Gravel	% Sand	% Silt/Clay
BH-5 @ 20.5-21.5					7.8%	10.8%	41.8%	47.4%
BH-5 @ 25.4-26.5					22.4%	0.0%	44.0%	56.0%
BH-5 @ 30.3-31.2					14.0%	2.2%	43.8%	54.0%
BH5 @ 31.2-31.5					14.5%			3.1%

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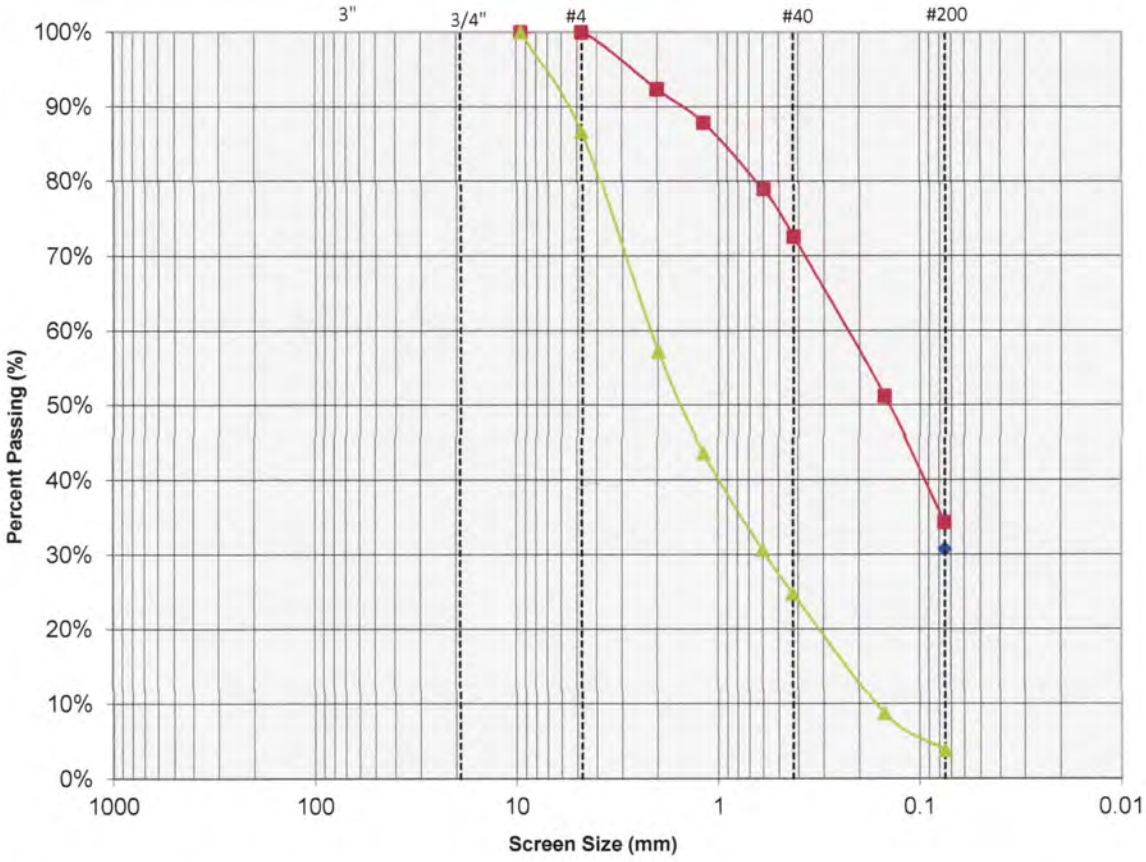
Project No: 16-174.1
Location: Lompa Ranch, Carson City NV
Date Sampled: 9/27/2016

GRAIN SIZE DISTRIBUTION



Sample Number	USCS Classification	LL	PL	Cc	Cu
TP-7 @ Bulk 0-2.0	Clayey Sand, SC	39	16		
TP-7 @3.5 - 5.3	Silty Sand, SM				
TP-7 @ 5.3 - 6.6	Sand, SP				

Sample Number	D100	D60	D30	D10	% Moisture	% Gravel	% Sand	% Silt/Clay
TP-7 @ Bulk 0-2.0					5.5%	0.0%	69.3%	30.7%
TP-7 @3.5 - 5.3					3.1%	0.0%	65.7%	34.3%
TP-7 @ 5.3 - 6.6					1.6%	13.4%	82.8%	3.8%

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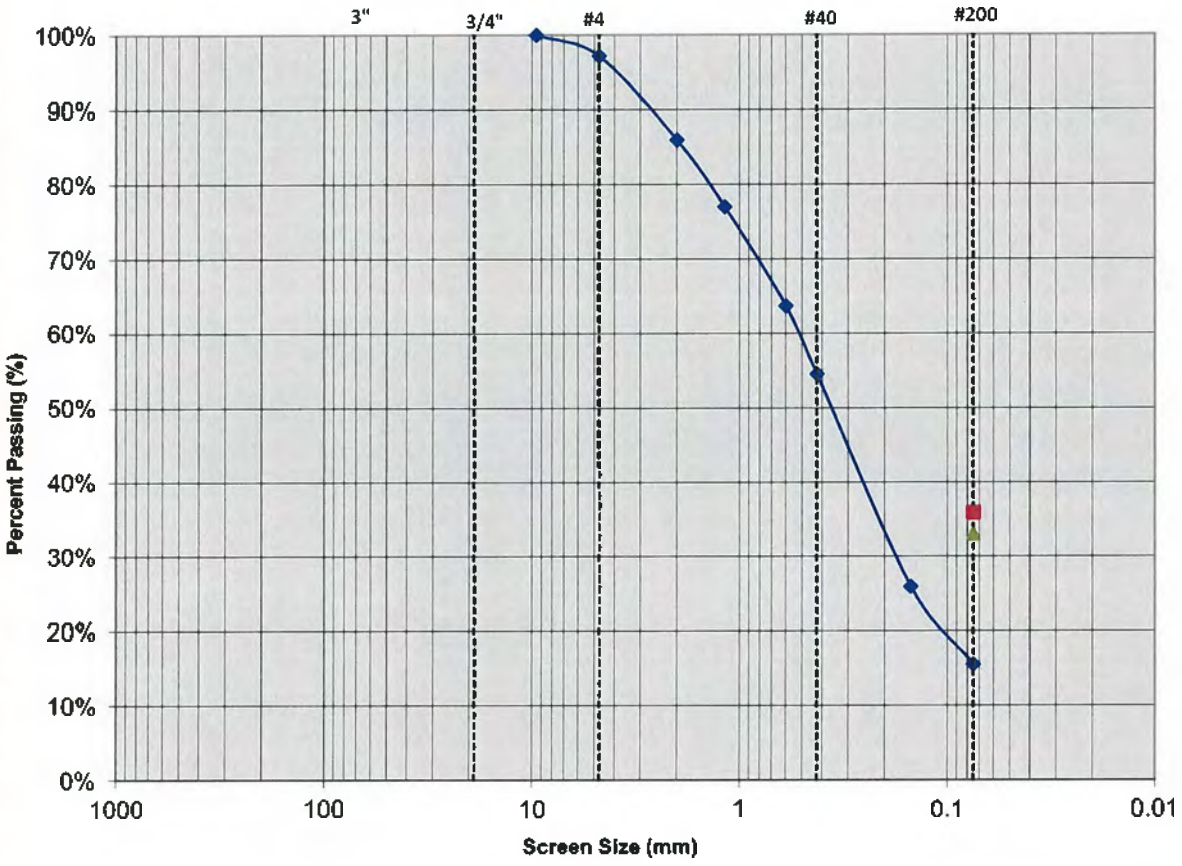
Project: Lompa Ranch Project
Project No: 16-174.1
Location: Lompa Ranch, Carson City NV
Date Sampled: 9/27/2016

GRAIN SIZE DISTRIBUTION



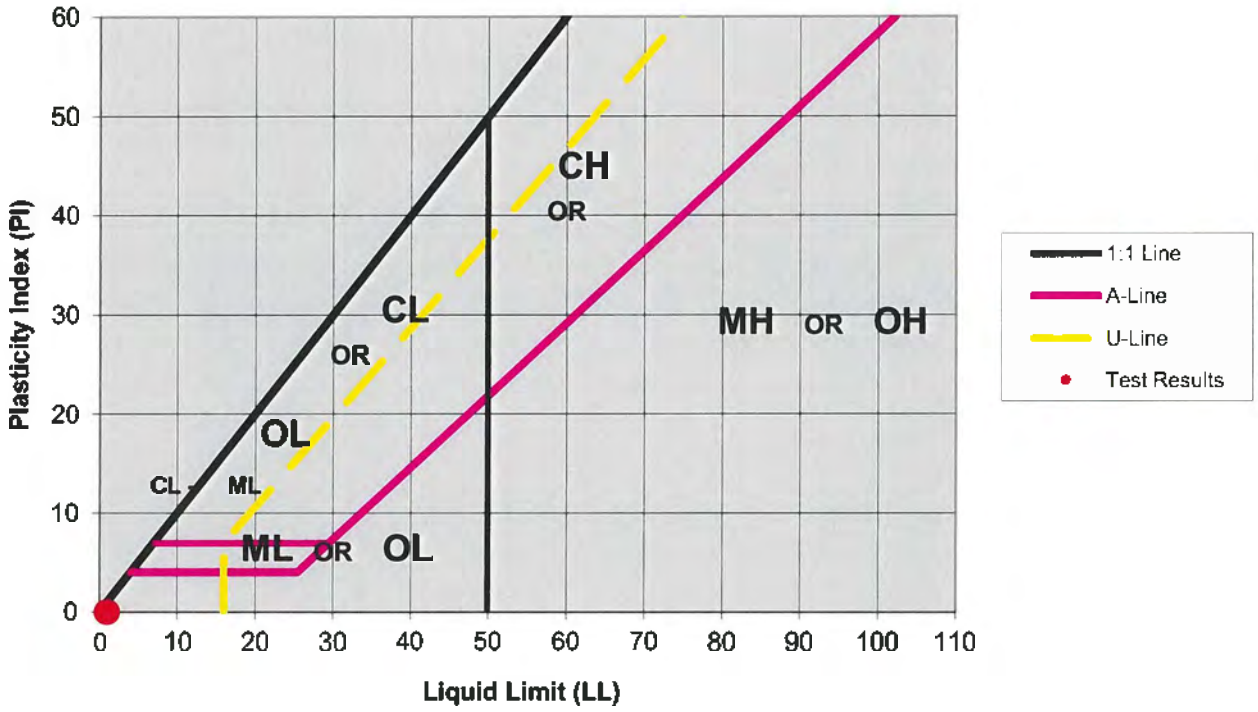
Sample Number	USCS Classification	LL	PL	Cc	Cu
BH-6 @ 8.4-9.0	Silty Sand, SM				
BH-6 @ 20-20.5	Silty Sand, SM				
BH-6 @ 21-21.5	Clayey Sand, SC				

Sample Number	D100	D60	D30	D10	% Moisture	% Gravel	% Sand	% Silt/Clay
BH-6 @ 8.4-9.0					9.0%	2.8%	81.7%	15.5%
BH-6 @ 20-20.5					19.1%	0.0%	64.2%	35.8%
BH-6 @ 21-21.5					20.8%	0.0%	66.9%	33.1%

Resource Concepts Inc
4010 Technology Way, Unit D, Carson City, NV 89703
Ofc: 775-883-1600 Fax: 775-888-9904

Project Name:	Lompa
Project Number:	16-174.1
Sample Number:	BH-2 @ 8.5-8.8
Date: 10/20/2016	By: JK

Plasticity Chart (ASTM D2487)



LIQUID LIMIT	-
PLASTIC LIMIT	-
PLASTICITY INDEX	Non Plastic

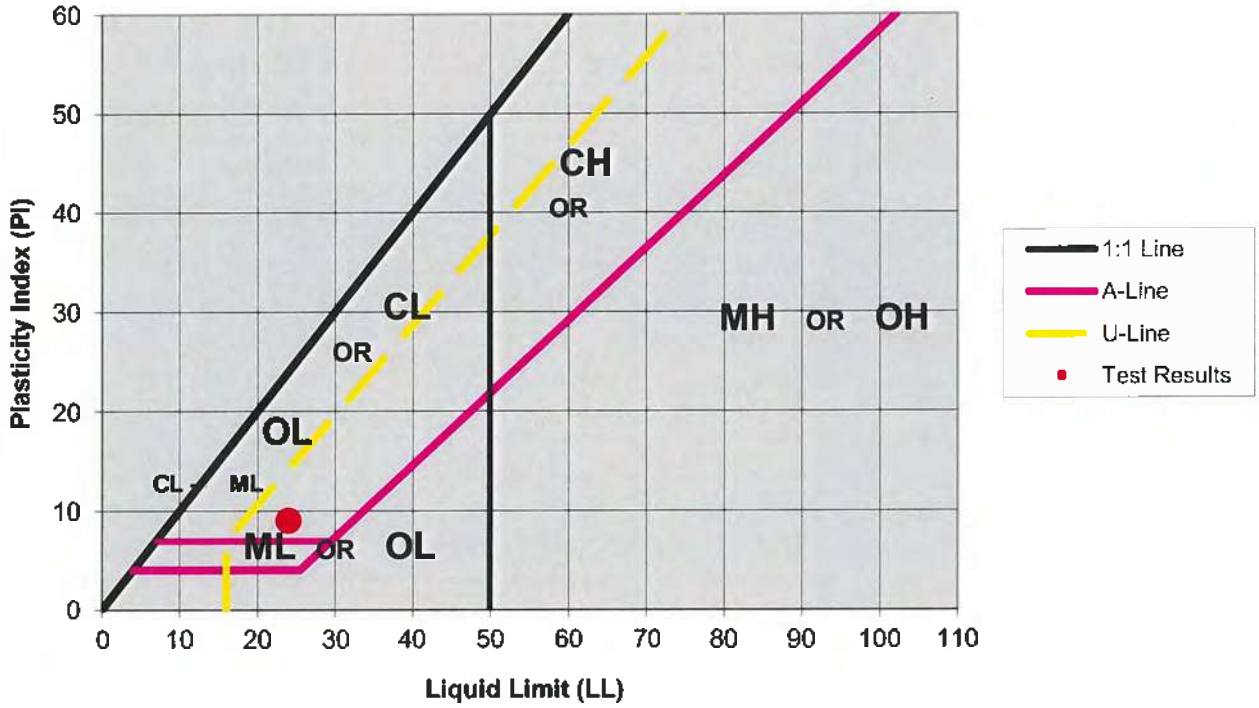
USCS Classification:

Silty Sand, SM

Resource Concepts Inc
4010 Technology Way, Unit D, Carson City, NV 89703
Ofc: 775-883-1600 Fax: 775-888-9904

Project Name:			Lompa
Project Number:			16-174.1
Sample Number:			BH-2 @ 8.8-9.8
Date:	10/20/2016	By:	JK

Plasticity Chart (ASTM D2487)



LIQUID LIMIT	24
PLASTIC LIMIT	15
PLASTICITY INDEX	9

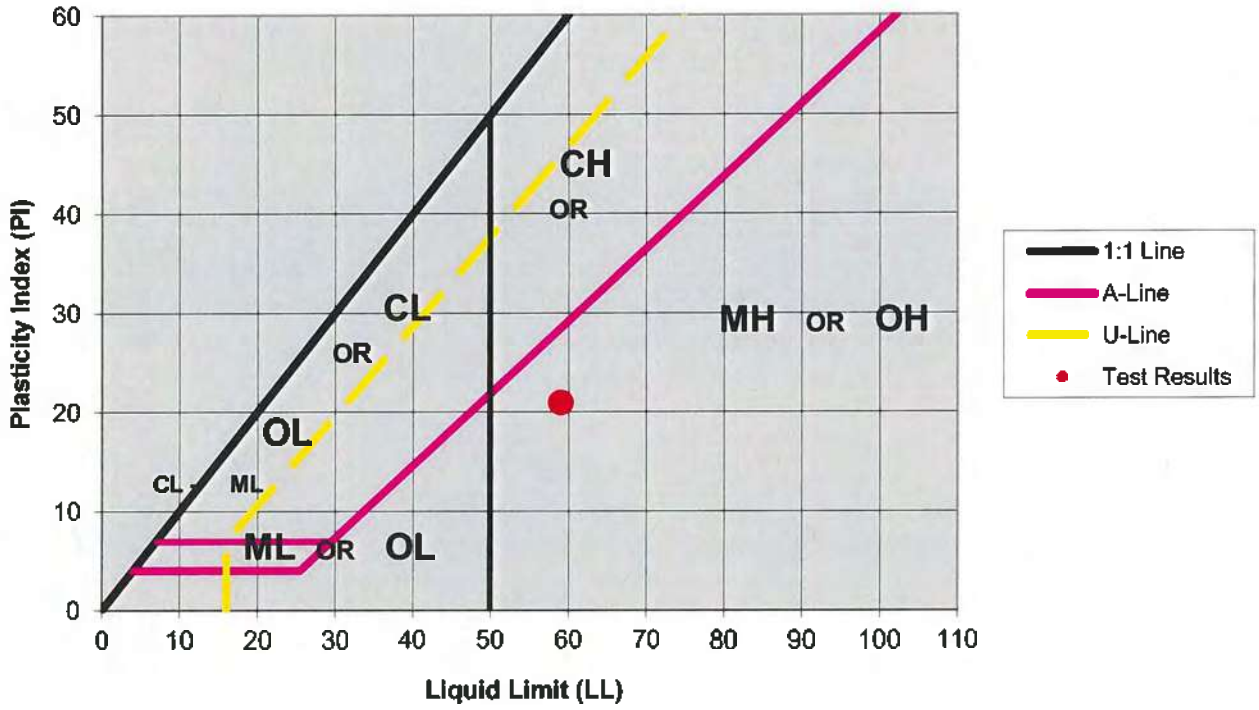
USCS Classification:

Clayey Sand, SC

Resource Concepts Inc
4010 Technology Way, Unit D, Carson City, NV 89703
Ofc: 775-883-1600 Fax: 775-888-9904

Project Name:	Lompa
Project Number:	16-174.1
Sample Number:	BH-3 @ 2.5
Date: 10/20/2016	By: JK

Plasticity Chart (ASTM D2487)



LIQUID LIMIT	59
PLASTIC LIMIT	38
PLASTICITY INDEX	21

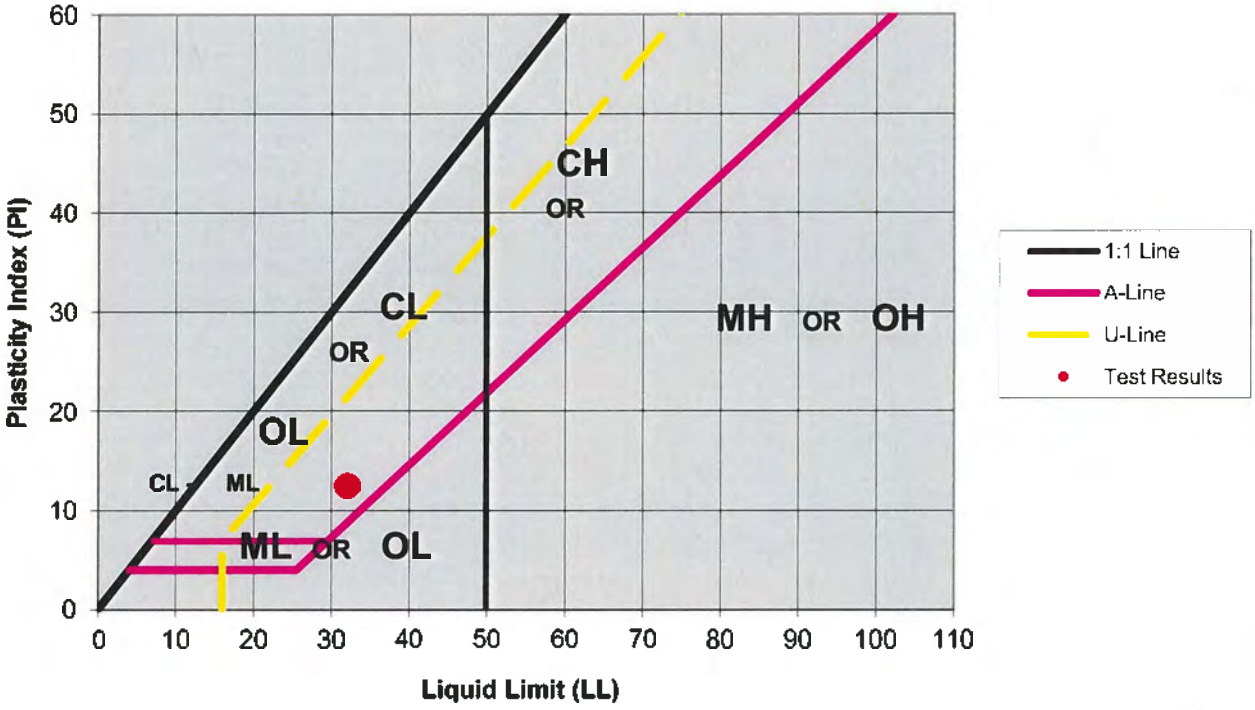
USCS Classification:

Sandy Silt, MH

Resource Concepts Inc
4010 Technology Way, Unit D, Carson City, NV 89703
Ofc: 775-883-1600 Fax: 775-888-9904

Project Name:			Lompa
Project Number:			16-174.1
Sample Number:			BH3 @ 6.0-6.5
Date:	10/20/2016	By:	JK

Plasticity Chart (ASTM D2487)



LIQUID LIMIT	32
PLASTIC LIMIT	20
PLASTICITY INDEX	12

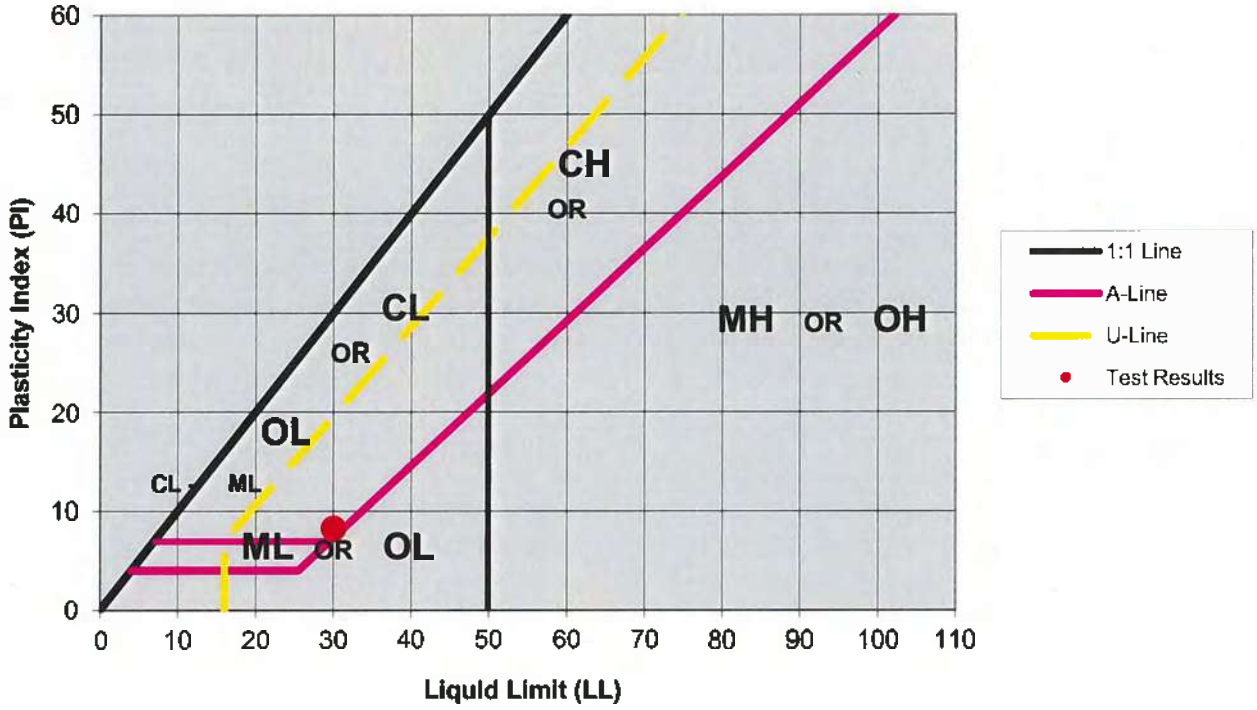
USCS Classification:

Clayey Sand, SC

Resource Concepts Inc
4010 Technology Way, Unit D, Carson City, NV 89703
Ofc: 775-883-1600 Fax: 775-888-9904

Project Name:			Lompa
Project Number:			16-174.1
Sample Number:			BH3 @ 9.4-10.0
Date:	10/20/2016	By:	JK

Plasticity Chart (ASTM D2487)



LIQUID LIMIT	30
PLASTIC LIMIT	22
PLASTICITY INDEX	8

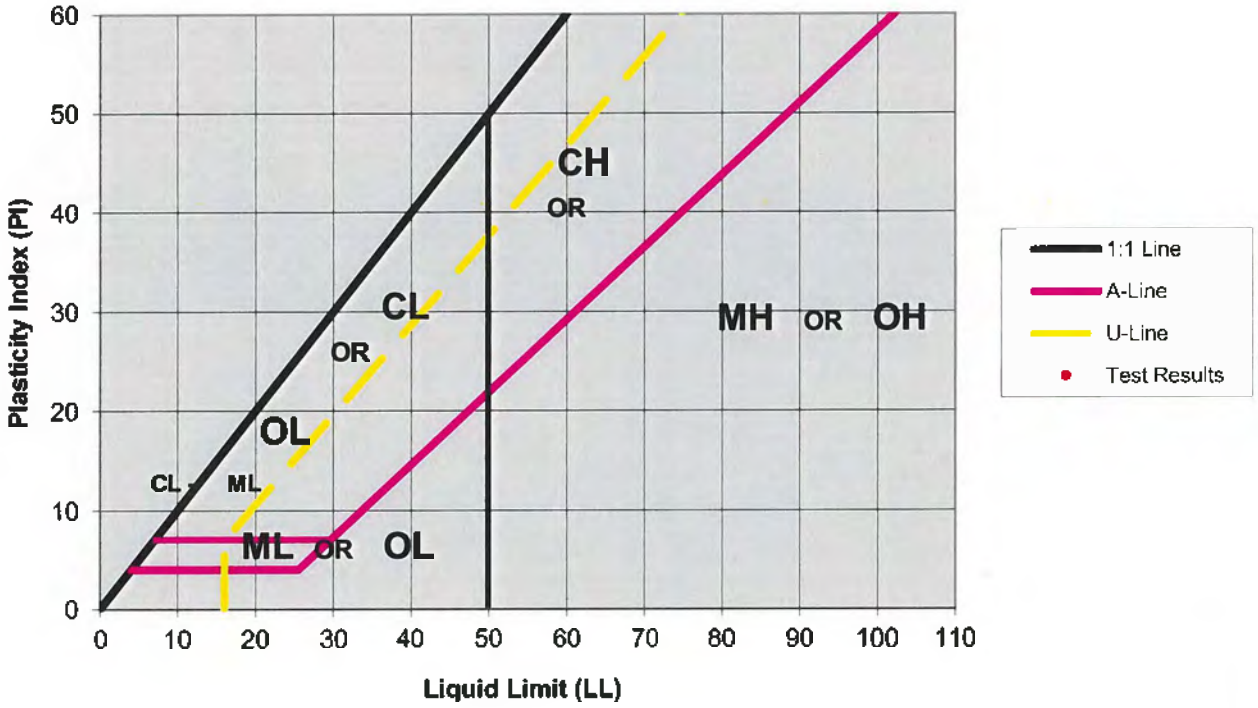
USCS Classification:

Clay, CL

Resource Concepts Inc
4010 Technology Way, Unit D, Carson City, NV 89703
Ofc: 775-883-1600 Fax: 775-888-9904

Project Name:			Lompa
Project Number:			16-174.1
Sample Number:			BH3 @ 14-14.5
Date:	10/20/2016	By:	JK

Plasticity Chart (ASTM D2487)



LIQUID LIMIT	-
PLASTIC LIMIT	-
PLASTICITY INDEX	Non Plastic

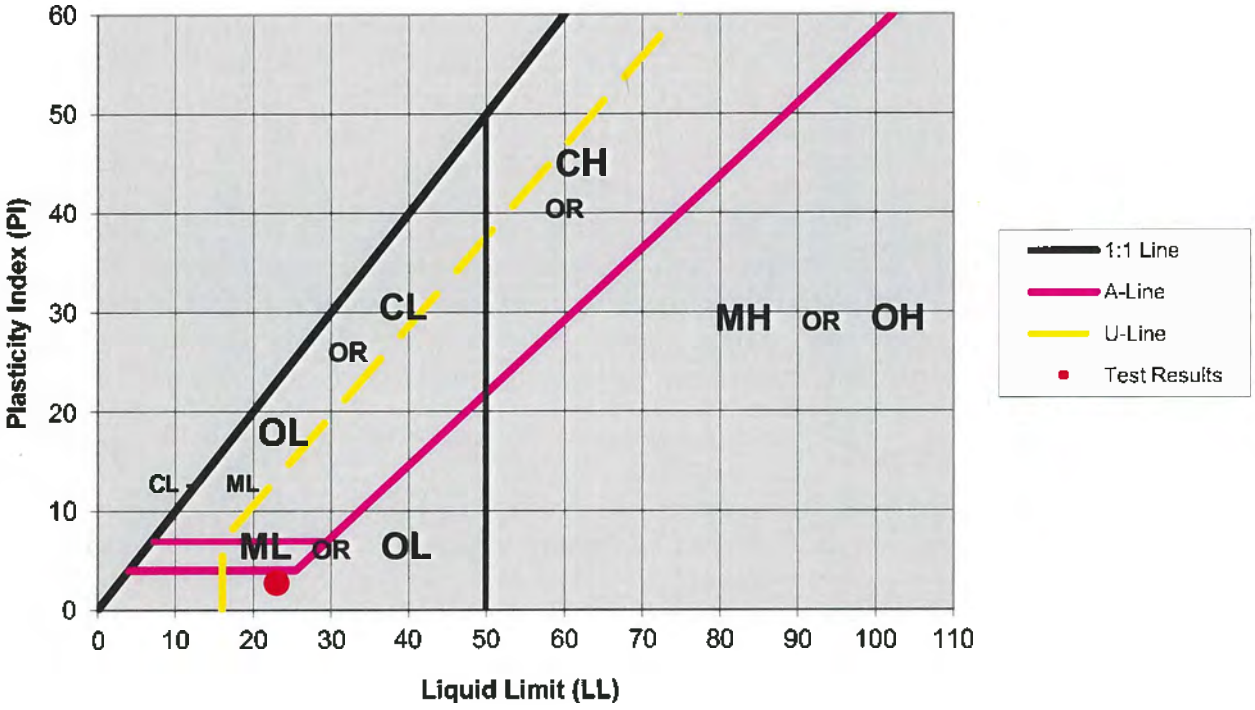
USCS Classification:

Silty Sand, SM

Resource Concepts Inc
4010 Technology Way, Unit D, Carson City, NV 89703
Ofc: 775-883-1600 Fax: 775-888-9904

Project Name:	Lompa
Project Number:	16-174.1
Sample Number:	BH4 @ 1-3
Date: 10/20/2016	By: JK

Plasticity Chart (ASTM D2487)



LIQUID LIMIT	23
PLASTIC LIMIT	20
PLASTICITY INDEX	3

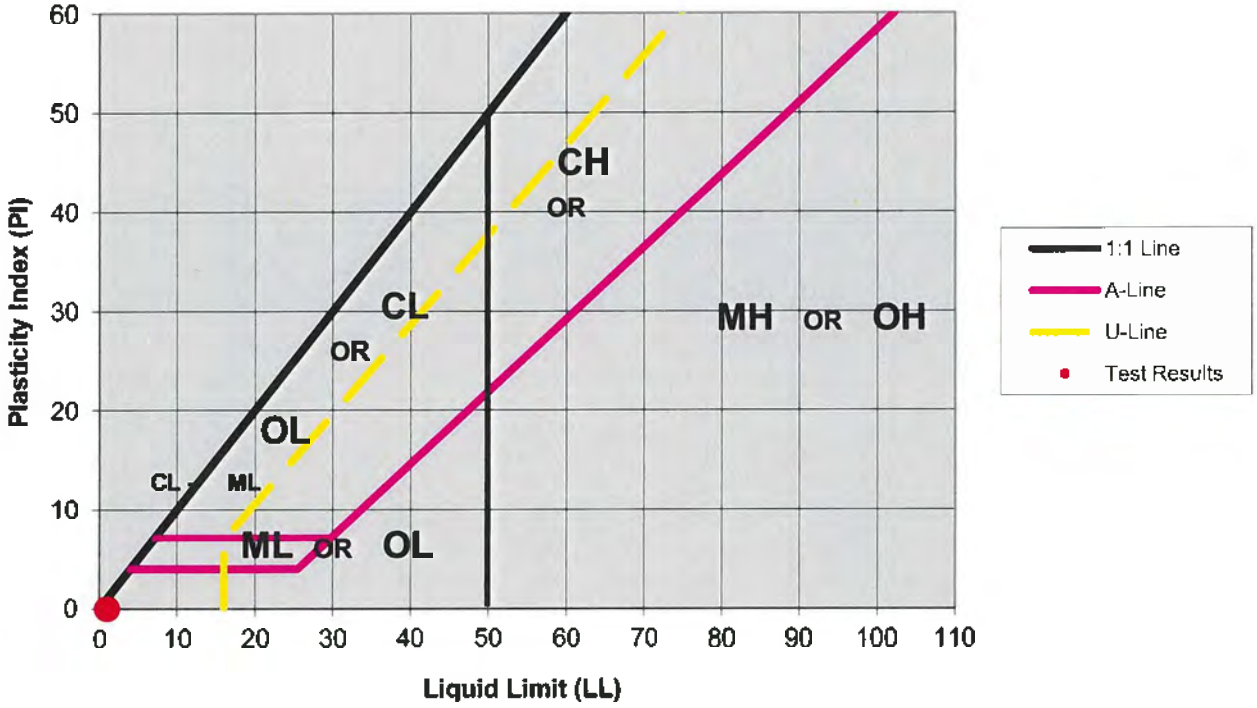
USCS Classification:

Silty Sand, SM

Resource Concepts Inc
4010 Technology Way, Unit D, Carson City, NV 89703
Ofc: 775-883-1600 Fax: 775-888-9904

Project Name:	Lompa
Project Number:	16-174.1
Sample Number:	BH4 @ 25-26.5
Date: 10/20/2016	By: JK

Plasticity Chart (ASTM D2487)



LIQUID LIMIT	-
PLASTIC LIMIT	-
PLASTICITY INDEX	Non Plastic

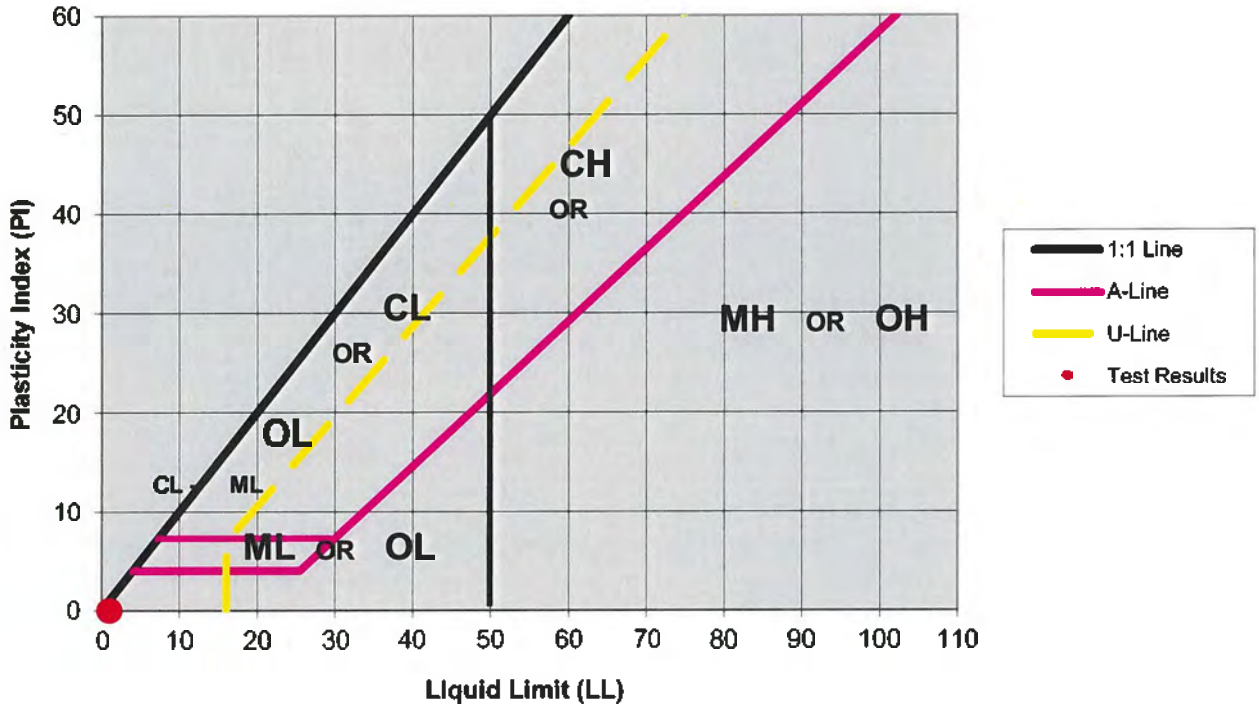
USCS Classification:

Clayey Silt, ML

Resource Concepts Inc
4010 Technology Way, Unit D, Carson City, NV 89703
Ofc: 775-883-1600 Fax: 775-888-9904

Project Name:			Lompa
Project Number:			16-174.1
Sample Number:			BH4 @ 40-40.6
Date:	10/20/2016	By:	JK

Plasticity Chart (ASTM D2487)



LIQUID LIMIT	-
PLASTIC LIMIT	-
PLASTICITY INDEX	Non Plastic

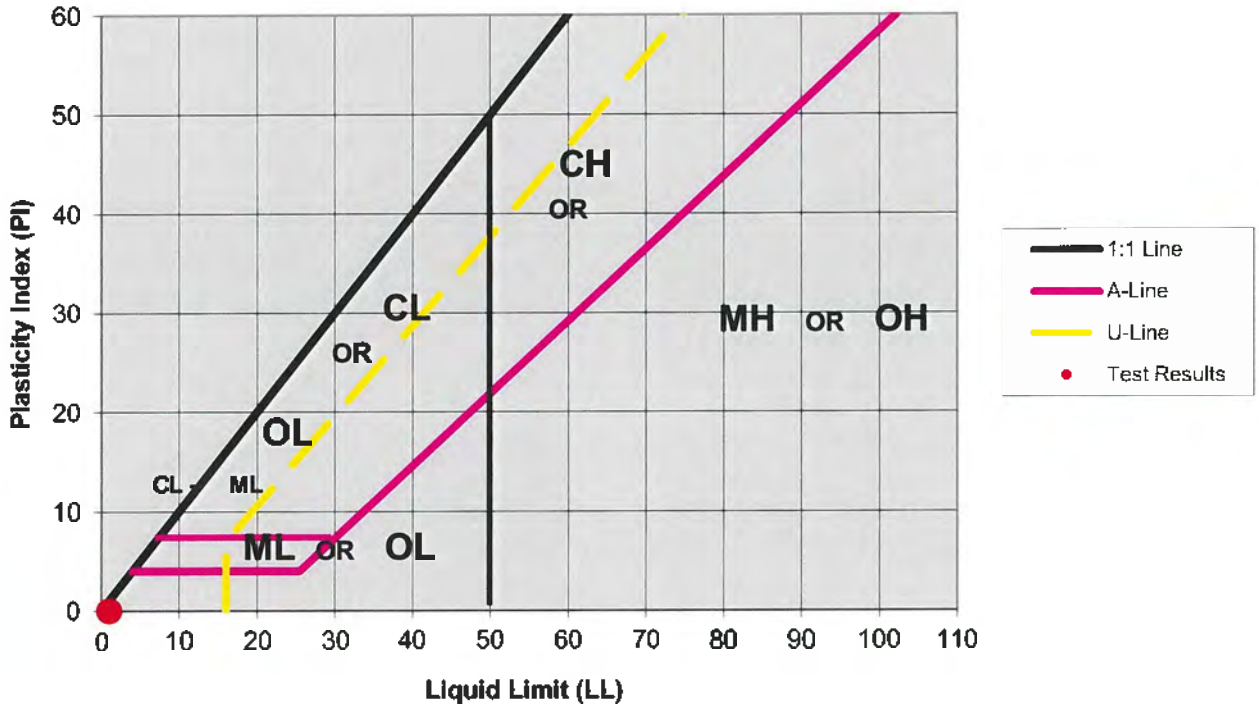
USCS Classification:

Silty Sand, SM

Resource Concepts Inc
4010 Technology Way, Unit D, Carson City, NV 89703
Ofc: 775-883-1600 Fax: 775-888-9904

Project Name:	Lompa
Project Number:	16-174.1
Sample Number:	BH-6 @ 20.5-21.0
Date: 10/20/2016	By: JK

Plasticity Chart (ASTM D2487)

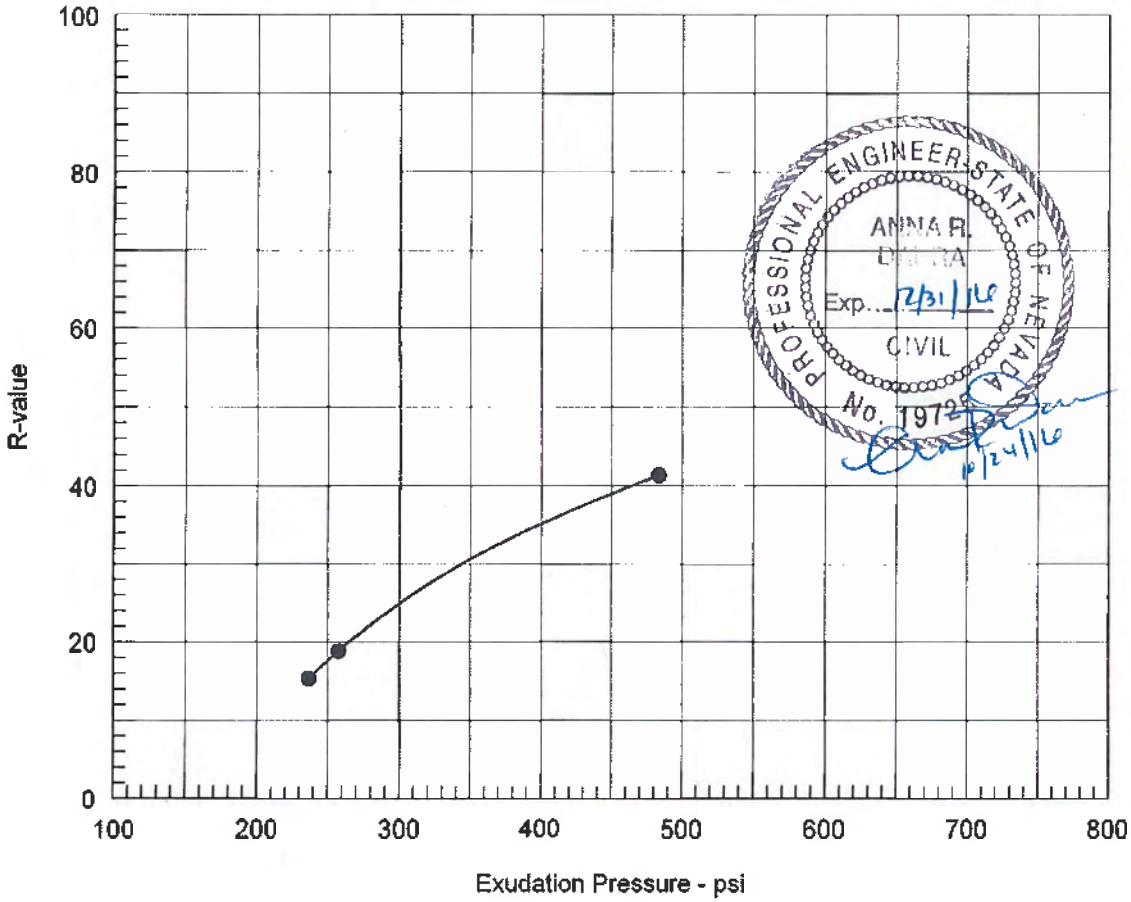


LIQUID LIMIT	-
PLASTIC LIMIT	-
PLASTICITY INDEX	Non Plastic

USCS Classification:

Silty Sand, SM

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	120	106.3	19.3	0.03	124	2.62	237	14	15
2	160	108.3	18.3	0.39	76	2.53	483	41	41
3	150	106.2	18.8	0.55	112	2.55	258	19	19

Test Results	Material Description
R-value at 300 psi exudation pressure = 25	

Project No.: 0086-15-1
Project: Testing As Ordered
Source of Sample: Lompa Ranch **Depth:** 0-2'
Sample Number: TP-8
Date: 10/24/2016

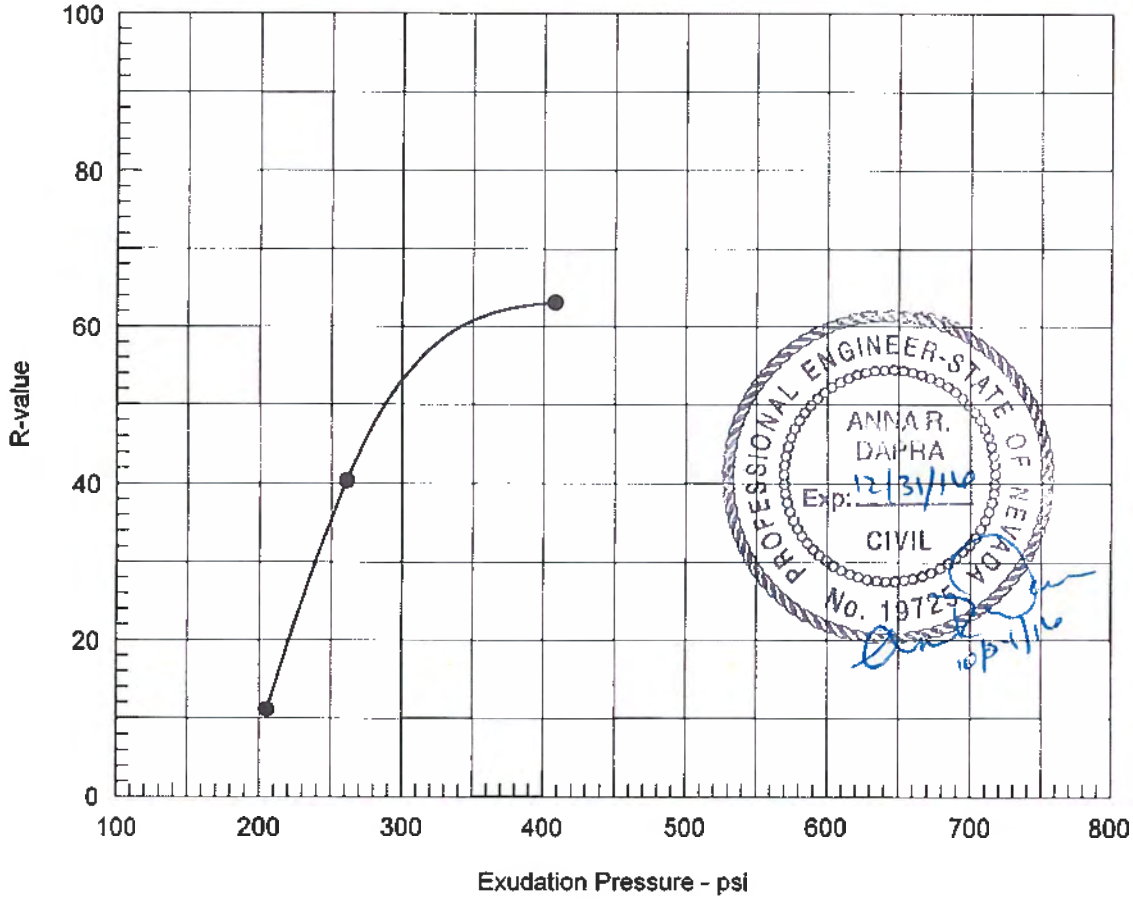
Tested by: G. Overstreet
Checked by: A. DApra
Remarks:
Laboratory Log 5331

R-VALUE TEST REPORT

BLACK EAGLE CONSULTING, INC.

Figure _____

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	80	106.0	19.5	0.42	131	2.63	205	10	11
2	150	106.7	18.1	0.82	73	2.57	261	39	40
3	250	110.2	16.4	1.49	42	2.46	408	63	63

Test Results	Material Description
R-value at 300 psi exudation pressure = 53	

Project No.: 0086-15-1
Project: Testing As Ordered
Source of Sample: Lompa Ranch **Depth:** 0-2'
Sample Number: BH-5
Date: 10/24/2016

Tested by: G. Overstreet
Checked by: A. Dapra
Remarks:
Laboratory Log 5331

R-VALUE TEST REPORT

BLACK EAGLE CONSULTING, INC.

Figure _____

10/26/2016

Resource Concepts Inc.
340 North Minnesota Street
Carson City, NV 89703
Attn: Gary Luce

OrderID: *1610370*

Dear: Gary Luce

This is to transmit the attached analytical report. The analytical data and information contained therein was generated using specified or selected methods contained in references, such as Standard Methods for the Examination of Water and Wastewater, online edition, Methods for Determination of Organic Compounds in Drinking Water, EPA-600/4-79-020, and Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods (SW846) Third Edition.

The samples were received by WETLAB-Western Environmental Testing Laboratory in good condition on 10/12/2016. Additional comments are located on page 2 of this report.

If you should have any questions or comments regarding this report, please do not hesitate to call.

Sincerely,

Andy Smith
QA Manager

SPARKS
475 E. Greg Street, Suite 119
Sparks, Nevada 89431
tel (775) 355-0202
fax (775) 355-0817
EPA LAB ID: NV00925 - ELAP No: 2523

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Elko, Nevada 89801
tel (775) 777-9933
fax (775) 777-9933
EPA LAB ID: NV00926

LAS VEGAS
3230 Polaris Ave. Suite 4
Las Vegas, Nevada 89102
tel (702) 475-8899
fax (702) 622-2868
EPA LAB ID: NV00932

Western Environmental Testing Laboratory
Report Comments

Resource Concepts Inc. - 1610370

Specific Report Comments

None

Report Legend

B	--	Blank contamination; Analyte detected above the method reporting limit in an associated blank
D	--	Due to the sample matrix dilution was required in order to properly detect and report the analyte. The reporting limit has been adjusted accordingly.
HT	--	Sample analyzed beyond the accepted holding time
J	--	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit
M	--	The matrix spike/matrix spike duplicate (MS/MSD) values for the analysis of this parameter were outside acceptance criteria due to probable matrix interference. The reported result should be considered an estimate.
N	--	There was insufficient sample available to perform a spike and/or duplicate on this analytical batch.
NC	--	Not calculated due to matrix interference
QD	--	The sample duplicate or matrix spike duplicate analysis demonstrated sample imprecision. The reported result should be considered an estimate.
QL	--	The result for the laboratory control sample (LCS) was outside WETLAB acceptance criteria and reanalysis was not possible. The reported data should be considered an estimate.
S	--	Surrogate recovery was outside of laboratory acceptance limits due to matrix interference. The associated blank and LCS surrogate recovery was within acceptance limits
SC	--	Spike recovery not calculated. Sample concentration >4X the spike amount; therefore, the spike could not be adequately recovered
U	--	The analyte was analyzed for, but was not detected above the level of the reported sample reporting/quantitation limit

General Lab Comments

Per method recommendation (section 4.4), Samples analyzed by methods EPA 300.0 and EPA 300.1 have been filtered prior to analysis.

The following is an interpretation of the results from EPA method 9223B:
A result of zero (0) indicates absence for both coliform and Escherichia coli meaning the water meets the microbiological requirements of the U.S. EPA Safe Drinking Water Act (SDWA). A result of one (1) for either test indicates presence and the water does not meet the SDWA requirements. Waters with positive tests should be disinfected by a certified water treatment operator and retested.

Per federal regulation the holding time for the following parameters in aqueous/water samples is 15 minutes: Residual Chlorine, pH, Dissolvec Oxygen, Sulfite.

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EPA LAB ID: NV00926

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Las Vegas, Nevada 89102
tel (702) 475-8899
fax (702) 622-2868
EPA LAB ID: NV00932

Western Environmental Testing Laboratory
Analytical Report

Resource Concepts Inc.
340 North Minnesota Street
Carson City, NV 89703
Attn: Gary Luce
Phone: (775) 883-1600 **Fax:** (775) 883-1656

Date Printed: 10/26/2016
OrderID: *1610370*
PO\Project: *16-174.1*

Customer Sample ID: Lompa Ranch TP-1 0-4.3 **Collect Date/Time:** 9/27/2016
WETLAB Sample ID: 1610370-001 **Receive Date:** 10/12/2016 16:15

Analyte	Method	Results	Units	DF	RL	Analyzed	LabID
General Chemistry							
Paste pH	SW846 9045B	8.74	pH Units	1		10/14/2016	NV00925
Resistivity	SM 2510B	4700	ohms.cm	1	1.0	10/17/2016	NV00925
Anions by Ion Chromatography							
Chloride	EPA 300.0	9.0	mg/kg	3	3.0	10/18/2016	NV00925
Sulfate	EPA 300.0	19	mg/kg	3	3.0	10/18/2016	NV00925
Sample Preparation							
Saturated Paste Preparation	CSTPM S:1.0	Complete		1		10/14/2016	NV00925
3:1 DI Water Extraction	WL 3.0	Complete		1		10/13/2016	NV00925

Customer Sample ID: Lompa Ranch TP-4 0.5-2.7 **Collect Date/Time:** 9/27/2016
WETLAB Sample ID: 1610370-002 **Receive Date:** 10/12/2016 16:15

Analyte	Method	Results	Units	DF	RL	Analyzed	LabID
General Chemistry							
Paste pH	SW846 9045B	9.77	pH Units	1		10/14/2016	NV00925
Resistivity	SM 2510B	2200	ohms.cm	1	1.0	10/17/2016	NV00925
Anions by Ion Chromatography							
Chloride	EPA 300.0	86	mg/kg	15	15	10/18/2016	NV00925
Sulfate	EPA 300.0	ND D	mg/kg	15	15	10/18/2016	NV00925
Sample Preparation							
Saturated Paste Preparation	CSTPM S:1.0	Complete		1		10/14/2016	NV00925
3:1 DI Water Extraction	WL 3.0	Complete		1		10/13/2016	NV00925

Customer Sample ID: Lompa Ranch TP-12 0.5-1.6 **Collect Date/Time:** 9/27/2016
WETLAB Sample ID: 1610370-003 **Receive Date:** 10/12/2016 16:15

Analyte	Method	Results	Units	DF	RL	Analyzed	LabID
General Chemistry							
Paste pH	SW846 9045B	9.73	pH Units	1		10/14/2016	NV00925
Resistivity	SM 2510B	850	ohms.cm	1	1.0	10/17/2016	NV00925
Anions by Ion Chromatography							
Chloride	EPA 300.0	84	mg/kg	3	3.0	10/18/2016	NV00925

DF=Dilution Factor, RL=Reporting Limit, ND=Not Detected or <RL

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EPA LAB ID: NV00926

LAS VEGAS
3230 Polaris Ave. Suite 4
Las Vegas, Nevada 89102
tel (702) 475-8899
fax (702) 622-2868
EPA LAB ID: NV00932

Customer Sample ID: Lompa Ranch TP-12 0.5-1.6 **Collect Date/Time:** 9/27/2016

WETLAB Sample ID: 1610370-003 **Receive Date:** 10/12/2016 16:15

Analyte	Method	Results	Units	DF	RL	Analyzed	LabID
Sulfate	EPA 300.0	13	mg/kg	3	3.0	10/18/2016	NV00925
Sample Preparation							
Saturated Paste Preparation	CSTPM S:1.0	Complete		1		10/14/2016	NV00925
3:1 DI Water Extraction	WL 3.0	Complete		1		10/13/2016	NV00925

DF=Dilution Factor, RL=Reporting Limit, ND=Not Detected or <RL

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EPA LAB ID: NV00926

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Las Vegas, Nevada 89102
tel (702) 475-8899
fax (702) 622-2868
EPA LAB ID: NV00932

Western Environmental Testing Laboratory
QC Report

QCBatchID	QCType	Parameter	Method	Result	Actual	% Rec	Units
QC16100578	Blank 1	Resistivity	SM 2510B	ND			ohms.cm
QC16100597	Blank 1	Chloride	EPA 300.0	ND			mg/L
		Sulfate	EPA 300.0	ND			mg/L

QCBatchID	QCType	Parameter	Method	Result	Actual	% Rec	Units
QC16100491	LCS 1	Paste pH	SW846 9045B	7.01	7.00	100	ph Units
QC16100578	LCS 1	Resistivity	SM 2510B	1402	1412	99	ohms.cm
QC16100597	LCS 1	Chloride	EPA 300.0	9.96	10.0	100	mg/L
		Sulfate	EPA 300.0	24.0	25.0	96	mg/L

QCBatchID	QCType	Parameter	Method	Duplicate Sample	Sample Result	Duplicate Result	Units	RPD
QC16100491	Duplicate	Paste pH	SW846 9045B	1610370-001	8.74	8.75	pH Units	<1%
QC16100578	Duplicate	Resistivity	SM 2510B	1610370-001	4658	4649	ohms.cm	<1%

QCBatchID	QCType	Parameter	Method	Spike Sample	Sample Result	MS Result	MSD Result	Spike Value	Units	MS %Rec	MSD %Rec	RPD %
QC16100597	MS 1	Chloride	EPA 300.0	1610388-004	1.76	7.16	7.15	5	mg/L	108	108	<1
		Sulfate	EPA 300.0	1610388-004	18.6	27.5	27.5	10	mg/L	90	89	<1
QC16100597	MS 2	Chloride	EPA 300.0	1610379-003	19.1	24.0	24.0	5	mg/L	98	98	<1
		Sulfate	EPA 300.0	1610379-003	50.6	59.2	59.2	10	mg/L	86	86	<1

DF=Dilution Factor, RL=Reporting Limit, ND=Not Detected or <RL

SPARKS
475 E. Greg Street, Suite 119
Sparks, Nevada 89431
tel (775) 355-0202
fax (775) 355-0817
EPA LAB ID: NV00925 - ELAP No: 2523

ELKO
1084 Lamoille Hwy
Elko, Nevada 89801
tel (775) 777-9933
fax (775) 777-9933
EPA LAB ID: NV00926

LAS VEGAS
3230 Polaris Ave. Suite 4
Las Vegas, Nevada 89102
tel (702) 475-8899
fax (702) 622-2868
EPA LAB ID: NV00932

WETLAB
WESTERN ENVIRONMENTAL TESTING LABORATORY
Specializing in Soil, Hazardous Waste and Water Analysis.

475 E. Greg Street #119 | Sparks, Nevada 89431 | www.WETLaboratory.com
tel (775) 355-0202 | fax (775) 355-0817
1084 Lamoille Highway | Elko, Nevada 89801
tel (775) 777-9933 | fax (775) 777-9933
3230 Polaris Ave., Suite 4 | Las Vegas, Nevada 89102
tel (702) 475-8899 | fax (702) 776-6152

WETLAB Order ID. 1610370
Sparks Control #
Elko Control #
LV Control #
Report Due Date
Page ____ of ____

Client: Resource Concepts
Address: 4010 Technology Way Unit D
City, State & Zip: Carson City, NV 89703
Contact: Gary Luce
Phone: 775-883-1600 | Collector's Name
Fax: 775-888-9904 | PWS/Project Name
P.O. Number: 16-174.1 | PWS/Project Number
Email: linda@rci-nv.com

Billing Address (if different than Client Address)
Company: Resource Concepts
Address: 340 Minnesota Street
City, State & Zip: Carson City, NV 89701
Contact: Linda Hutton
Phone: 775-883-1600 Fax:
Email: linda@rci-nv.com

Turnaround Time Requirements
Standard ✓
5 Day* (25%) ☐ 72 Hour* (50%) ☐
48 Hour* (100%) ☐ 24 Hour* (200%) ☐
*Surcharges Will Apply

Samples Collected From Which State?
NV ✓ CA ☐ Other ☐

Compliance Monitoring?
Yes ☐ No ✓

Report to Regulatory Agency?
Yes ☐ No ✓

Report Results Via
PDF ✓ EDD ☐ Other

Standard QC Required?
Yes ✓ No ☐

SAMPLE ID/LOCATION	DATE	TIME	PRES TYPE *	SAMPLE TYPE **	NO. OF CONTAINERS	Analyses Requested: Sulfate, chlorides, ph and resistivity	Spl. No.
Lompa Ranch TP-1 0-4.3	9/27			SO	1	✓	
Lompa Ranch TP-4 0.5-2.7	9/27			SO	1	✓	
Lompa Ranch TP-12 0.5-1.6	9/27			SO	1	✓	

1610 1
370 03

Instructions/Comments/Special Requirements:

Sample Matrix Key** DW = Drinking Water WW = Wastewater SW = Surface Water MW = Monitoring Well SD = Solid/Sludge SO = Soil HW = Hazardous Waste OTHER:

***SAMPLE PRESERVATIVES:** 1=Unpreserved 2=H2SO4 3=NaOH 4=HCl 5=HNO3 6=Na2S2O3 7=ZnOAc+NaOH 8=HCl/VOA Vial

Temp	Custody Seal	# of Containers	DATE	TIME	Samples Relinquished By	Samples Received By
25.1 °C	Y N None	3	9/26/15	4:15		
°C	Y N None					
°C	Y N None					
°C	Y N None					

WETLAB'S Standard Terms and Conditions apply unless written agreements specify otherwise. Payment terms are Net 30.

Client/Collector attests to the validity and authenticity of this (these) sample(s) and, is (are) aware that tampering with or intentionally mislabeling the sample(s) location, date or time of collection may be considered fraud and subject to legal action (NAC445.0636). ____ initial

To the maximum extent permitted by law, the Client agrees to limit the liability of WETLAB for the Client's damages to the total compensation received, unless other agreements are made in writing. This limitation shall apply regardless of the cause of action or legal theory pled or asserted. ____ initial

WETLAB will dispose of samples 90 days from sample receipt. Client may request a longer sample storage time for an additional fee. Please contact your Project Manager for details. ____ initial

301.2E

APPENDIX C

PREVIOUS SITE EXPLORATION- OTHER FIRMS

Site plan, boring logs, Cone Penetrometer Test (CPT) logs and laboratory data are presented from Black Eagle Consulting Inc., Geotechnical Investigation, Carson City Freeway, Phase 2A dated July 2005.

Site plan, boring logs and laboratory data are presented from Geocon Consulting, Inc., Geotechnical Investigation, Robinson Transmission Main Project, October 2010.

GEOTECHNICAL INVESTIGATION

CARSON CITY FREEWAY
PHASE 2A

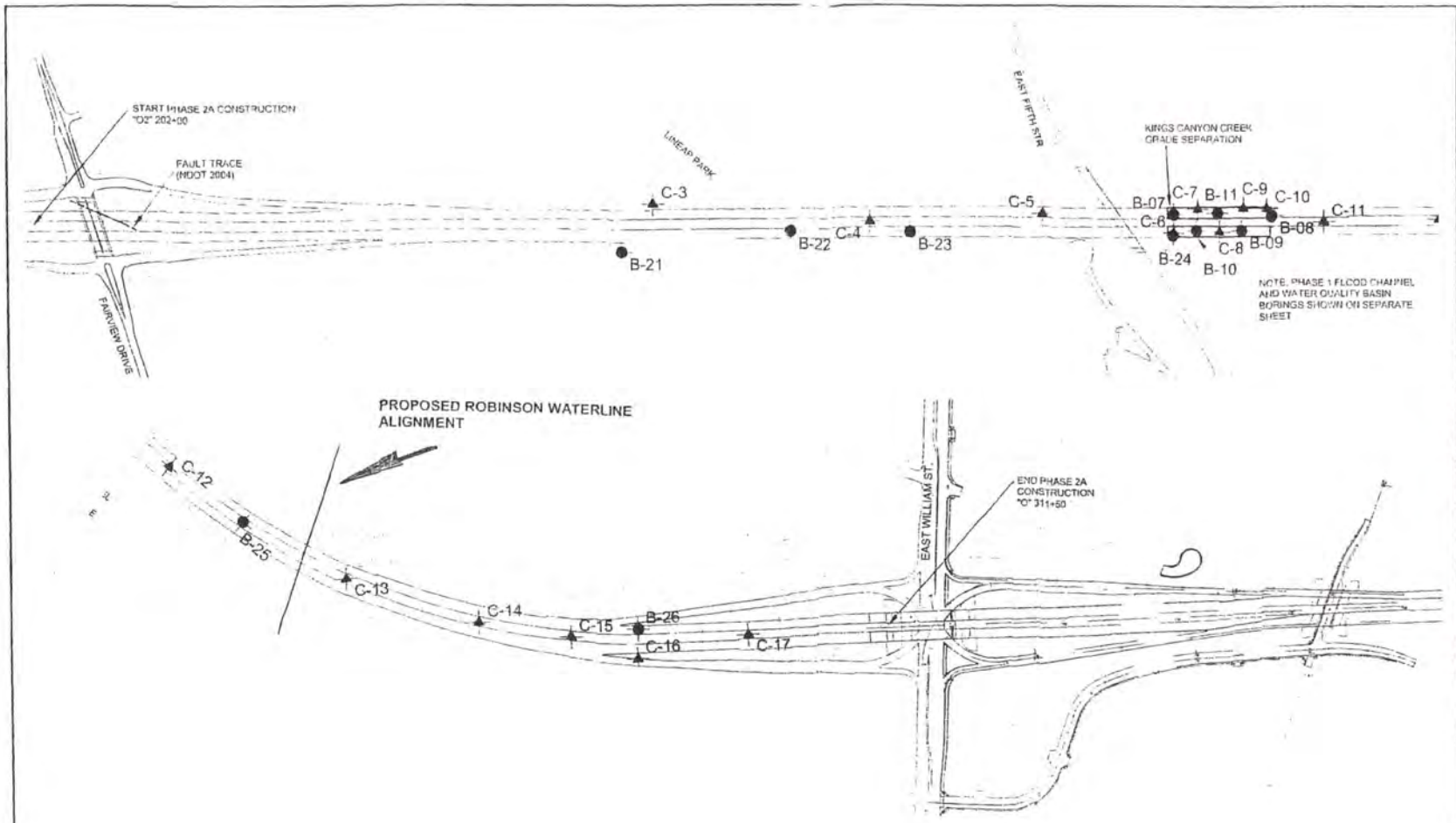
CARSON CITY, NEVADA

JULY 2005

Prepared for:

Louis Berger Group, Inc.
of
Las Vegas, Nevada

Black Eagle Consulting, Inc. - Geotechnical & Construction Services



LEGEND - BLACK EAGLE EXPLORATION

B-12, SW-2 ● BORING LOCATION BY BEC

C-15 ▲ APPROXIMATE CPT LOCATION BY BEC

APPROXIMATE LINE SAMPLING LOCATION

APPROXIMATE BORING LOCATIONS, BY OTHERS

EMBANKMENT > 10'

NOTES

1. BASE MAP PROVIDED BY LOUIS BERGER GROUP

IDENTIFICATION PREFIXES FOR EXPLORATIONS BY OTHERS	
CP, SB, USR	RIDOT
BC, BL, BR, BS	ALLEN-SLOBER ASSOCIATES
LSH	LUMOS & ASSOCIATES
HL-B	HARDING ESE

SCALE: 1"=200'
1' CONTOUR INTERVAL

NEVADA DEPARTMENT OF TRANSPORTATION
PLOT PLAN
CANYON CITY FREEWAY PHASE 2A 100% DESIGN
CARSON CITY, NEVADA

EXPLORATION LOG

START DATE 5/14/03
END DATE 5/15/03
JOB DESCRIPTION Carson City Freeway Phase 2
LOCATION Carson City, Nevada
BORING B-07
E.A. # 72781
GROUND ELEV. 4624.50 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
5/15/03	3.00	4621.5

STATION "O2" 251+50
OFFSET 34' Lt.
ENGINEER PGT
EQUIPMENT CME 850
OPERATOR Haz-Tech Drilling
DRILLING METHOD Mud Rotary
BACKFILLED Yes DATE 5/15/2003

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00								0.20 **SOD**	Drive hammer had an efficiency of 69 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.15.
	1.50	A	SPT	5 4 4	8	60	SV, PI	CL	**SANDY LEAN CLAY** brown, slightly moist, firm to stiff, with 63% medium plasticity fines, 36% fine to medium sand and trace angular gravel to 1/2 inch diameter. Weak roots present.
									3.00
	5.00								**CLAYEY SAND** light olive brown, moist to wet, very loose, with 40% low to medium plasticity fines, 60% fine to coarse sand and trace angular gravel to 1/2 inch diameter.
4619.50	5								
	6.50	B	SPT	1 0 1	1	80	SV, PI	SC	
									8.00
	10.00								**CLAYEY SAND** dark gray green, wet, loose to medium dense, with 31% non to low plasticity fines, 63% fine to coarse sand, and 6% angular gravel to 3/8 inch diameter. Interbedded **POORLY GRADED SAND with SILT** present in unit.
4614.50	10								
	11.50	C	SPT	4 3 7	10	70	SV, PI	SC	
									13.00
	15.00								**SANDY LEAN CLAY** dark gray green, wet, firm, with 63% low to medium plasticity fines, 36% fine to medium sand and trace angular gravel to 3/8 inch diameter. Weak micaceous.
4609.50	15								
	16.50	D	SPT	3 2 3	5	94	SV, PI	CL	
									18.00
	20.00								**SILTY SAND** dark gray green, wet, medium dense, with 15% non-plastic fines, 81% fine to coarse micaceous sand, and 4% subangular to subrounded gravel to 1 inch diameter.
4604.50	20								
	21.50	E	SPT	2 10 16	26	100	SV, PI	SM	
									24.00
	25.00								**POORLY GRADED SAND with SILT** light gray green, wet, dense, with 10-15% non-plastic fines, 75-85% fine to coarse (D.G. and micaceous) sand, and 5-15% angular gravel to 3/4 inch diameter.
4599.50	25								
	26.50	F	SPT	10 24 22	46	78	SV, PI	SP SM	
	30.00								
4594.50	30								
	31.50	G	SPT	11 15 22	37	75	SV, PI		
									33.00
	35.00								**SANDY LEAN CLAY** dark gray green, wet, hard, with 56% medium plasticity fines, 42% fine to medium sand and 2% angular gravel to

EXPLORATION LOG

START DATE 5/14/03
END DATE 5/15/03
JOB DESCRIPTION Carson City Freeway Phase 2
LOCATION Carson City, Nevada
BORING B-07
E.A. # 72781
GROUND ELEV. 4624.50 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
5/15/03	3.00	4621.5

STATION "O2" 251+50
OFFSET 34' Lt.
ENGINEER PGT
EQUIPMENT CME 850
OPERATOR Haz-Tech Drilling
DRILLING METHOD Mud Rotary
BACKFILLED Yes DATE 5/15/2003

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	36.50	H	SPT	6 14 26	40	94	SV, PI	CL	1/2 inch diameter. Weakly micaceous.	
	38.00									
	40.00								**SANDY SILT** dark gray green, wet, very stiff, with 53% non-plastic fines and 47% fine to medium sand. Weakly micaceous.	
4584.50	40									
	41.50	I	SPT	5 10 13	23	92	SV, PI	ML		
	43.00									
	45.00								**CLAYEY SAND** gray green to dark gray green, wet, dense to very dense, with 45% medium plasticity fines and 55% fine to medium sand.	
4579.50	45									
	46.50	J	SPT	11 19 25	44	100	SV, PI			
								SC		
	50.00									
4574.50	50									
	51.50	K	SPT	13 18 33	51	100	SV, PI			
	52.00									
	55.00								**SANDY LEAN CLAY** gray green, wet, very stiff to hard, with 57% high plasticity fines and 43% fine to medium sand.	
4569.50	55							CL		
	56.50	L	SPT	7 13 39	52	100	SV, PI			
	56.50									
	60.00							SM	**SILTY SAND** gray green, wet, very dense, with estimated 20-25% non-plastic fines and 75-80% fine to medium sand.	
	59.00									
4564.50	60									
	61.50	M	SPT	19 36 50 for 4"	50 for 4"	100	SV, PI	SP SM	**POORLY GRADED SAND with SILT** light gray green, with patchy reddish brown, wet, very dense, with 8% non-plastic fines, 90% fine to coarse (D.G.) sand and 2% subangular gravel to 3/8 inch diameter. Color change to light purple brown at 62 feet.	
	64.00									
	65.00								**CLAYEY SAND** gray green, wet, very dense, with 41% low to medium plasticity fines and 59% fine to medium sand. Sand is flowing/sluffing down hole requiring redrill.	
4559.50	65									
	66.50	N	SPT	16 22 30	52	100	SV, PI	SC		
	68.00									
	70.00								**SILTY SAND** light gray green, wet, very dense, with 17% non-plastic fines and 83% fine to coarse sand.	

EXPLORATION LOG

START DATE 5/14/03
END DATE 5/15/03
JOB DESCRIPTION Carson City Freeway Phase 2
LOCATION Carson City, Nevada
BORING B-07
E.A. # 72781
GROUND ELEV. 4624.50 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
5/15/03	3.00	4621.5

STATION "O2" 251+50
OFFSET 34' Lt.
ENGINEER PGT
EQUIPMENT CME 850
OPERATOR Haz-Tech Drilling
DRILLING METHOD Mud Rotary
BACKFILLED Yes DATE 5/15/2003

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	71.50	O	SPT	18 36 35	71	94	SV, PI	SM		
									73.00	
								ML	**SANDY SILT** gray green, wet, very stiff, with estimated 55-60% low plasticity fines and 40-45% fine sand.	
	75.00								75.00	
4549.50	75									
	76.50	P	SPT	10 40 50 for 5"	50 for 5"	78	SV, PI		**SILTY SAND** light gray green, wet, very dense, with 31% non-plastic fines and 69% fine to coarse sand.	
								SM		
									79.00	
	80.00								**POORLY GRADED SAND with SILT** light gray green, wet, very dense, with 12% non-plastic fines and 88% fine to coarse (D. G. and micaceous) sand.	
4544.50	80									
	81.50	Q	SPT	11 49 50 for 4"	50 for 4"	78	SV, PI	SP SM		
									83.00	
	85.00								**SILTY SAND** light gray green, wet, very dense, with 17-28% non-plastic fines and 72-83% fine to coarse sand.	
4539.50	85									
	86.50	R	SPT	45 50 50 for 5.5"	50 for 5.5"	61	SV, PI			
								SM		
	90.00									
4534.50	90									
	91.50	S	SPT	18 45 50 for 4.5"	50 for 4.5"	100	SV, PI		91.50	
4529.50	95									
4524.50	100									

EXPLORATION LOG

START DATE 5/16/03
END DATE 5/16/03
JOB DESCRIPTION Carson City Freeway Phase 2
LOCATION Carson City, Nevada
BORING B-08
E.A. # 72781
GROUND ELEV. 4624.00 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
5/16/03	4.80	4619.2

STATION "O2" 255+81
OFFSET 24' Lt.
ENGINEER PGT
EQUIPMENT CME 850
OPERATOR Haz-Tech Drilling
DRILLING METHOD Mud Rotary
BACKFILLED Yes DATE 5/16/2003

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	0.00	A	SPT	4 6 9	15	78	SV, PI	ML	**SILT with SAND** light brown, slightly moist, stiff, with 74% medium plasticity fines and 26% fine to medium sand. Minor roots in upper 4" and weak roots below.	Drive hammer had an efficiency of 69 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.15.
	1.50									
									3.50	
4619.00	5.00	B	SPT	2 4 8	12	67	SV, PI	SM	**SILTY SAND** brown, moist to wet, loose, with 40% low plasticity fines and 60% fine to medium sand. Sample B from 5.0-6.0 feet.	
	6.50								6.00	
								SM	**SILTY SAND** light gray brown, wet, medium dense, with estimated 15-20% low plasticity fines and 80-85% fine to coarse sand. Color change to light gray at 7'.	
									8.00	
4614.00	10.00	C	SPT	10 10 13	23	83	SV, PI	SM	**SILTY SAND** gray green, wet, dense, with 19% non-plastic fines, 75% fine to coarse sand, and 6% subangular gravel to 1" diameter.	
	11.50								13.00	
4609.00	15.00	D	SPT	3 17 21	38	94	SV, PI	SP SM	**POORLY GRADED SAND with SILT and GRAVEL** light green gray, wet, medium dense, with 9% non-plastic fines, 73% fine to coarse sand, and 18% subangular gravel to 3/4" diameter.	
	16.50								18.00	
4604.00	20.00	E	SPT	5 18 30	48	83	SV, PI	SM	**SILTY SAND** gray green, wet, dense, with 22% non-plastic fines, 69% fine to coarse sand, and 9% subangular gravel to 1" diameter.	
	21.50								23.00	
4599.00	25.00	F	SPT	13 13 12	25	75	SV, PI	SP SC	**POORLY GRADED SAND with CLAY** light gray green, wet, medium dense, with 9% low to medium plastic, 80% fine to coarse sand, and 11% angular to subangular gravel to 1" diameter.	
	26.50								29.00	
4594.00	30.00	G	SPT	6 6 10	16	78	SV, PI	ML	**SANDY SILT** gray green, wet, stiff, with 52% non-plastic fines and 48% fine sand. Sample G from 30.0-31.0 feet.	
	31.50								31.00	
								SM	**SILTY SAND** gray green, wet, medium dense, with estimated 40-45% low plasticity fines and 55-60% fine to medium sand.	
									33.00	
	35.00							ML	**SANDY SILT** dark gray green, wet, very stiff, with 54% non-plastic fines and 46% fine sand. Sample H from 35.0-36.0 feet.	

EXPLORATION LOG

START DATE 5/16/03
END DATE 5/16/03
JOB DESCRIPTION Carson City Freeway Phase 2
LOCATION Carson City, Nevada
BORING B-08
E.A. # 72781
GROUND ELEV. 4624.00 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
5/16/03	4.80	4619.2

STATION "O2" 255+81
OFFSET 24' Lt.
ENGINEER PGT
EQUIPMENT CME 850
OPERATOR Haz-Tech Drilling
DRILLING METHOD Mud Rotary
BACKFILLED Yes DATE 5/16/2003

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
		H	SPT	6 13 29	42	89	SV, PI		36.00	
	36.50							SM	**SILTY SAND** gray green, wet, very dense, with estimated 10-15% non to low plasticity fines, 85-90% fine to coarse sand, and trace of angular to subangular gravel to 1/2" diameter.	
									38.00	
									CLAYEY SAND gray green, wet, medium dense, with 47% low to medium plasticity fines and 53% fine to medium sand. Thin layers of SILTY SAND interbedded in unit.	
4584.00	40.00									
	40	I	SPT	3 6 9	15	97	SV, PI	SC		
	41.50									
									43.00	
									SANDY LEAN CLAY gray green, wet, very stiff, with 51-57% medium plasticity fines and 43-51% fine sand. Sample K from 50.0-51.0 feet.	
	45.00									
4579.00	45	J	SPT	6 13 16	29	100	SV, PI			
	46.50							CL		
	50.00									
4574.00	50	K	SPT	5 12 29	41	100	SV, PI		51.00	
	51.50								**SILTY SAND** gray green, wet, very dense, with estimated 30-35% non plastic fines, 65-70% fine to coarse sand. Micaceous.	
								SM		
	55.00									
4569.00	55								55.00	
		L	SPT	22 39 34	73	89	SV, PI		**SILTY SAND** gray green, wet, very dense, with 21% non-plastic fines and 79% fine to coarse sand. Micaceous. Interbedded with SANDY SILT at 57.5-58.5 feet and 61-62 feet.	
	56.50									
								SM		
4564.00	60									
									63.00	
									SILTY SAND gray green, wet, very dense, with 16% non-plastic fines and 84% fine to coarse sand.	
	65.00									
4559.00	65	M	SPT	18 37 50 for 5.5"	50 for 5.5"	100	SV, PI			
	66.50									
								SM		

EXPLORATION LOG

START DATE 5/16/03
END DATE 5/16/03
JOB DESCRIPTION Carson City Freeway Phase 2
LOCATION Carson City, Nevada
BORING B-08
E.A. # 72781
GROUND ELEV. 4624.00 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
5/16/03	4.80	4619.2

STATION "O2" 255+81
OFFSET 24' Lt.
ENGINEER PGT
EQUIPMENT CME 850
OPERATOR Haz-Tech Drilling
DRILLING METHOD Mud Rotary
BACKFILLED Yes DATE 5/16/2003

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	75.00								75.00	
4549.00	75	N	SPT	16 18 16	34	100	SV, PI	ML	**SILT** gray green, wet, hard, with 87% medium plasticity fines and 13% fine sand. Fine mica flakes. Drilling conditions indicate a change in texture to a SILTY SAND at a depth of approximately 78 to 82 feet.	
	76.50								78.00	
4544.00	80							SM	**SILTY SAND** gray green, wet, dense, with estiamted 20-25% non-plastic fines and 75-80% fine to coarse sand.	
									82.00	
								CL	**SANDY LEAN CLAY** gray green, wet, very stiff, with 58% medium to high plasticity fines and 42% fine sand. Sample O from 85.0-86.0 feet.	
	85.00									
4539.00	85	O	SPT	10 11 21	32	100	SV, PI		86.00	
	86.50							SM	86.50 **SILTY SAND** gray green, wet, dense, with estimated 20-25% non to low plasticity fines and 75-80% fine to coarse sand.	
4534.00	90									
4529.00	95									
4524.00	100									

NV_DOT 0212033.GPJ NV_DOT.GDT 6/17/2005

EXPLORATION LOG

START DATE 6/28/04
END DATE 6/29/04
JOB DESCRIPTION Carson City Freeway Phase 2
LOCATION Carson City, Nevada
BORING B-25
E.A. # 72781
GROUND ELEV. 4626.80 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
6/29/04	7.00	4619.8

STATION "O2" 267+20
OFFSET 3' Lt.
ENGINEER JWP/DPM
EQUIPMENT BK 81
OPERATOR Haz-Tech
DRILLING METHOD Mud Rotary
BACKFILLED Yes DATE 6/29/2004

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
								SW	**Well Graded Sand with Gravel**; gray, dry, road base.	Drive hammer had an efficiency of 88 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.47.
	2.50								2.50	
	4.00	A	SPT	6 7 9	16	83		CL	**Sandy Lean Clay**; dark brown, moist to dry, hard, with estimated 50 to 80% medium plasticity fines and 20-50% fine sand. Pocket Penetrometer=4 to 4.5	
	4.50								4.00	
4621.80	5 6.00	B	SPT	6 2 5	7	50		SC	**Clayey Sand**; light brown, moist, stiff to very stiff to medium dense, with estimated 30 to 40% low to medium plasticity fines and 60 - 70% fine to medium sand. Pocket Penetrometer =2.5 - 4.5.	
	7.50								7.00	
	9.00	C	MC	14 12 10	22	66		SM	**Silty Sand**; orange-brown, wet, dense, with estimated 20-25% non-plastic to low plasticity fines and 75-80% fine to medium sand.	
	9.50							CL	8.50 9.00	
4616.80	10 11.00	D	SPT	5 5 9	14	100	SV, PI	ML	**Sandy Lean Clay**; brown, wet, very stiff, with estimated 50-60% medium plasticity fines and 40-50% fine to medium sand. **Sandy Silt**; orange-brown, wet, medium dense, with 60% non-plastic fines and 40% fine sand.	
	12.50								12.00	
	14.00	E	SPT	6 4 7	11	94	SV, PI	SC SM	**Silty, Clayey Sand**; gray, wet, medium dense, with 25% low-plasticity fines and 75% fine to coarse sand. Some 2" thick layers in sample with 40% non-plastic fines.	
	14.50								13.80	
4611.80	15 16.00	F	SPT	5 6 10	16	83	SV, PI	SM	**Silty Sand**; brown to blue-gray, wet, medium dense, with 49% non-plastic fines and 51% fine sand. Fines content decreases with depth.	Hole drilled to 14 feet depth on 6/28/2004
	17.50								17.00	
	19.00	G	SPT	5 11 9	20	66		SP SC	**Poorly Graded Sand with Clay**; blue-gray to green, wet, medium dense, with estimated 8% medium plasticity fines, 90% fine to coarse sand, and 2% fine sub-angular gravel.	
	20.00								19.00	
4606.80	20 21.50	H	SPT	7 11 10	21	100	SV, PI	SM	**Silty Sand**; blue-gray, wet, hard, with 31-36% very low plasticity fines and 63-69% fine sand, includes mica.	
	25.00									
4601.80	25 26.50	I	MC	18 11 16	27	66				
	30.00								Fines content decreases with depth.	
4596.80	30 31.50	J	SPT	7 9 16	25	83	SV, PI		31.20	

NV_DOT 0212033.GPJ NV_DOT.GDT 6/17/2005

EXPLORATION LOG

START DATE 6/28/04
END DATE 6/28/04
JOB DESCRIPTION Carson City Freeway Phase 2
LOCATION Carson City, Nevada
BORING B-26
E.A. # 72781
GROUND ELEV. 4626.20 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
6/28/04	4.70	4621.5

STATION "O2" 285+41
OFFSET 45' Lt.
ENGINEER JWP
EQUIPMENT BK 81
OPERATOR Haz-Tech
DRILLING METHOD Mud Rotary
BACKFILLED Yes DATE 6/28/2004

ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
										Rotary wash drilling from ground surface. Drive hammer had an efficiency of 88 percent. Blowcounts can be converted to Standard SPT N60 by multiplying by 1.47.
								SC	**Clayey Sand** brown, moist, medium dense, with estimated 25 - 30% low plasticity fines and 70 - 75% fine sand.	
	2.50									
	4.00	A	SPT	5 5 6	11	100				
	4.50								3.70	
4621.20	5	B	MC	6 11 20	31	100	SV, PI	SP	**Poorly-Graded Sand** light brown to gray, dense, with estimated 100%fine to medium sand.	
	6.00								5.00	
								SM	**Silty Sand** brown, wet, dense, with 19% non- to low plastic fines and 81% fine to medium sand. Pocket penetrometer = 0 tsf.	
	7.50								7.00	
	9.00	C	SPT	5 6 5	11	83		SC	**Clayey Sand** mottled gray and brown, moist, with estimated 25-40% medium plasticity fines and 60-75% fine to medium sand. Pocket penetrometer = 1.5 - 4 tsf.	
	9.50								10.00	
4616.20	10	D	SPT	6 8 10	18	100		SP	10.75 **Poorly Graded Sand with Silt** light gray-brown, wet, medium dense, with estimated 5% non-plastic fines and 95% fine to coarse sand.	
	11.00								**Clayey Sand** brown, wet, dense, with 28% medium plasticity fines, 71% fine to coarse sand, and 1% gravel. Pocket penetrometer=2.5 - 4 tsf.	
	12.50								grades with less (10-20%) fines from 12.5 to 13 feet.	
	14.00	E	SPT	14 11 12	23	50	DS (E+F)	SC	one 1-inch layer of silty sand with 15% non-plastic fines at 15 feet.	
	14.50									
4611.20	15	F	SPT	9 11 14	25	100				
	16.00									
	17.50									
	19.00	G	SPT	6 8 14	22	66	SV, PI		4-inch layer of lean clay, brown, wet, stiff, with estimated 80% low plasticity fines at 18.2 feet. Pocket penetrometer=2 tsf.	
	19.50								20.00 grades with 15-20% low plasticity fines.	
4606.20	20	H	SPT	11 13 22	35	100		SM	**Silty Sand** brown, wet, dense, with estimated 15-25% non-plastic fines and 65-75% fine to coarse sand.	
	21.00									
	24.50								23.50	
4601.20	25	I	MC	4 5 8	13	100		CL	**Sandy Clay** light brown, wet, very stiff, with estimated 60% medium plasticity fines and 40% fine sand. Pocket penetrometer= 2-3 tsf.	No recovery MC; recovered disturbed sample with SPT.
	26.00									
	29.50								28.00	
4596.20	30	J	MC	17 38 29	67	100		SP	**Poorly Graded Sand** brown-gray, wet, very dense, with estimated 2% non-plastic fines and 98% fine to medium sand.	
	31.00								30.50	
	34.50							SM	**Silty Sand** orange-brown, moist to wet, very dense, with estimated 15-20% sand and 80 - 85% fine sand.	
									35.00	

EXPLORATION LOG

START DATE 6/28/04
END DATE 6/28/04
JOB DESCRIPTION Carson City Freeway Phase 2
LOCATION Carson City, Nevada
BORING B-26
E.A. # 72781
GROUND ELEV. 4626.20 (ft)
HAMMER DROP SYSTEM Automatic

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft
6/28/04	4.70	4621.5

STATION "O2" 285+41
OFFSET 45' Lt.
ENGINEER JWP
EQUIPMENT BK 81
OPERATOR Haz-Tech
DRILLING METHOD Mud Rotary
BACKFILLED Yes DATE 6/28/2004

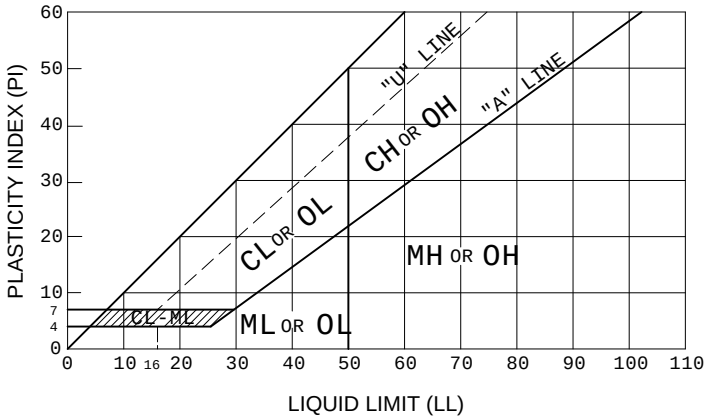
ELEV. (ft)	DEPTH (ft)	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT 6 inch Increments	BLOW COUNT Last 1 foot	Percent Recov'd	LAB TESTS	USCS Group	MATERIAL DESCRIPTION	REMARKS
	37.00	K	SH	250 psi	250 psi	100	SV, PI, Consol	CL	**Sandy Lean Clay** tan-brown, wet, very stiff, with 60% medium plasticity fines and 40% fine sand.	
	38.00									
	39.50							SM	Alternating 4" layers of **Silty Sand** and **Poorly Graded Sand with Silt** brown, wet, dense, with 5-30% low- to non-plastic fines and 70 - 95% fine to medium sand.	
4586.20	40	L	SPT	16 17 11	28	100				
	40.50									
	41.00							CL	**Lean Clay with Sand** brown, wet, stiff, with estimated 80% low plasticity fines and 20% very fine sand or silt.	
4581.20	45									
4576.20	50									
4571.20	55									
4566.20	60									
4561.20	65									

SOIL CLASSIFICATION CHART

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

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

PLASTICITY CHART



FOR CLASSIFICATION OF FINE-GRAINED SOILS AND FINE-GRAINED FRACTION OF COARSE-GRAINED SOILS

EXPLORATION SAMPLE TERMINOLOGY

Sample Type	Sample Symbol	Sample Code
Auger Cuttings		Auger
Bulk (Grab) Sample		Grab
Modified California Sampler		MC
Shelby Tube		SH or ST
Standard Penetration Test		SPT
Split Spoon		SS
No Sample		

LABORATORY TEST ABBREVIATIONS

Consol=Consolidation; DS = Direct Shear; E=Expansion; HYD = Hydrometer; MD= Moisture and Density PI= Atterberg Limits; R = R-value; SV = Sieve Analysis; TXCU= Consolidated Undrained Triaxial; TXUU= Unconsolidated Undrained Triaxial

GRAIN SIZE TERMINOLOGY

Component of Sample	Size Range
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 2mm)
Sand	# 4 to #200 sieve (2mm to 0.074mm)
Silt or Clay	Passing #200 sieve (0.074mm)

RELATIVE DENSITY OF GRANULAR SOILS

N - Blows/ft	Relative Density
0 - 4	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
greater than 50	Very Dense

CONSISTENCY OF COHESIVE SOILS

Unconfined Compressive Strength, psf	N - Blows/ft	Consistency
less than 500	0 - 1	Very Soft
500 - 1,000	2 - 4	Soft
1,000 - 2,000	5 - 8	Firm
2,000 - 4,000	9 - 15	Stiff
4,000 - 8,000	16 - 30	Very Stiff
8,000 - 16,000	31 - 60	Hard
greater than 16,000	greater than 60	Very Hard

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Reno, Nevada 89502-7140
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Fax: (775) 359-7766

Key to Boring Logs

Project: Carson City Freeway Phase 2

Location: Carson City, Nevada

Project Number: 72781 Plate Number: 3

CONE PENETRATION TEST SOUNDING LOG

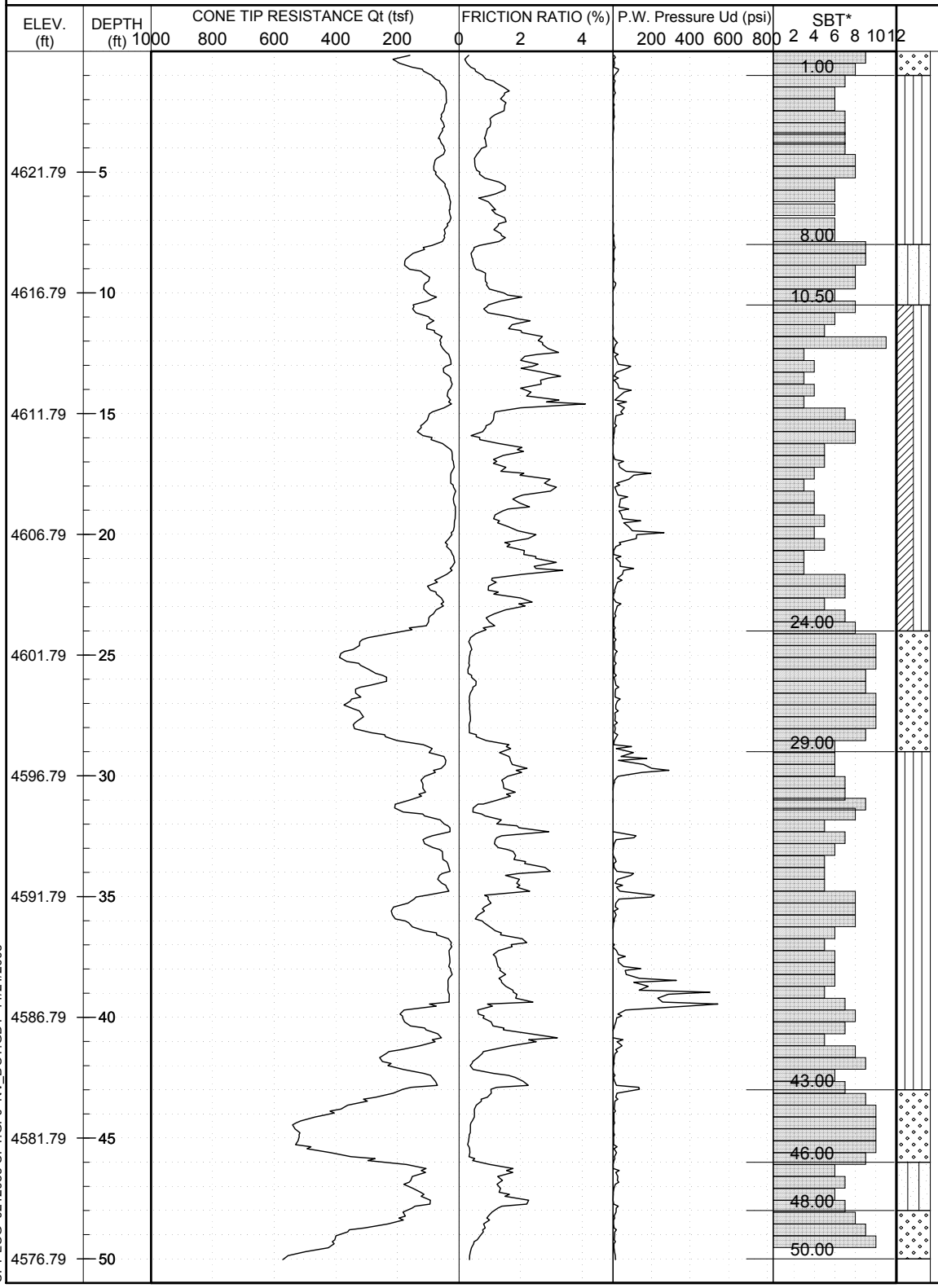
SHEET 1 OF 1

START DATE 6/22/04
END DATE 6/22/04
JOB DESCRIPTION Carson City Freeway Phase II
LOCATION Carson City, Nevada
BORING C-11
E.A. # 72781
GROUND ELEV. 4626.79 (ft)

Note: SBT is the Soil Behavior Type correlation by Robertson and Campanella (1990)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "O2" 258+08
OFFSET 2' Rt.
ENGINEER JWP
EQUIPMENT
OPERATOR Gregg Drilling
CPT TYPE 15 sq. cm, PWP Filter behind Tip
BACKFILLED _____ DATE _____



INTERPRETED SOIL DESCRIPTION

- 1.00 – Dense sand (road base).
- 1.00 to 8.00 – Sandy silt to silty sand, lowest undrained strength Su = 4 to 8 ksf.
- 8.00 to 10.50 – Silty sand to sand.
- 10.50 to 24.00 – Clayey silt to silty clay, with interbedded silty sand layers at 15 and 22 feet depth. Lowest undrained strength Su = 2 to 3 ksf, approximately 18 to 22 feet depth.
- 24.00 to 29.00 – Dense sand.
- 29.00 to 43.00 – Sandy silt to silty sand, with occasional 1/2-foot thick silty sand layers interbedded.
- 43.00 to 46.00 – Dense Sand
- 46.00 to 48.00 – Silt sand to sand.
- 48.00 to 50.00 – Dense sand.

CPT LOG 0212033 CPT.GPJ NV_DOT.GDT 11/21/2005

Interpreted soil description is based on generalization of Soil Behavior Type (SBT). Description will not be exactly comparable to USCS classification. USCS material graphics symbols are used as a convenient reference to typical soil behavior only.

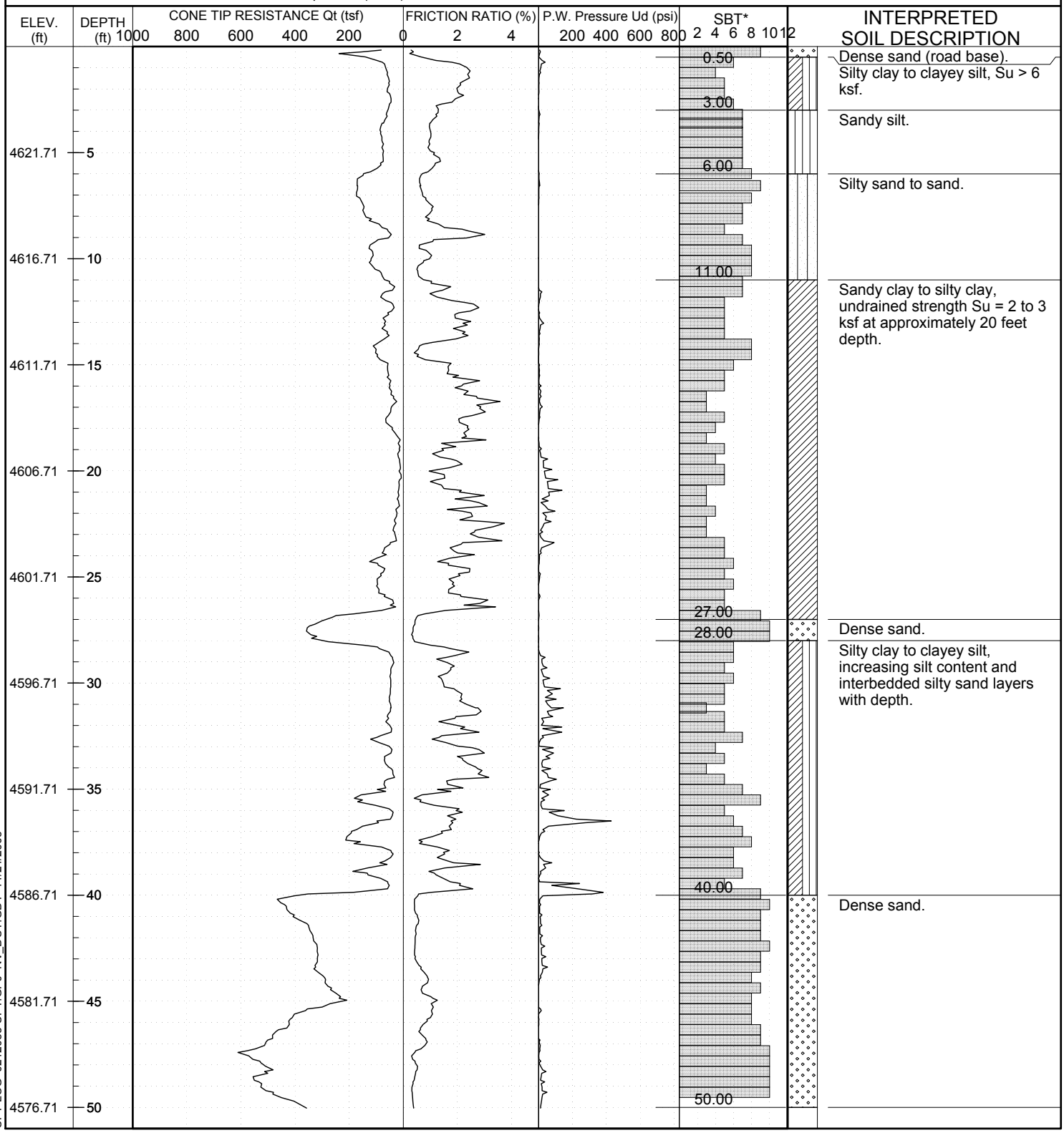
CONE PENETRATION TEST SOUNDING LOG

START DATE 6/22/04
END DATE 6/22/04
JOB DESCRIPTION Carson City Freeway Phase II
LOCATION Carson City, Nevada
BORING C-12
E.A. # 72781
GROUND ELEV. 4626.71 (ft)

Note: SBT is the Soil Behavior Type correlation by Robertson and Campanella (1990)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "O2" 263+08
OFFSET 2' Rt.
ENGINEER JWP
EQUIPMENT
OPERATOR Gregg Drilling
CPT TYPE 15 sq. cm, PWP Filter behind Tip
BACKFILLED _____ DATE _____



INTERPRETED SOIL DESCRIPTION

- Dense sand (road base).
- Silty clay to clayey silt, Su > 6 ksf.
- Sandy silt.
- Silty sand to sand.
- Sandy clay to silty clay, undrained strength Su = 2 to 3 ksf at approximately 20 feet depth.
- Dense sand.
- Silty clay to clayey silt, increasing silt content and interbedded silty sand layers with depth.
- Dense sand.

CPT LOG 0212033 CPT.GPJ NV_DOT.GDT 11/21/2005

Interpreted soil description is based on generalization of Soil Behavior Type (SBT). Description will not be exactly comparable to USCS classification. USCS material graphics symbols are used as a convenient reference to typical soil behavior only.

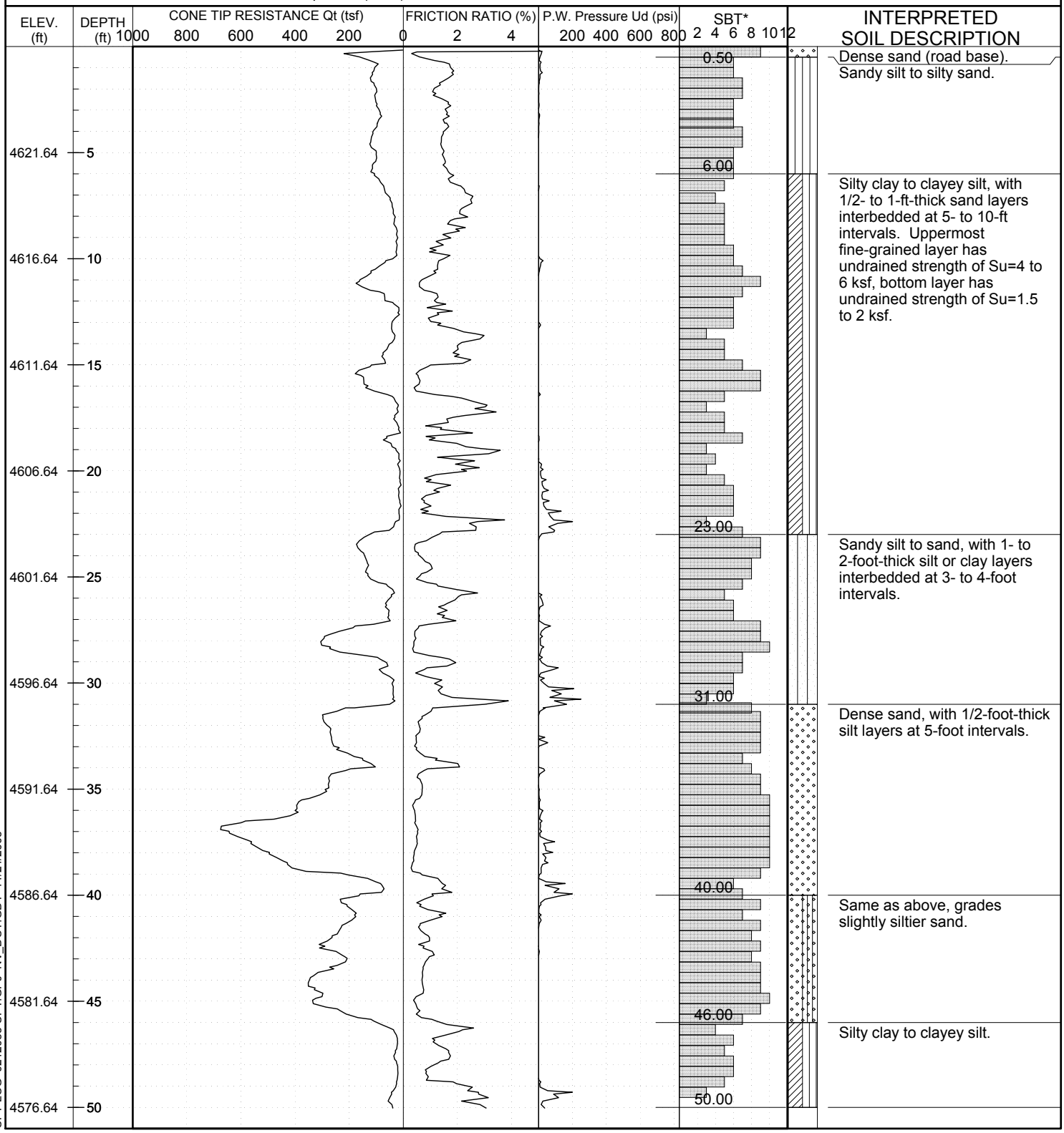
CONE PENETRATION TEST SOUNDING LOG

START DATE 6/22/04
END DATE 6/22/04
JOB DESCRIPTION Carson City Freeway Phase II
LOCATION Carson City, Nevada
BORING C-13
E.A. # 72781
GROUND ELEV. 4626.64 (ft)

Note: SBT is the Soil Behavior Type correlation by Robertson and Campanella (1990)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "O2" 272+26
OFFSET 1' Rt.
ENGINEER JWP
EQUIPMENT
OPERATOR Gregg Drilling
CPT TYPE 15 sq. cm, PWP Filter behind Tip
BACKFILLED _____ DATE _____



INTERPRETED SOIL DESCRIPTION

- 0.50 – 6.00: Dense sand (road base). Sandy silt to silty sand.
- 6.00 – 23.00: Silty clay to clayey silt, with 1/2- to 1-ft-thick sand layers interbedded at 5- to 10-ft intervals. Uppermost fine-grained layer has undrained strength of Su=4 to 6 ksf, bottom layer has undrained strength of Su=1.5 to 2 ksf.
- 23.00 – 31.00: Sandy silt to sand, with 1- to 2-foot-thick silt or clay layers interbedded at 3- to 4-foot intervals.
- 31.00 – 40.00: Dense sand, with 1/2-foot-thick silt layers at 5-foot intervals.
- 40.00 – 46.00: Same as above, grades slightly siltier sand.
- 46.00 – 50.00: Silty clay to clayey silt.

CPT LOG 0212033 CPT.GPJ NV_DOT.GDT 11/21/2005

Interpreted soil description is based on generalization of Soil Behavior Type (SBT). Description will not be exactly comparable to USCS classification. USCS material graphics symbols are used as a convenient reference to typical soil behavior only.

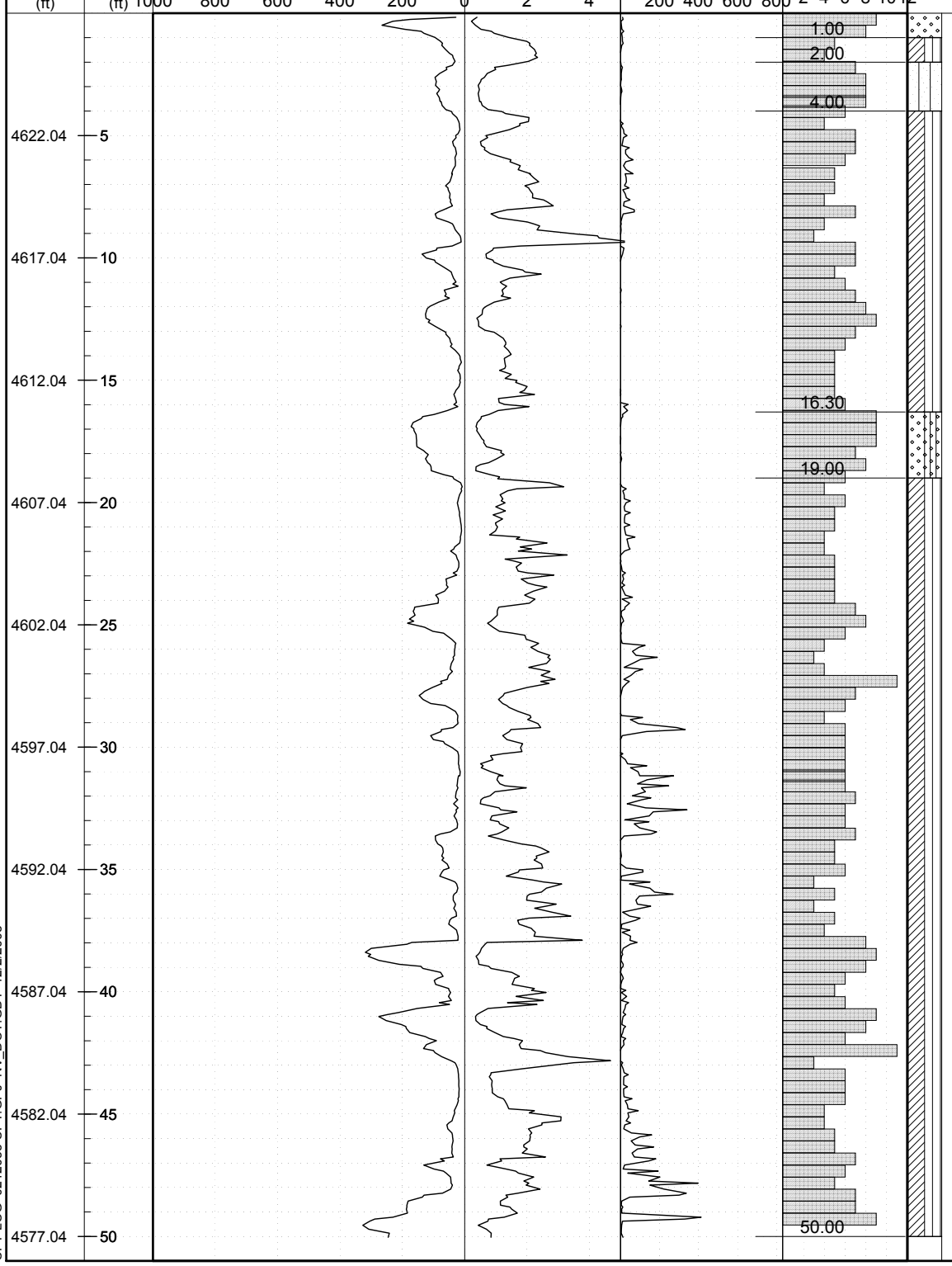
CONE PENETRATION TEST SOUNDING LOG

START DATE 6/23/04
END DATE 6/23/04
JOB DESCRIPTION Carson City Freeway Phase II
LOCATION Carson City, Nevada
BORING C-14
E.A. # 72781
GROUND ELEV. 4627.04 (ft)

Note: SBT is the Soil Behavior Type correlation by Robertson and Campanella (1990)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "O2" 278+36
OFFSET 4' Rt.
ENGINEER JWP
EQUIPMENT
OPERATOR Gregg Drilling
CPT TYPE 15 sq. cm, PWP Filter behind Tip
BACKFILLED _____ DATE _____



INTERPRETED SOIL DESCRIPTION

- Dense sand (road base).
- Clayey silt to silty clay, undrained strength Su=6-10 ksf.
- Silty sand to sand.
- Sandy clayey silt to silty clay with 1/2-foot-thick sandy silt to sand layers at 2- to 5-foot intervals. Undrained strength 4 - 6 ksf near top and 2- 4 near base.
- Dense sand to silty sand.
- Sandy clayey silt to silty clay with 1/2- to 2-foot-thick sandy silt to sand layers at 2- to 15-foot intervals. Uppermost fine-grained layer has undrained strength of 1.5 - 2 ksf.

CPT LOG 0212033 CPT.GPJ NV_DOT.GDT 12/2/2005

Interpreted soil description is based on generalization of Soil Behavior Type (SBT). Description will not be exactly comparable to USCS classification. USCS material graphics symbols are used as a convenient reference to typical soil behavior only.

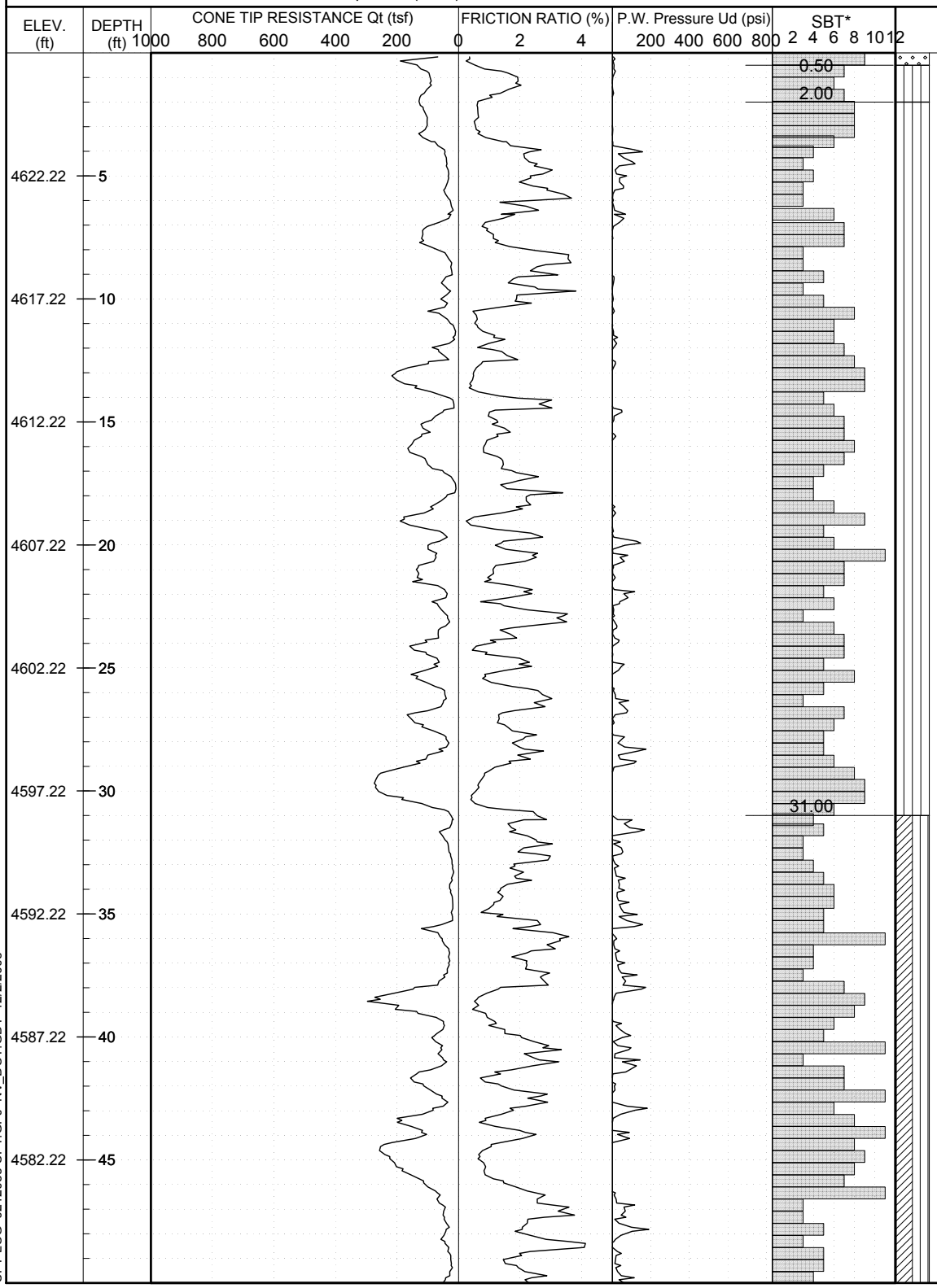
CONE PENETRATION TEST SOUNDING LOG

START DATE 6/23/04
END DATE 6/23/04
JOB DESCRIPTION Carson City Freeway Phase II
LOCATION Carson City, Nevada
BORING C-15
E.A. # 72781
GROUND ELEV. 4627.22 (ft)

Note: SBT is the Soil Behavior Type correlation by Robertson and Campanella (1990)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "O2" 282+43
OFFSET 4' Rt.
ENGINEER JWP
EQUIPMENT
OPERATOR Gregg Drilling
CPT TYPE 15 sq. cm, PWP Filter behind Tip
BACKFILLED _____ DATE _____



INTERPRETED SOIL DESCRIPTION

Dense sand (road base).
Silt to silty sand.

Interbedded silt, clayey silt, silty sand, and sand in 1/2 to 1-foot thick layers. Lowest strengths range from 2 to 3 ksf.

Silty clay to clayey silt, with 1/2- to 2-foot-thick silty sand and sand layers at 5 to 10 feet intervals.

CPT LOG 0212033 CPT.GPJ NV_DOT.GDT 12/2/2005

Interpreted soil description is based on generalization of Soil Behavior Type (SBT). Description will not be exactly comparable to USCS classification. USCS material graphics symbols are used as a convenient reference to typical soil behavior only.

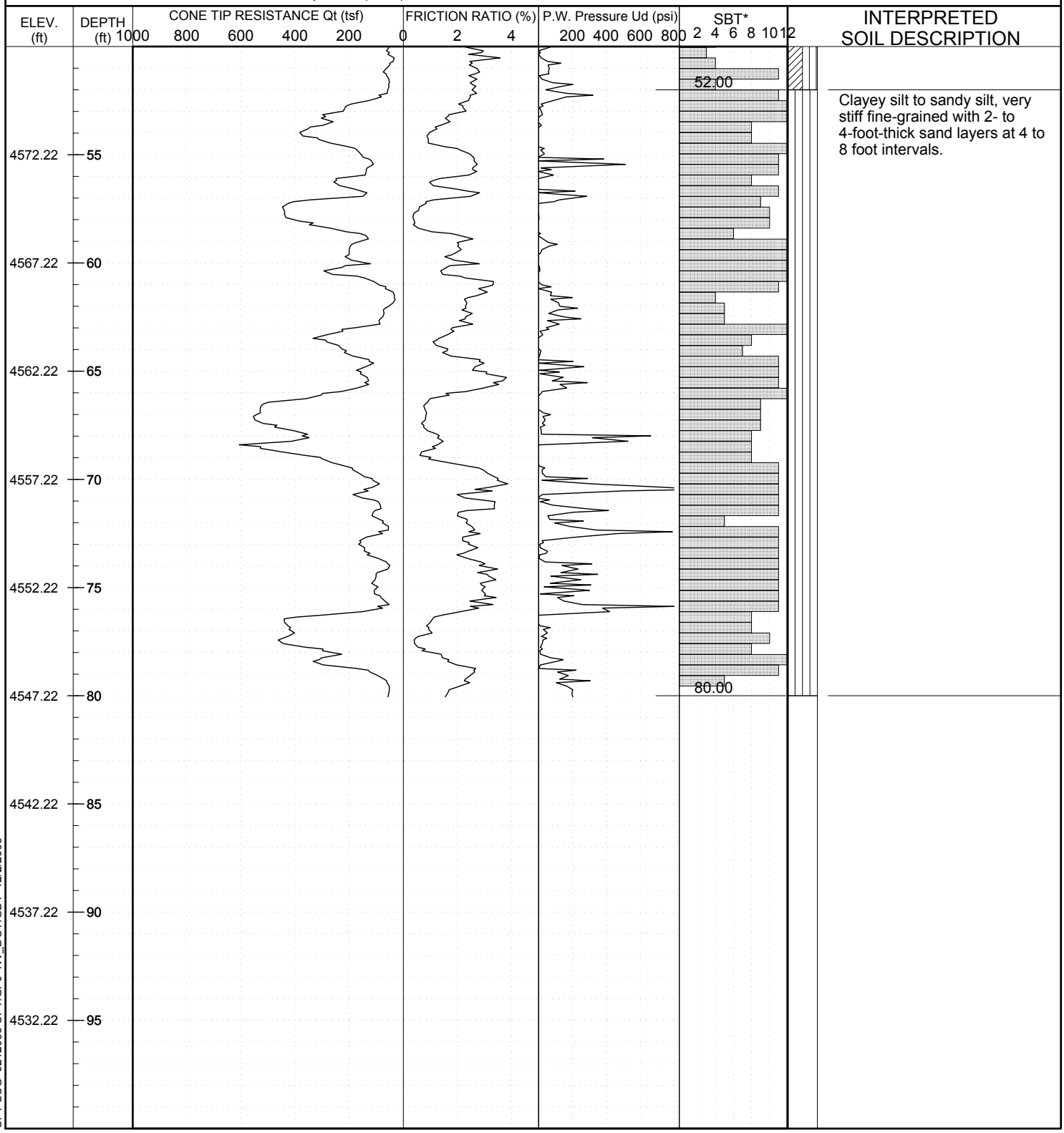
CONE PENETRATION TEST SOUNDING LOG

START DATE 6/23/04
END DATE 6/23/04
JOB DESCRIPTION Carson City Freeway Phase II
LOCATION Carson City, Nevada
BORING C-15
E.A. # 72781
GROUND ELEV. 4627.22 (ft)

Note: SBT is the Soil Behavior Type correlation by Robertson and Campanella (1990)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "O2" 282+43
OFFSET 4' Rt.
ENGINEER JWP
EQUIPMENT
OPERATOR Gregg Drilling
CPT TYPE 15 sq. cm, PWP Filter behind Tip
BACKFILLED _____ DATE _____



INTERPRETED SOIL DESCRIPTION

Clayey silt to sandy silt, very stiff fine-grained with 2- to 4-foot-thick sand layers at 4 to 8 foot intervals.

CPT LOG 0212033 CPT.GPJ NV_DOT.GDT 12/2/2005

Interpreted soil description is based on generalization of Soil Behavior Type (SBT). Description will not be exactly comparable to USCS classification. USCS material graphics symbols are used as a convenient reference to typical soil behavior only.

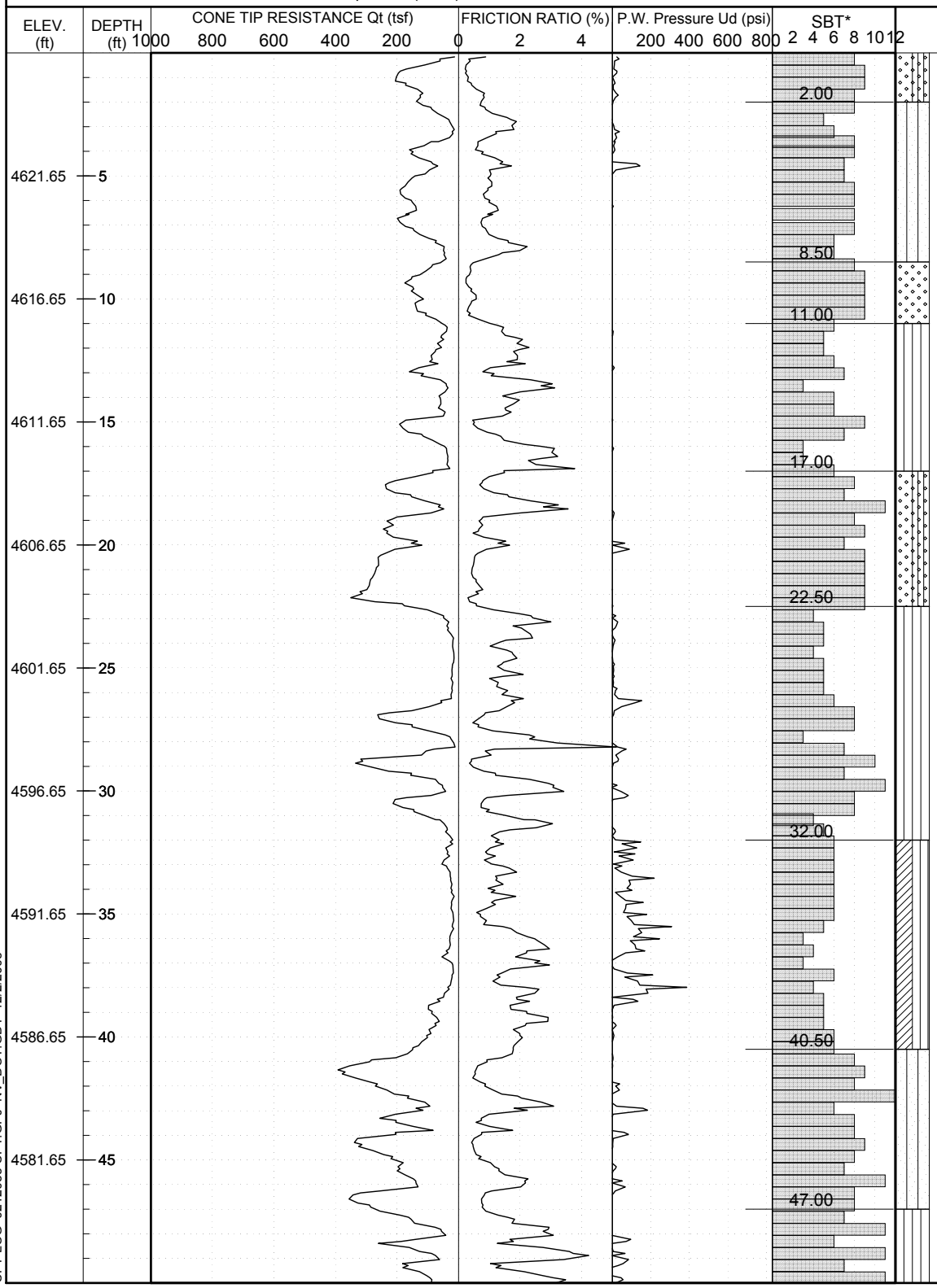
CONE PENETRATION TEST SOUNDING LOG

START DATE 6/23/04
END DATE 6/23/04
JOB DESCRIPTION Carson City Freeway Phase II
LOCATION Carson City, Nevada
BORING C-16
E.A. # 72781
GROUND ELEV. 4626.65 (ft)

Note: SBT is the Soil Behavior Type correlation by Robertson and Campanella (1990)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "O2" 285+38
OFFSET 84' Rt.
ENGINEER JWP
EQUIPMENT
OPERATOR Gregg Drilling
CPT TYPE 15 sq. cm, PWP Filter behind Tip
BACKFILLED _____ DATE _____



INTERPRETED SOIL DESCRIPTION

- Sand to silty sand.
- Silty sand to silt, Su=3 ksf.
- Medium dense sand.
- Sandy silt to clayey silt.
- Sand to silty sand, dense, with thin silty sand interbeds.
- Clayey silt to silty clay with 3 1/2-foot-thick sand interbeds around 30 feet depth, Su= 2.25 - 3 ksf.
- Clayey silt to silty clay, Su=3 - 6 ksf.
- Silty sand to sand, with 1/2-foot-thick silty sand and sandy silt interbeds at 1 to 3-foot intervals.
- Silt to very stiff fine-grained soils.

CPT LOG 0212033 CPT.GPJ NV_DOT.GDT 12/2/2005

Interpreted soil description is based on generalization of Soil Behavior Type (SBT). Description will not be exactly comparable to USCS classification. USCS material graphics symbols are used as a convenient reference to typical soil behavior only.

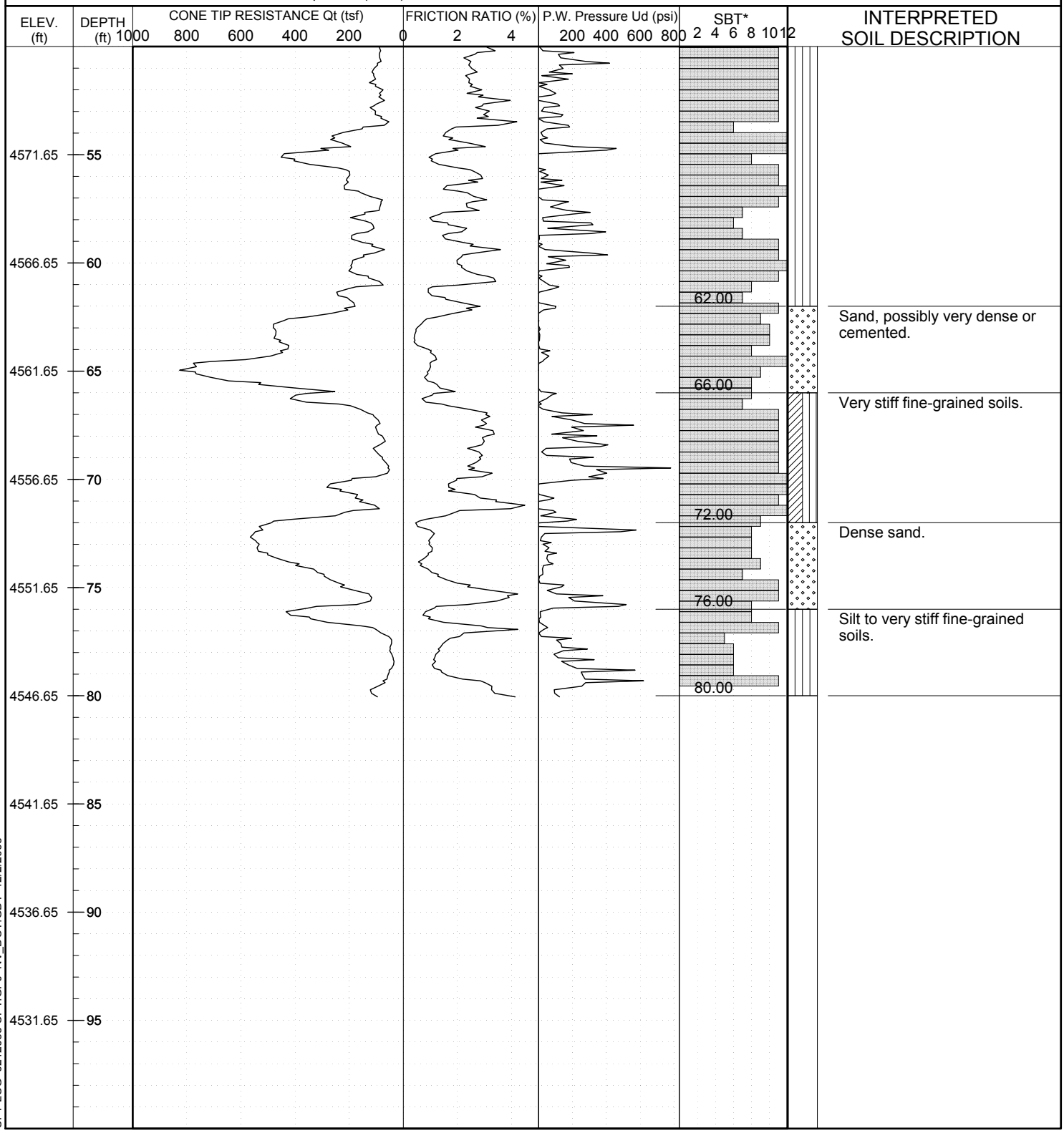
CONE PENETRATION TEST SOUNDING LOG

START DATE 6/23/04
END DATE 6/23/04
JOB DESCRIPTION Carson City Freeway Phase II
LOCATION Carson City, Nevada
BORING C-16
E.A. # 72781
GROUND ELEV. 4626.65 (ft)

Note: SBT is the Soil Behavior Type correlation by Robertson and Campanella (1990)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "O2" 285+38
OFFSET 84' Rt.
ENGINEER JWP
EQUIPMENT
OPERATOR Gregg Drilling
CPT TYPE 15 sq. cm, PWP Filter behind Tip
BACKFILLED _____ DATE _____



INTERPRETED SOIL DESCRIPTION

- 62.00: Sand, possibly very dense or cemented.
- 66.00: Very stiff fine-grained soils.
- 72.00: Dense sand.
- 76.00: Silt to very stiff fine-grained soils.
- 80.00

CPT LOG 0212033 CPT.GPJ NV_DOT.GDT 12/2/2005

Interpreted soil description is based on generalization of Soil Behavior Type (SBT). Description will not be exactly comparable to USCS classification. USCS material graphics symbols are used as a convenient reference to typical soil behavior only.

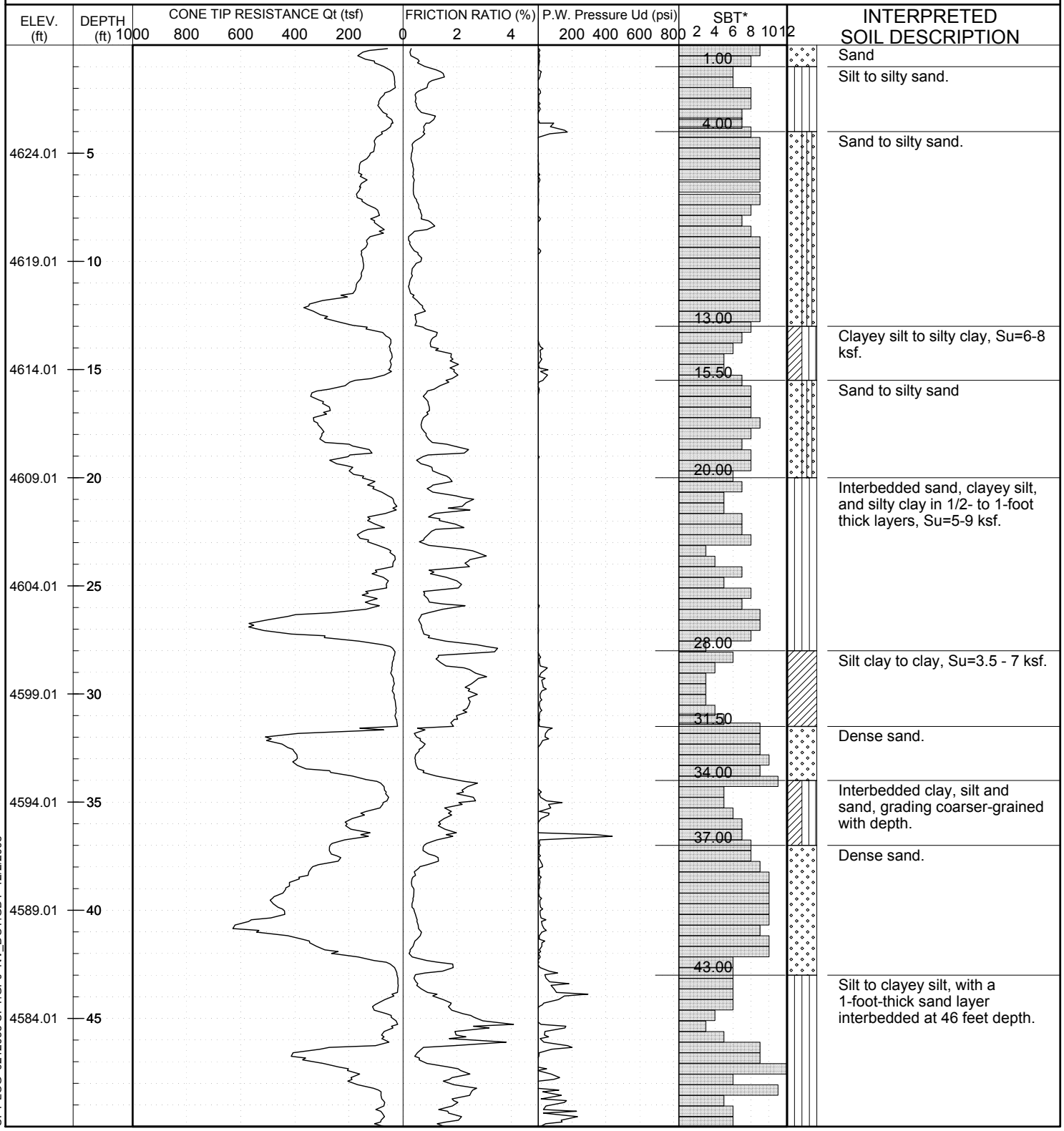
CONE PENETRATION TEST SOUNDING LOG

START DATE 6/23/04
END DATE 6/23/04
JOB DESCRIPTION Carson City Freeway Phase II
LOCATION Carson City, Nevada
BORING C-17
E.A. # 72781
GROUND ELEV. 4629.01 (ft)

Note: SBT is the Soil Behavior Type correlation by Robertson and Campanella (1990)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "O" 306+04
OFFSET 2' Lt.
ENGINEER JWP
EQUIPMENT
OPERATOR Gregg Drilling
CPT TYPE 15 sq. cm, PWP Filter behind Tip
BACKFILLED _____ DATE _____



INTERPRETED SOIL DESCRIPTION

- Sand
- Silt to silty sand.
- Sand to silty sand.
- Clayey silt to silty clay, Su=6-8 ksf.
- Sand to silty sand
- Interbedded sand, clayey silt, and silty clay in 1/2- to 1-foot thick layers, Su=5-9 ksf.
- Silt clay to clay, Su=3.5 - 7 ksf.
- Dense sand.
- Interbedded clay, silt and sand, grading coarser-grained with depth.
- Dense sand.
- Silt to clayey silt, with a 1-foot-thick sand layer interbedded at 46 feet depth.

CPT LOG 0212033 CPT.GPJ NV_DOT.GDT 12/2/2005

Interpreted soil description is based on generalization of Soil Behavior Type (SBT). Description will not be exactly comparable to USCS classification. USCS material graphics symbols are used as a convenient reference to typical soil behavior only.

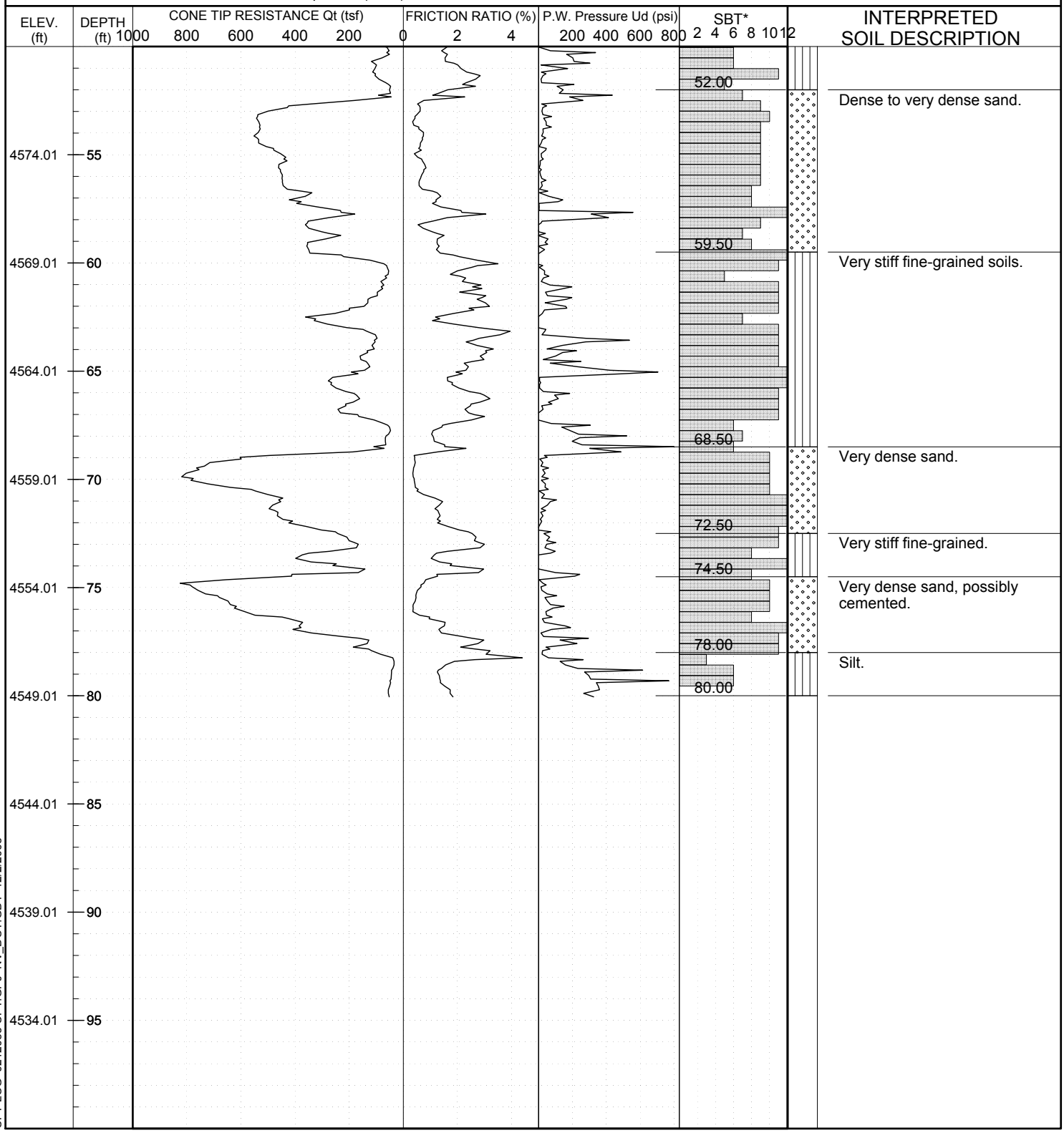
CONE PENETRATION TEST SOUNDING LOG

START DATE 6/23/04
END DATE 6/23/04
JOB DESCRIPTION Carson City Freeway Phase II
LOCATION Carson City, Nevada
BORING C-17
E.A. # 72781
GROUND ELEV. 4629.01 (ft)

Note: SBT is the Soil Behavior Type correlation by Robertson and Campanella (1990)

GROUNDWATER LEVEL		
DATE	DEPTH ft	ELEV. ft

STATION "O" 306+04
OFFSET 2' Lt.
ENGINEER JWP
EQUIPMENT
OPERATOR Gregg Drilling
CPT TYPE 15 sq. cm, PWP Filter behind Tip
BACKFILLED _____ DATE _____

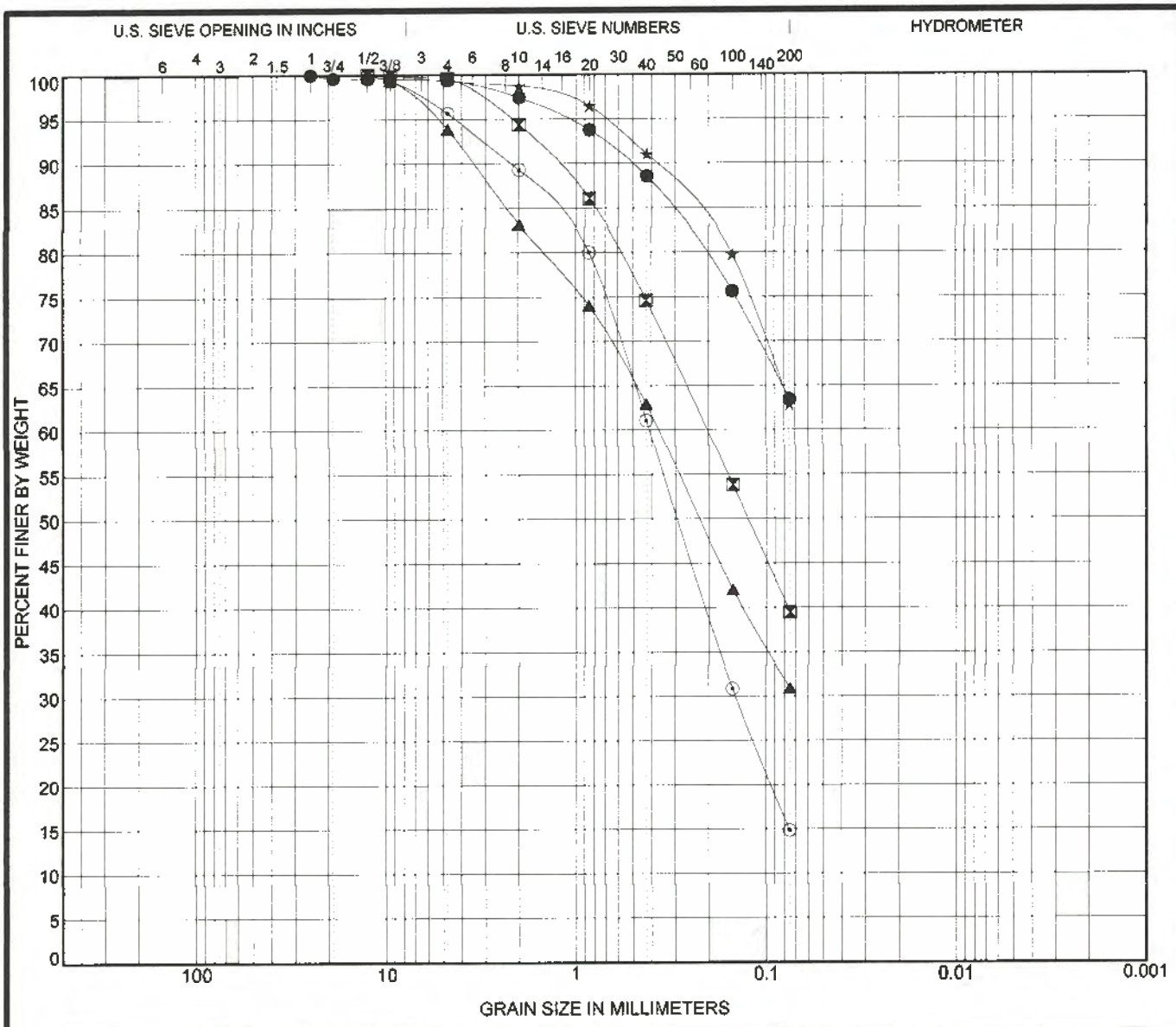


INTERPRETED SOIL DESCRIPTION

- 52.00 – 59.50: Dense to very dense sand.
- 59.50 – 68.50: Very stiff fine-grained soils.
- 68.50 – 72.50: Very dense sand.
- 72.50 – 74.50: Very stiff fine-grained.
- 74.50 – 78.00: Very dense sand, possibly cemented.
- 78.00 – 80.00: Silt.

CPT LOG 0212033 CPT.GPJ NV_DOT.GDT 12/2/2005

Interpreted soil description is based on generalization of Soil Behavior Type (SBT). Description will not be exactly comparable to USCS classification. USCS material graphics symbols are used as a convenient reference to typical soil behavior only.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
● B-07	0.0'	SANDY LEAN CLAY (CL)	35	22	13		
⊠ B-07	5.0'	CLAYEY SAND (SC)	32	21	11		
▲ B-07	10.0'	CLAYEY SAND (SC)	29	21	8		
★ B-07	15.0'	SANDY LEAN CLAY (CL)	30	20	10		
⊙ B-07	20.0'	SILTY SAND (SM)	NP	NP	NP		

Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
● B-07	0.0'	25				15.4	0.6	35.9	63.4	
⊠ B-07	5.0'	12.5	0.205			25.0	0.4	60.1	39.5	
▲ B-07	10.0'	12.5	0.368			22.9	6.1	63.0	30.9	
★ B-07	15.0'	9.5				25.4	0.7	36.4	62.8	
⊙ B-07	20.0'	12.5	0.41	0.144		23.4	4.3	80.8	14.8	

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1345 Capital Blvd., Suite A
Reno, Nevada 89502-7140
Telephone: (775) 359-6600
Fax: (775) 359-7766

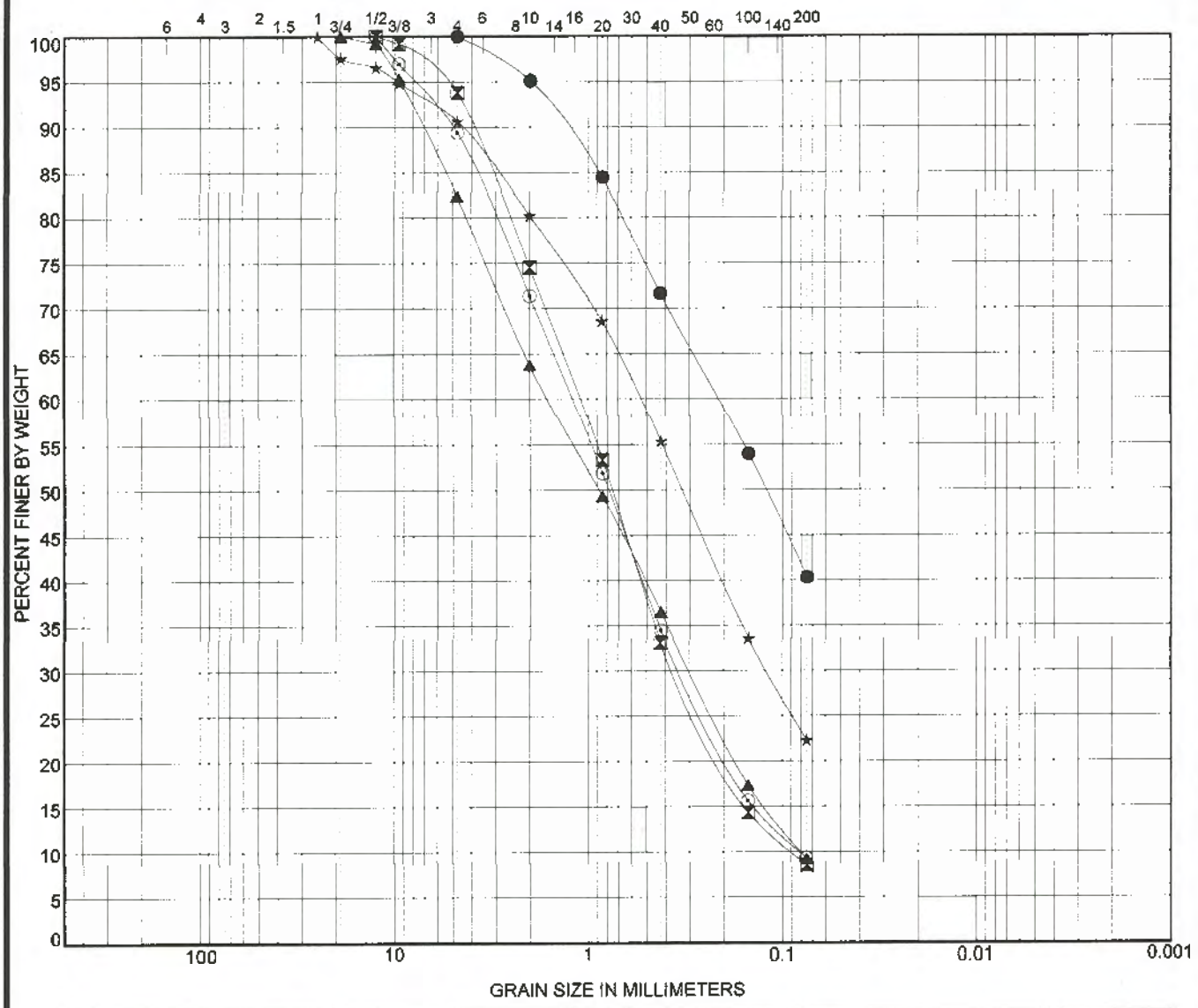
GRAIN SIZE DISTRIBUTION

Project: Carson City Freeway Phase 2

Location: Carson City, Nevada

Project Number: 72781 Plate Number: C-a

US_GRAIN_SIZE2 0212033.GPJ US_LAB.GDT 7/6/2005



Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
● B-08	5.0'	CLAYEY SAND (SC)	32	14	18		
⧓ B-08	10.0'	WELL-GRADED SAND with SILT (SW-SM)	NP	NP	NP	1.29	12.45
▲ B-08	15.0'	POORLY GRADED SAND with SILT and GRAVEL (SP-SM)	NP	NP	NP	0.69	20.02
★ B-08	20.0'	SILTY SAND (SM)	NP	NP	NP		
⊙ B-08	25.0'	WELL-GRADED SAND with SILT (SW-SM)	NP	NP	NP	1.12	15.01

Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
● B-08	5.0'	4.75	0.214			19.1	0.0	59.6	40.4	
⧓ B-08	10.0'	12.5	1.112	0.358	0.089	19.7	6.2	85.3	8.5	
▲ B-08	15.0'	19	1.602	0.298	0.08	13.7	17.6	73.1	9.2	
★ B-08	20.0'	25	0.541	0.12		18.0	9.3	68.4	22.3	
⊙ B-08	25.0'	12.5	1.214	0.332	0.081	18.9	10.6	80.1	9.3	

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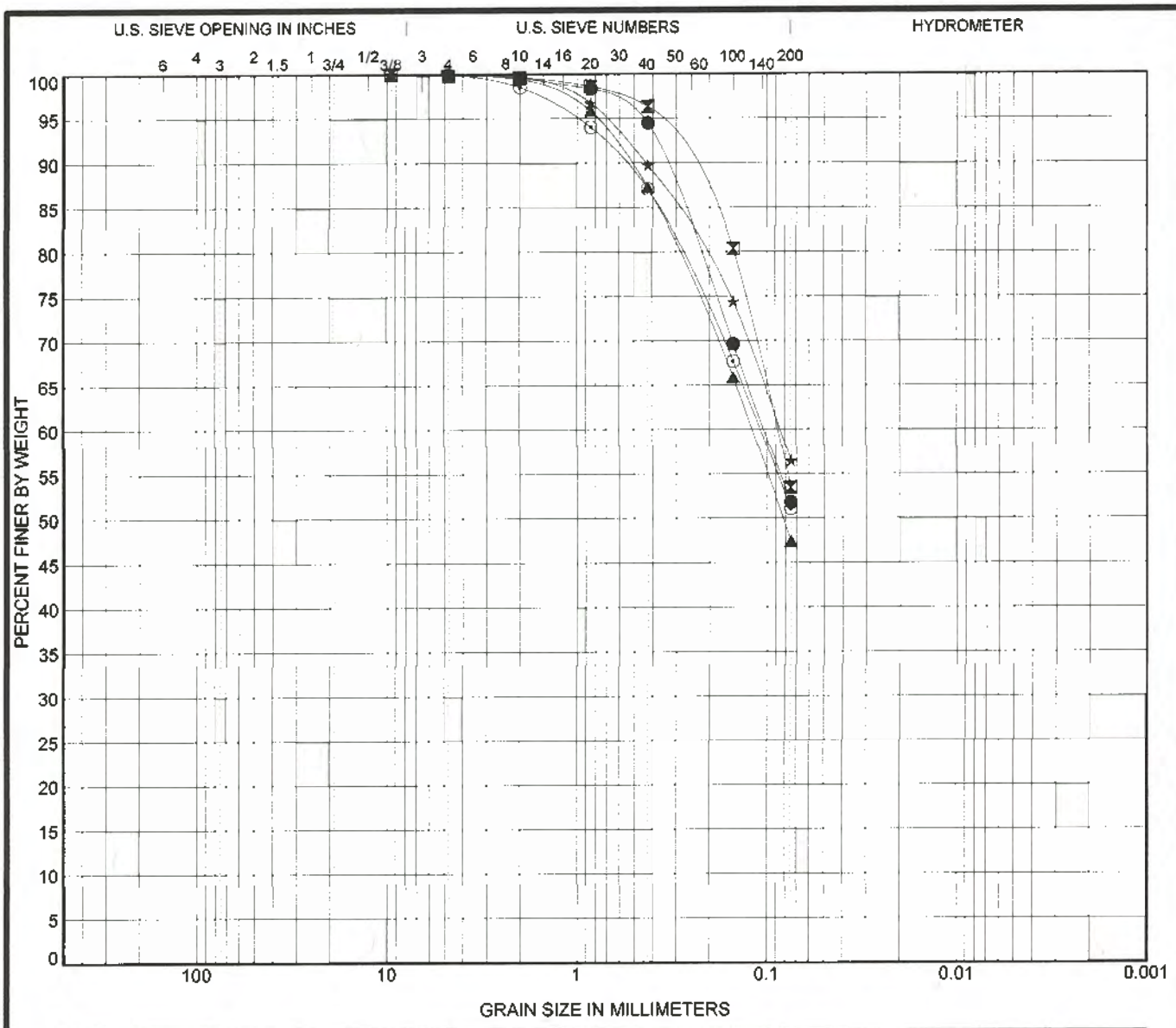
GRAIN SIZE DISTRIBUTION

Project: Carson City Freeway Phase 2

Location: Carson City, Nevada

Project Number: 72781 Plate Number: C-e

US GRAIN SIZE2 0212033.GPJ US LAB.GDT 7/6/2005



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
● B-08	30.0'	**SANDY LEAN CLAY (CL)**	30	19	11		
⧗ B-08	35.0'	**SANDY SILT (ML)**	NP	NP	NP		
▲ B-08	40.0'	**CLAYEY SAND (SC)**	29	18	11		
★ B-08	45.0'	**SANDY LEAN CLAY (CL)**	26	15	11		
⊙ B-08	50.0'	**SANDY LEAN CLAY (CL)**	31	18	13		

Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
● B-08	30.0'	4.75	0.103			23.9	0.0	48.2	51.8	
⧗ B-08	35.0'	9.5	0.089			25.5	0.2	46.4	53.4	
▲ B-08	40.0'	9.5	0.12			22.0	0.0	52.6	47.4	
★ B-08	45.0'	4.75	0.086			21.2	0.0	43.5	56.5	
⊙ B-08	50.0'	9.5	0.109			24.0	0.0	48.9	51.1	

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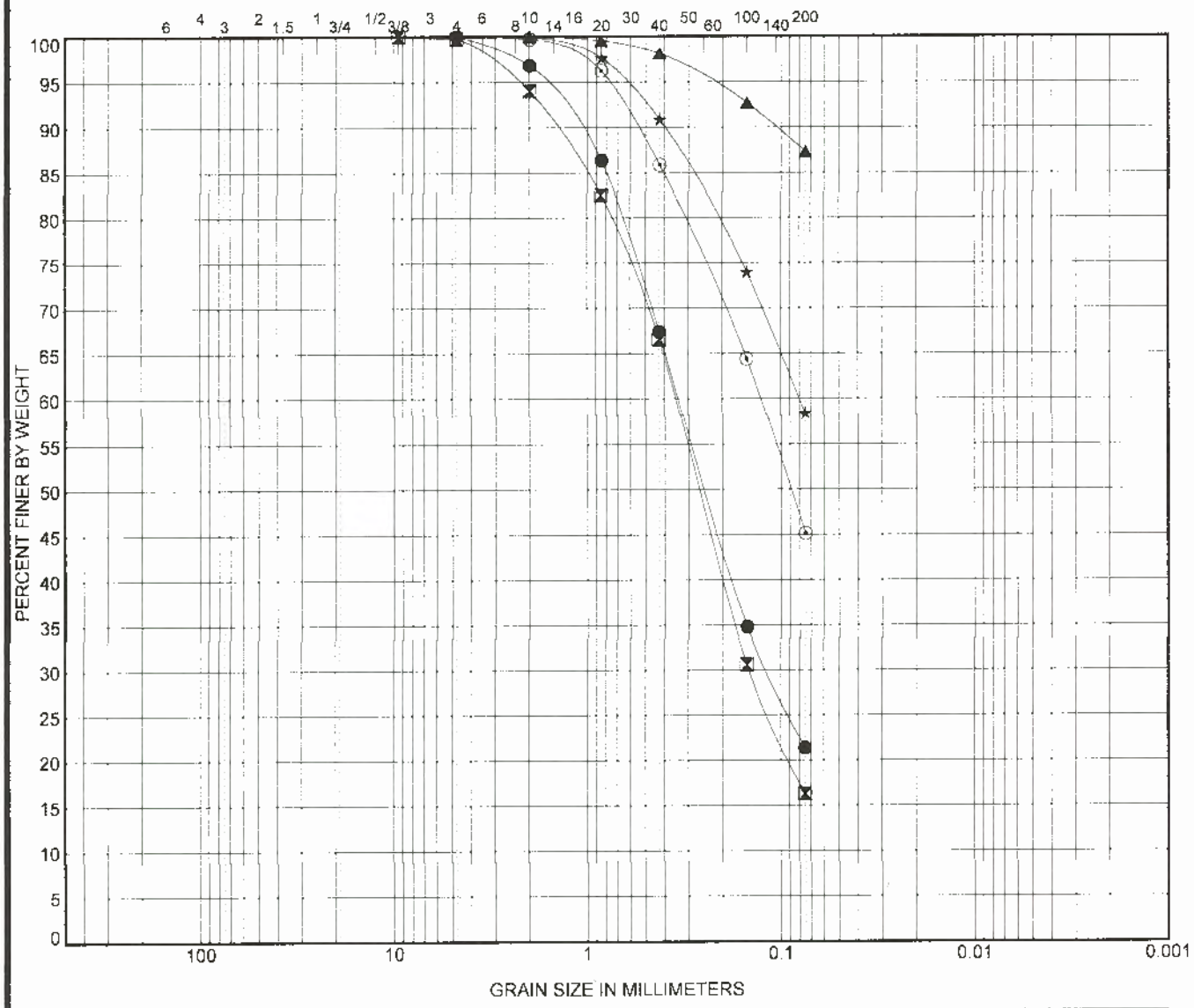
GRAIN SIZE DISTRIBUTION

Project: Carson City Freeway Phase 2

Location: Carson City, Nevada

Project Number: 72781 Plate Number: C-f

US GRAIN SIZE2 0212033.GPJ US_LAB.GDT 7/6/2005



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	B-08	55.0'	SILTY SAND (SM)	NP	NP	NP		
⧓	B-08	65.0'	SILTY SAND (SM)	NP	NP	NP		
▲	B-08	75.0'	SILT (ML)	46	30	16		
★	B-08	85.0'	SANDY LEAN CLAY (CL)	43	20	23		
⊙	B-09	0.0'	CLAYEY SAND (SC)	36	14	22		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	B-08	55.0'	4.75	0.335	0.117		22.0	0.0	78.6	21.4	
⧓	B-08	65.0'	9.5	0.352	0.146		20.4	0.3	83.4	16.3	
▲	B-08	75.0'	2				36.8	0.0	12.7	87.3	
★	B-08	85.0'	4.75	0.081			26.7	0.0	41.6	58.4	
⊙	B-09	0.0'	4.75	0.128			16.1	0.0	54.9	45.1	

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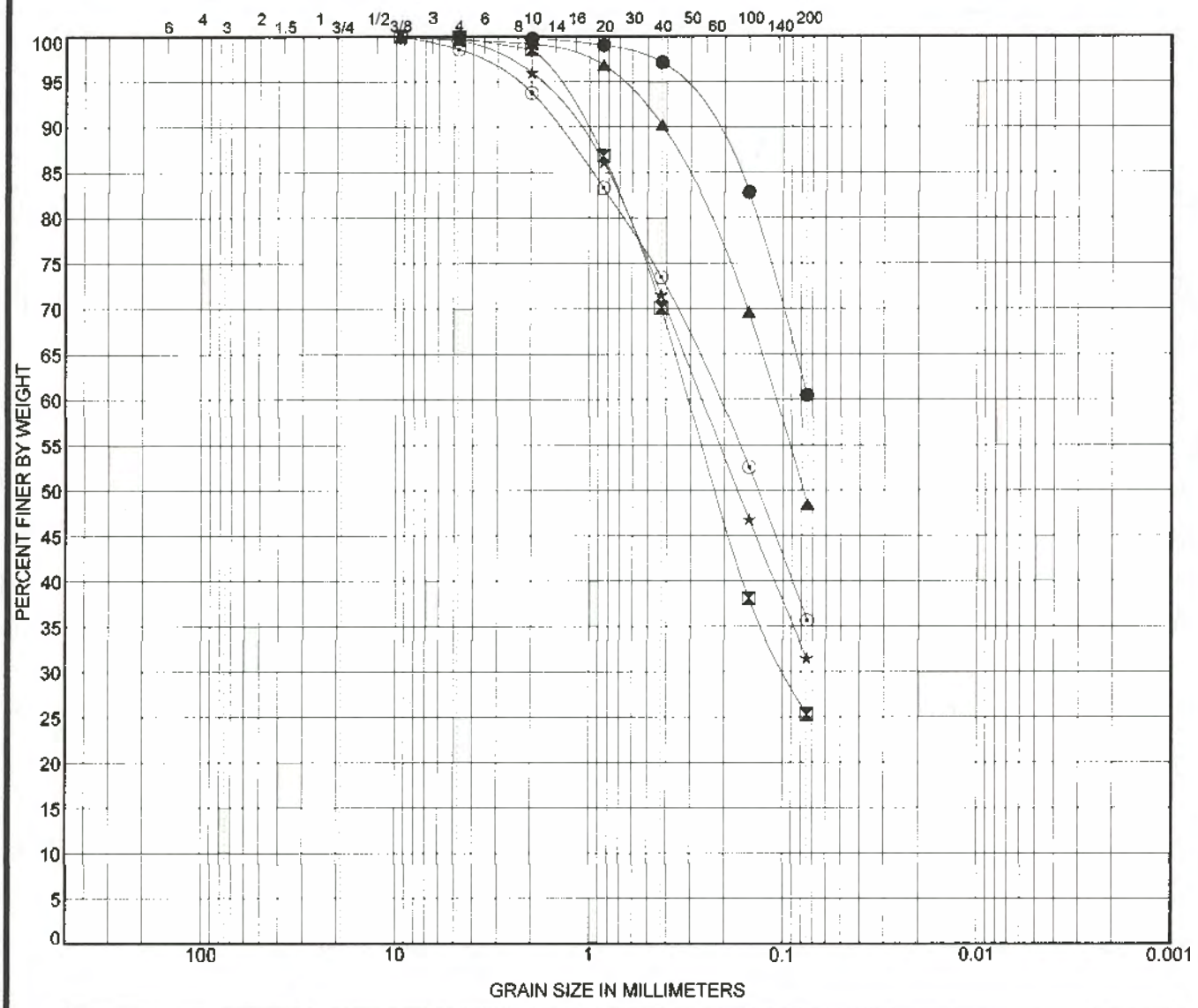
GRAIN SIZE DISTRIBUTION

Project: Carson City Freeway Phase 2

Location: Carson City, Nevada

Project Number: 72781 Plate Number: C-g

US_GRAIN_SIZE2 0212033.GPJ US_LAB.GDT 7/6/2005



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
●	B-25	10.0'	SANDY SILT (ML)	NP	NP	NP		
⧓	B-25	12.5'	SILTY, CLAYEY SAND (SC-SM)	24	19	5		
▲	B-25	15.0'	SILTY SAND (SM)	NP	NP	NP		
★	B-25	20.0'	SILTY SAND (SM)	21	19	2		
⊙	B-25	30.0'	SILTY SAND (SM)	21	20	1		

	Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
●	B-25	10.0'	4.75				24.1	0.0	39.5	60.5	
⧓	B-25	12.5'	9.5	0.306	0.097		19.2	0.1	74.6	25.3	
▲	B-25	15.0'	9.5	0.109			23.1	0.4	51.1	48.5	
★	B-25	20.0'	9.5	0.261			13.7	0.4	68.1	31.5	
⊙	B-25	30.0'	9.5	0.217			16.5	1.4	63.0	35.6	

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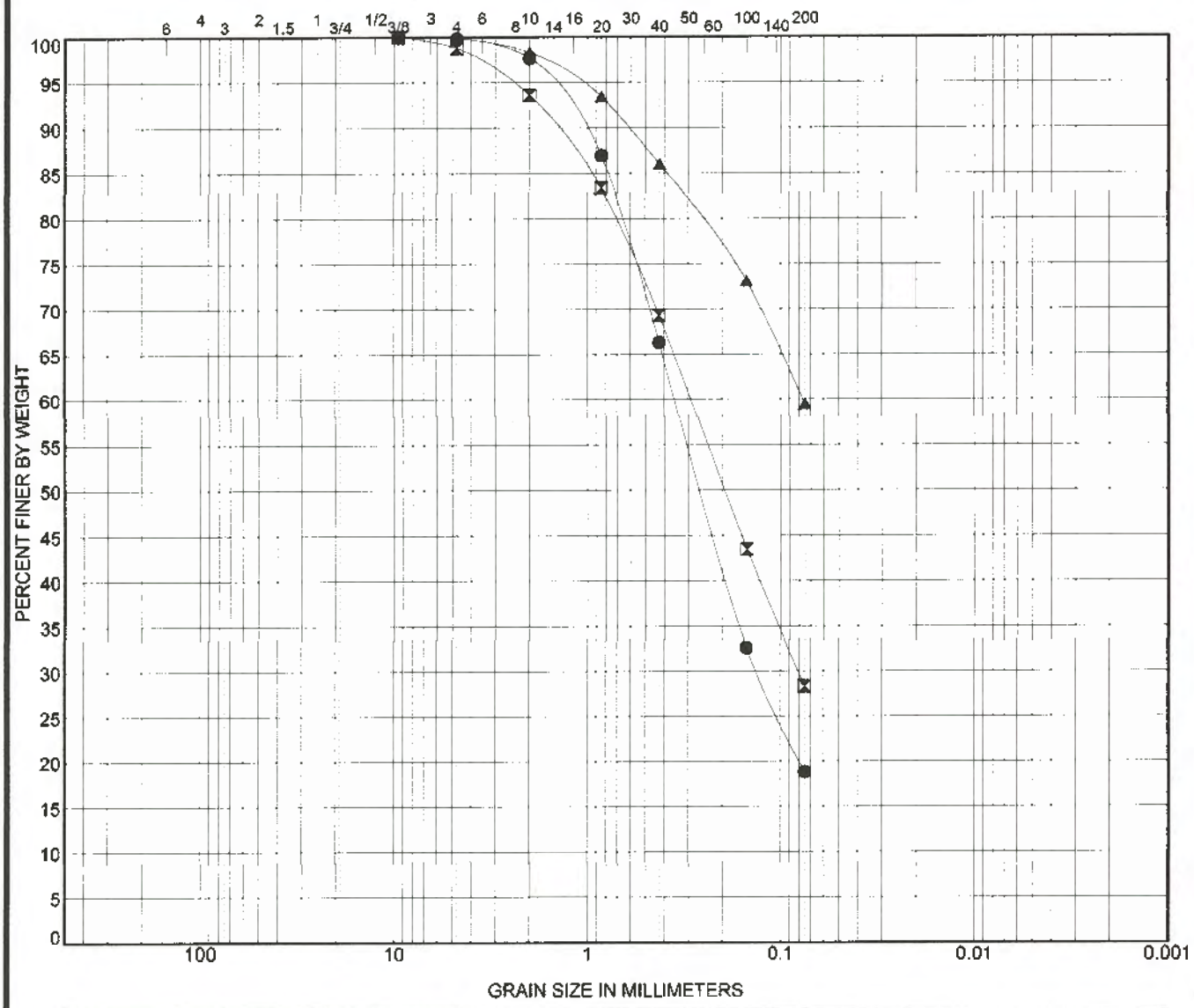
GRAIN SIZE DISTRIBUTION

Project: Carson City Freeway Phase 2

Location: Carson City, Nevada

Project Number: 72781 Plate Number: C-y

US_GRAIN_SIZE2 0212033.GPJ US_LAB.GDT 7/6/2005



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		USCS Classification	LL	PL	PI	Cc	Cu
● B-26	5.5'	SILTY SAND (SM)	NP	NP	NP		
⊠ B-26	17.5'	CLAYEY SAND (SC)	34	14	20		
▲ B-26	35.0'	SANDY LEAN CLAY (CL)	33	21	12		

Specimen Identification		D100	D60	D30	D10	MC %	%Gravel	%Sand	%Silt	%Clay
● B-26	5.5'	9.5	0.35	0.132		15.1	0.2	81.0	18.8	
⊠ B-26	17.5'	9.5	0.292	0.081		17.0	1.2	70.5	28.3	
▲ B-26	35.0'	9.5	0.077			16.5	0.2	40.3	59.5	

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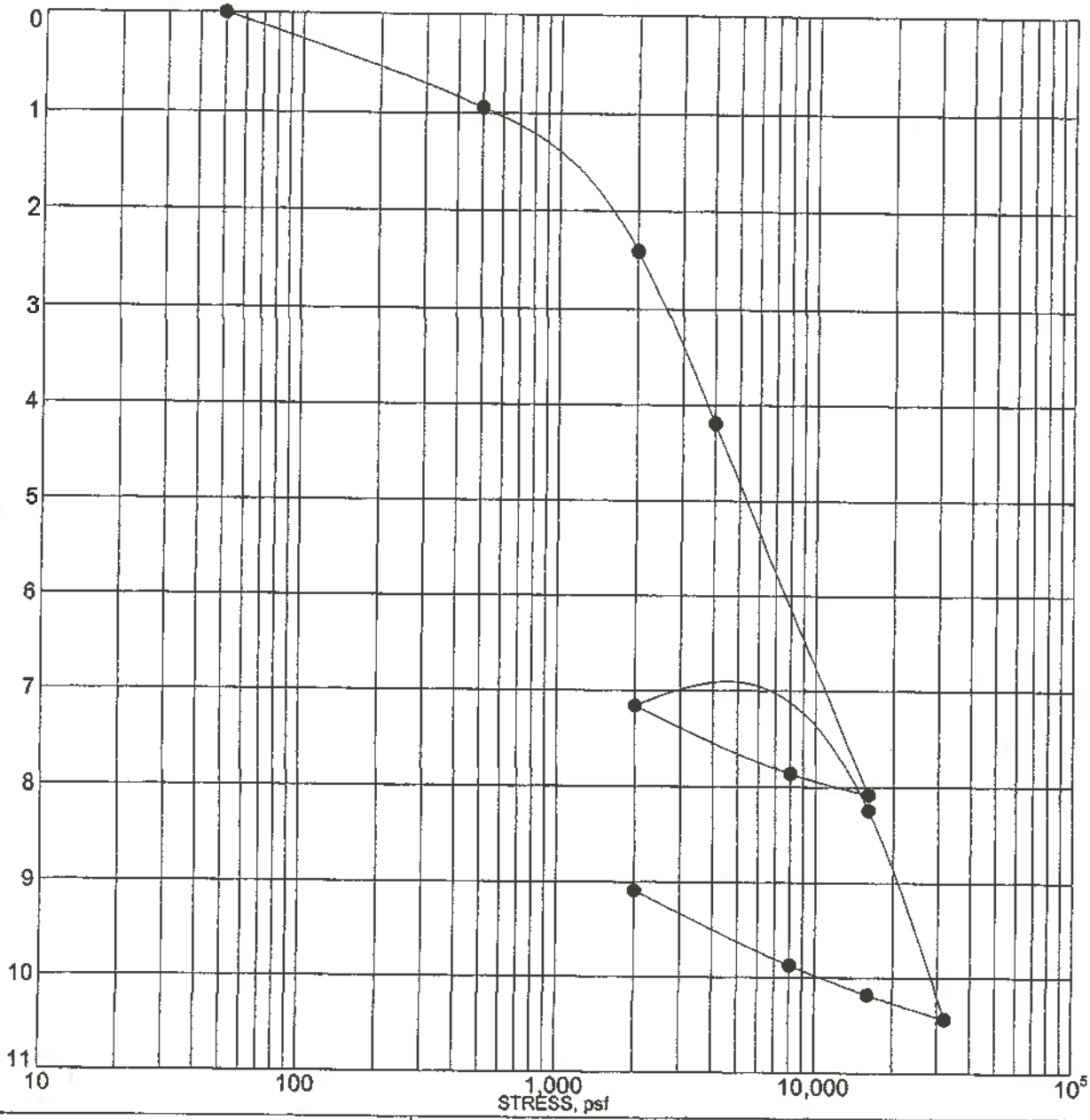
GRAIN SIZE DISTRIBUTION

Project: Carson City Freeway Phase 2

Location: Carson City, Nevada

Project Number: 72781 Plate Number: C-z

US_GRAIN_SIZE2 0212033.GPJ US_LAB.GDT 7/6/2005



Source: B-26 [35]				Classification: SANDY LEAN CLAY (CL)		
LL= 33	PL=21	PI=12	Gs= 2.75	Test Unit: Carol-Warner 1016 Pneumatic		
Specimen Type: Ring				Condition: Inundated	**Before Test**	**After Test**
Diameter (in.): 2.42		Height (in.): 1.00		Water Content, w(%)	16.5	15.0
Overburden Press, Po (psf):			2400	Void Ratio, e0	0.56	0.41
Preconsolidation Pressure, Pc (psf):			2500	Saturation, S(%)	81.2	100.2
Compression Index, Cc:			0.109	Dry Density (pcf)	110.1	121.6
Rebound Index, Cs:			0.016	Test Method: ASTM D2435B		
Remarks:						

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Fax: (775) 359-7766

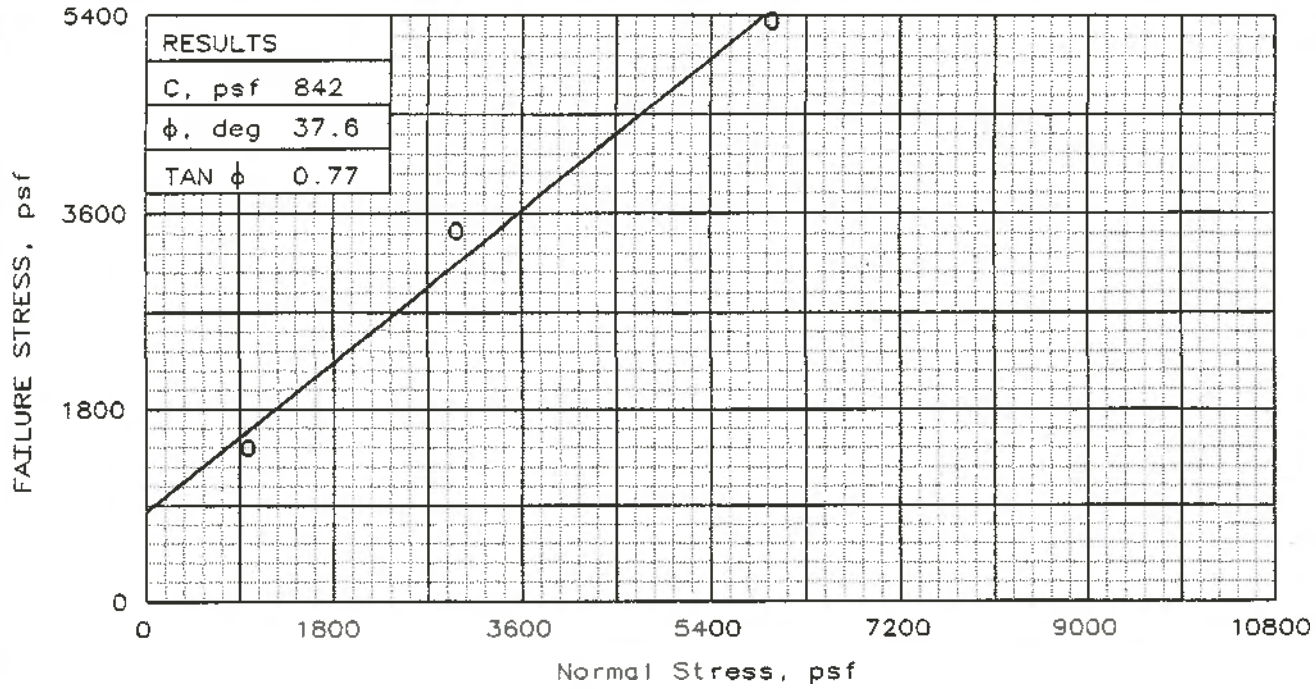
CONSOLIDATION TEST - STRAIN

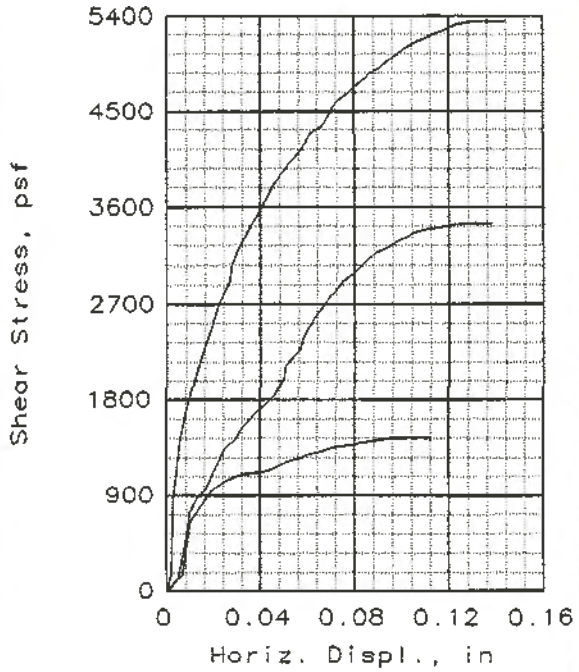
Project: Carson City Freeway Phase 2

Location: Carson City, Nevada

Project Number: 0212-03-3

Plate Number: D-19





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	15.6	15.6	15.6
	DRY DENSITY, pcf	114.4	114.4	114.4
	SATURATION, %	88.9	88.9	88.9
	VOID RATIO	0.473	0.473	0.473
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	15.7	15.1	14.6
	DRY DENSITY, pcf	118.2	119.7	120.9
	SATURATION, %	99.6	100.0	99.8
	VOID RATIO	0.426	0.408	0.395
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.97	0.96	0.95
NORMAL STRESS, psf		1000	3000	6000
FAILURE STRESS, psf		1440	3444	5354
DISPLACEMENT, in		0.10	0.13	0.13
ULTIMATE STRESS, psf				
DISPLACEMENT, in				
Strain rate, in/min		0.0200	0.0200	0.0200

SAMPLE TYPE: Remolded
DESCRIPTION: Silty Sand

SPECIFIC GRAVITY= 2.7
REMARKS: Non Plastic

CLIENT: Louis Berger and Associates

PROJECT: Carson City Freeway, Bridges

SAMPLE LOCATION: B-26 E&F @ 12.5'

PROJ. NO.: 0212-03-3 DATE: 12-17-04

DIRECT SHEAR TEST REPORT

BLACK EAGLE CONSULTING, INC.

Fig. No.: D-6

GEOCON

CONSULTANTS, INC.

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

GEOTECHNICAL INVESTIGATION

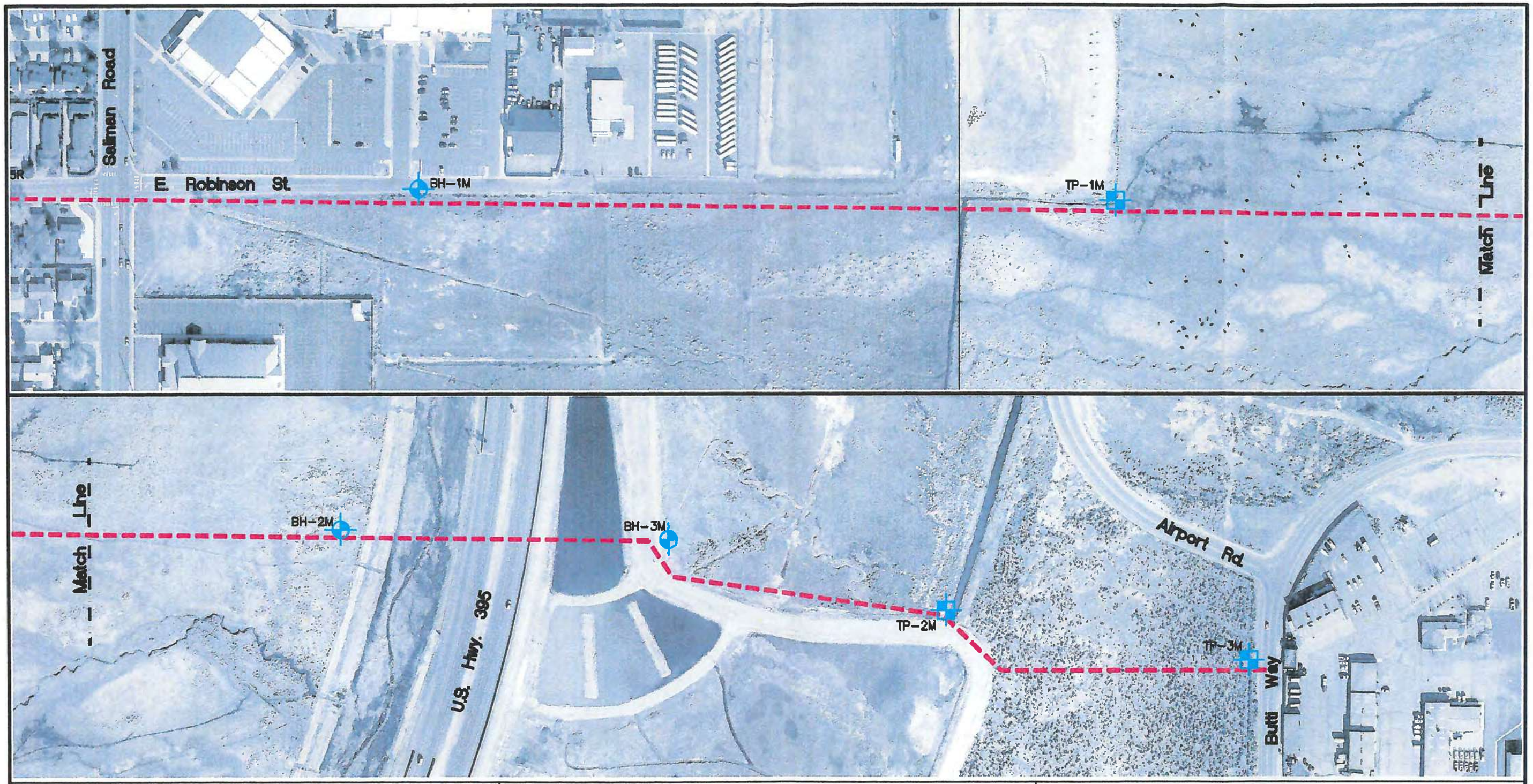
ROBINSON
TRANSMISSION MAIN PROJECT
CARSON CITY, NEVADA

PREPARED FOR

MANHARD CONSULTING, LTD.
CARSON CITY, NEVADA

GEOCON PROJECT NO. R8688-06-01

OCTOBER 2010



N
W E
S

0 100 200 400 FEET

Legend:

- Boring Location - GEOCON
- Test Pit Location - GEOCON
- Boring Location - LUMOS
- Test Pit Location - LUMOS
- Approximate Water Main Alignment

Site Map
Robinson St. Transmission Main
Carson City, Nevada

GEOCON CONSULTANTS, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
4010 TECHNOLOGY WAY SUITE. D – CARSON CITY, NEVADA 89706
PHONE 775 888-9900 – FAX 775 888-9904

Job No.: R8688-06-01
October, 2010
Figure 2D

COMMENTS:

LOG OF BORING No. BH-1M

LOGGED BY: S. Flores DATE: 8/10/10

EQUIPMENT: CME 75

TOTAL DEPTH: 8.5 WATER DEPTH: 7.2

MISC. TESTS	R VALUE	UNIT DRY WEIGHT, PCF	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 200 SIEVE, %	DEPTH, FT	SYMBOL	SAMPLE	BLOWS PER FOOT	DESCRIPTION / CLASSIFICATION	LAYER ELEV./ DEPTH
											SURFACE ELEVATION:	
											ASPHALT CONCRETE- 6"	0.5
		104	9			24			X	9	SILTY SAND (SM)- Imported sand fill, medium dense, moist, dark yellowish brown w/ gravel	1.5
		103	5			11	5		X	7	CLAYEY SAND (SC)- Loose, moist, dark yellowish brown	3.3
			16			24	▼		X	4	SILTY SAND (SM)- Loose, moist, yellowish brown	5.7
											CLAYEY SAND (SC)- Loose, moist to saturated, dark yellowish brown	8.5

LOG OF BORING R8688-06-01GPJ GPJ GEOCON NV.GDT 10/2/10

GEOCON CONSULTANTS, INC

PROJECT:

ROBINSON WATERLINE
Carson City, Nevada

JOB NO.: R8688-06-01 DATE: 9/1/10

Figure-18

COMMENTS:

LOG OF BORING No. BH-2M

LOGGED BY: G. Luce DATE: 8/10/10

EQUIPMENT: CME 75

TOTAL DEPTH: 50.0 WATER DEPTH: 9.5

MISC. TESTS	R VALUE	UNIT DRY WEIGHT, PCF	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 200 SIEVE, %	DEPTH, FT	SYMBOL	SAMPLE	BLOWS PER FOOT	DESCRIPTION / CLASSIFICATION	LAYER ELEV./ DEPTH
											SURFACE ELEVATION:	
											SILTY SAND (SM)- Loose, dry, dark yellowish brown	
											with rootlets	3.0
							5		X	16	SANDY SILT (ML)- Medium dense, moist, light olive brown	
											with a thin (< 1") clay layer 5.5' below ground surface	7.5
							10 ▼			31	POORLY GRADED SAND (SP)- Dense, saturated, gray	
		90	16			4						
							15		X	18	SANDY SILT (ML)- Medium dense, saturated, gray with varved layers of silty sand	12.5
							20			18		
		92	26			67						
							25		X	12	SANDY CLAY (CL)- Stiff, saturated, dark yellowish brown	22.5
		108	25			70						
							30			73	SILTY CLAY TO CLAYEY SILT (CL-ML)-Dense, saturated, olive gray	28.0
		122	11									
							35		X	29		
		60	12			69						
							40			43		
		90	17			63						
							45		X	37		
		116	16									
							50		X	48	SILTY SAND (SM)- Dense, saturated, light gray with fine gravel	48.0
		80	20			15						51.5

LOG OF BORING R8688-06-01GPJ GPJ GEOCON NV.GDT 10/2/10

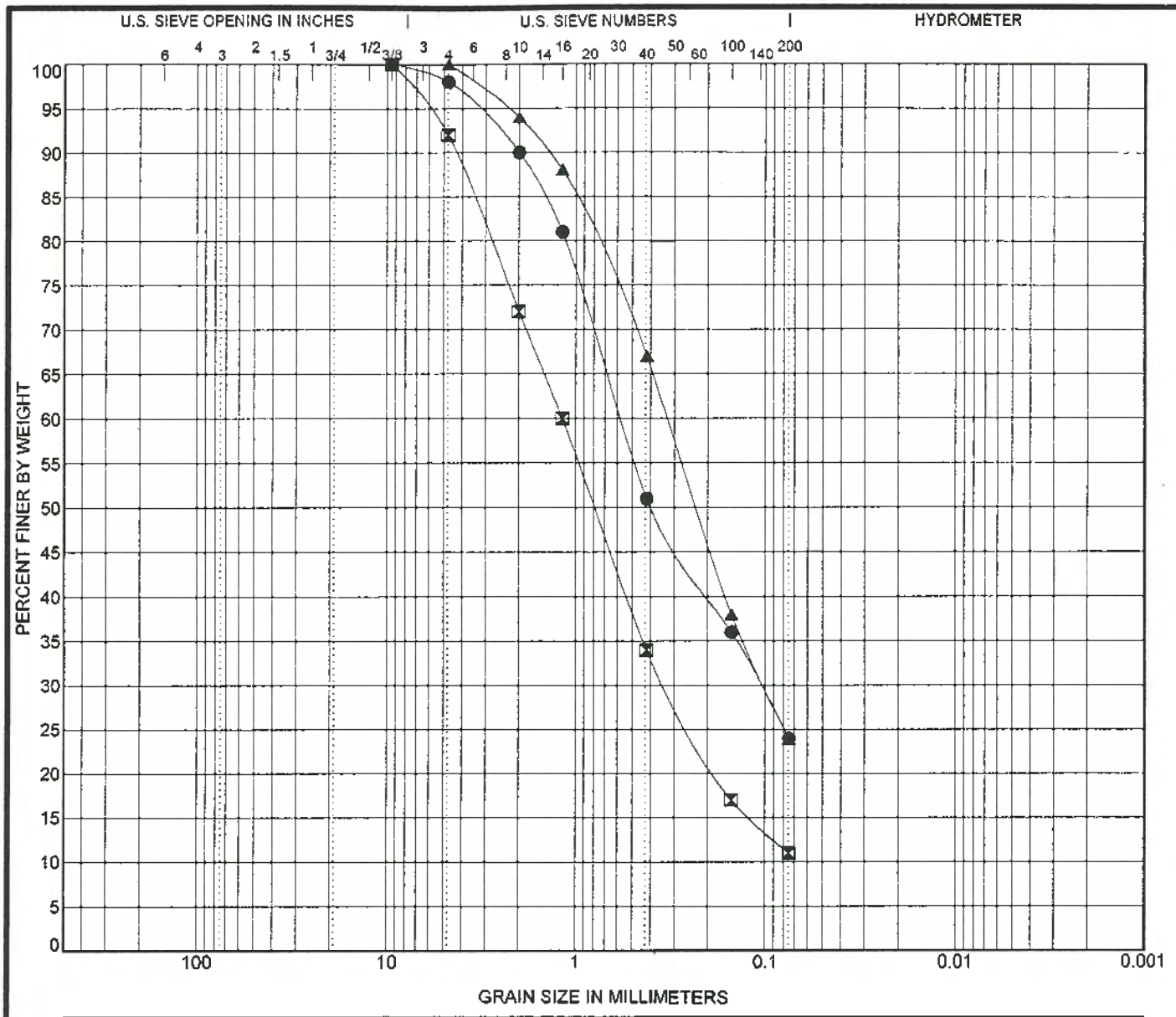
GEOCON CONSULTANTS, INC

PROJECT:

ROBINSON WATERLINE
Carson City, Nevada

JOB NO.: R8688-06-01 DATE: 9/1/10

Figure-19



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	BH-1M	2.5	Dk. Yellowish Brown Clayey Sand (SC)					
⊠	BH-1M	3.5	Dk. Yellowish Brown Well Graded Sand (SW-SM)				1.38	17.66
▲	BH-1M	7.0	Dk. Yellowish Brown Clayey Sand (SC)					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BH-1M	2.5	9.5	0.573	0.106		2.0	74.0	24.0	
⊠	BH-1M	3.5	9.5	1.18	0.33		8.0	81.0	11.0	
▲	BH-1M	7.0	4.75	0.328	0.101		0.0	76.0	24.0	

GEOCON CONSULTANTS INC
Geocon
4010 Technology Way, Suite D
89706
Telephone: 775.888.9900
Fax: 775.888.9904

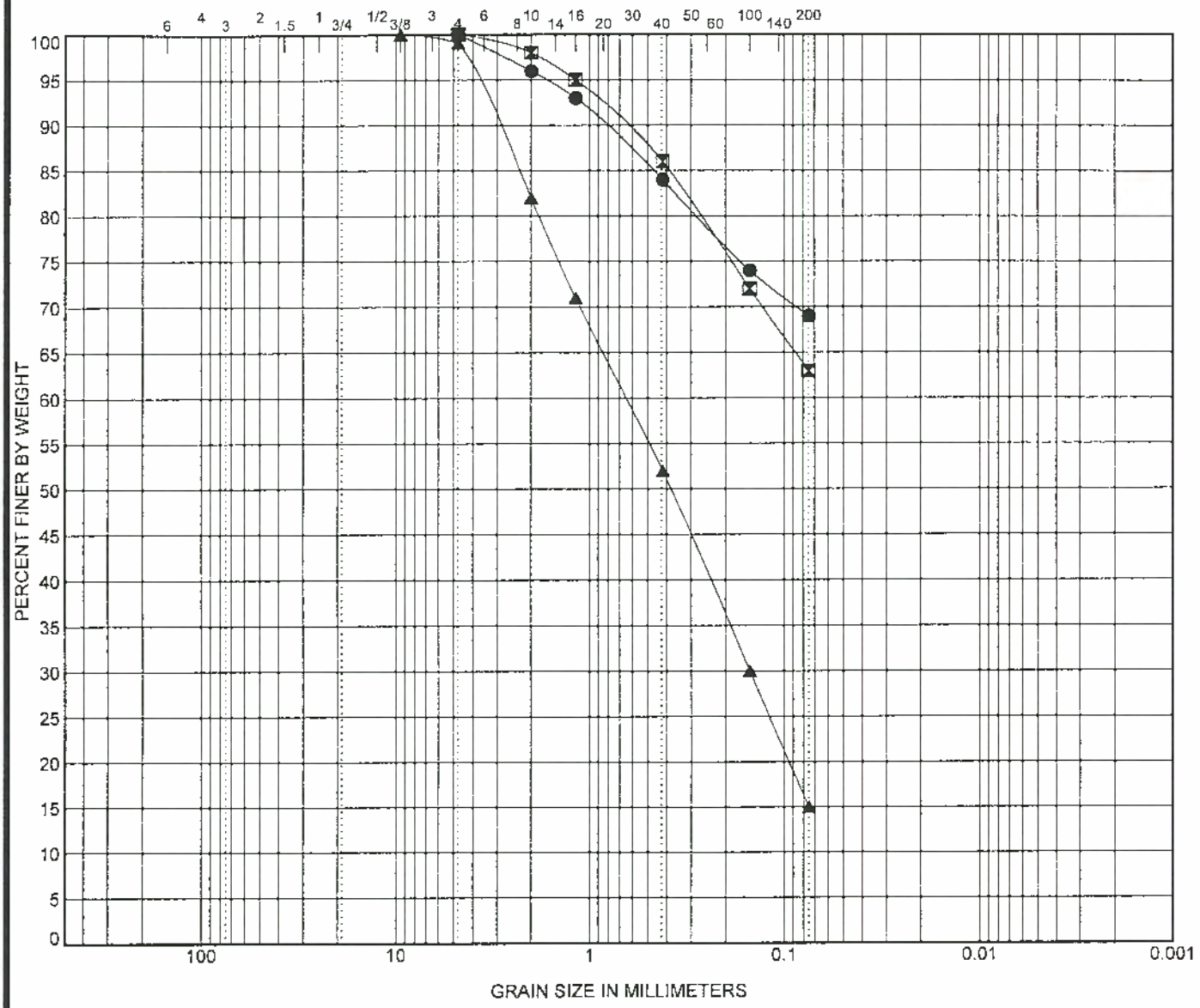
GRAIN SIZE DISTRIBUTION

Project: ROBINSON WATERLINE

Location: Carson City, Nevada

Number: R8688-06-01

US GRAIN SIZE R8688-06-01GPJ GEOCON NV.GDT 10/2/10



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	BH-2M	35.5	Grayish Brown Sandy Silty Clay (CL-ML)					
⊠	BH-2M	41.0	Olive Gray Sandy Silty Clay (CL-ML)					
▲	BH-2M	50.4	Light Gray Silty Sand (SM)					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BH-2M	35.5	4.75				0.0	31.0	69.0	
⊠	BH-2M	41.0	4.75				0.0	37.0	63.0	
▲	BH-2M	50.4	9.5	0.649	0.15		1.0	84.0	15.0	

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GRAIN SIZE DISTRIBUTION

Project: ROBINSON WATERLINE

Location: Carson City, Nevada

Number: R8688-06-01

US GRAIN SIZE R8688-06-01GPJ GEOCON NV.GDT 10/2/10

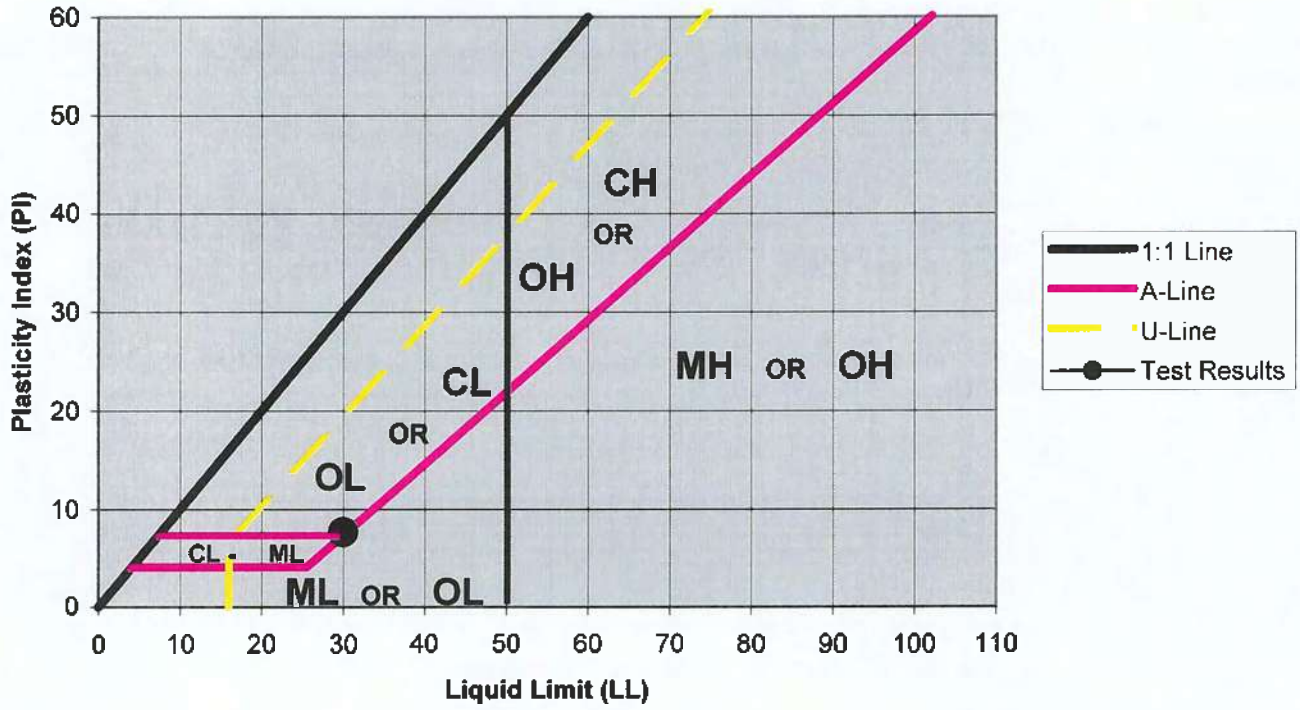
GEOCON CONSULTANTS

Carson City

PLASTICITY INDEX

Project Name:	Robinson Waterline Project		
Project Number:	R8688-06-01		
Sample Number:	BH-2M 25.6 - 26.5		
Date:	8/19/2010	By:	SF

Plasticity Chart (ASTM D2487)



LIQUID LIMIT	30
PLASTIC LIMIT	22
PLASTICITY INDEX	8

USCS Classification:
Sandy Lean Clay (CL)

GEOCON

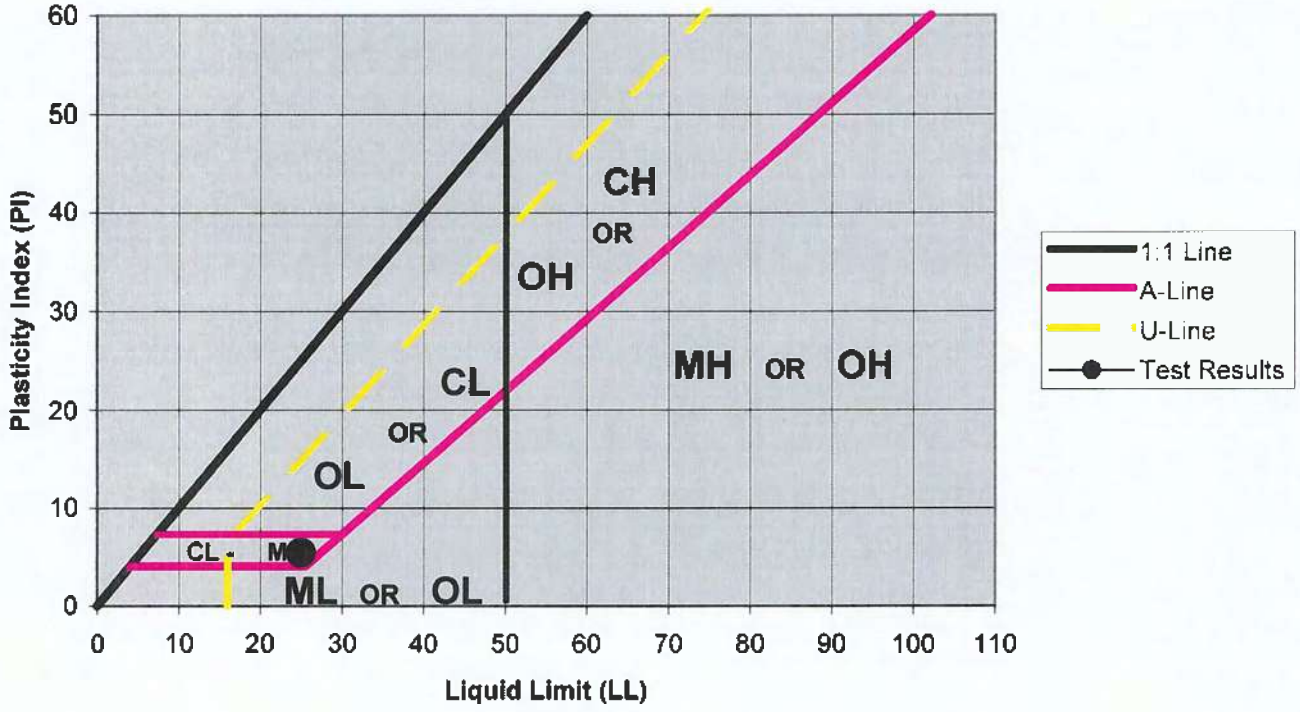
GEOCON CONSULTANTS

Carson City

PLASTICITY INDEX

Project Name:	Robinson Street Waterline		
Project Number:	R8688-06-01		
Sample Number:	BH-2M 45.5 - 46.0		
Date:	8/19/2010	By:	SF

Plasticity Chart (ASTM D2487)



LIQUID LIMIT	25
PLASTIC LIMIT	20
PLASTICITY INDEX	5

USCS Classification:
Sandy Silty Clay (CL-ML)

GEOCON

GEOCON, INC.
4010 Technology, Unit D Carson City, NV
775-888-9900 ofc/775/888-9904 fax

Project:	Robionson Water Line
Project No:	R8688-06-01
Lab No:	CC589
Date Sampled:	40400
Date Tested:	8/16/2010
Sample No:	BH-2M 25.6 - 26.5
Material Desc:	Sandy Clay (CL)
	Munsell Color 2.5YR (5/2) Grayish Brown

Unconfined Compressive Strength of Fine Grained Soils (ASTM D 2166-06)

Water Content Determination

Tare:	Zoidberg
Wt. of Wet + Tare	178.9
Wt. of Dry + Tare	150.2
Wt. Water	28.7
Wt. Tare	34.1
Wt. Wet Specimen	144.8
Wt. Dry Specimen	116.1

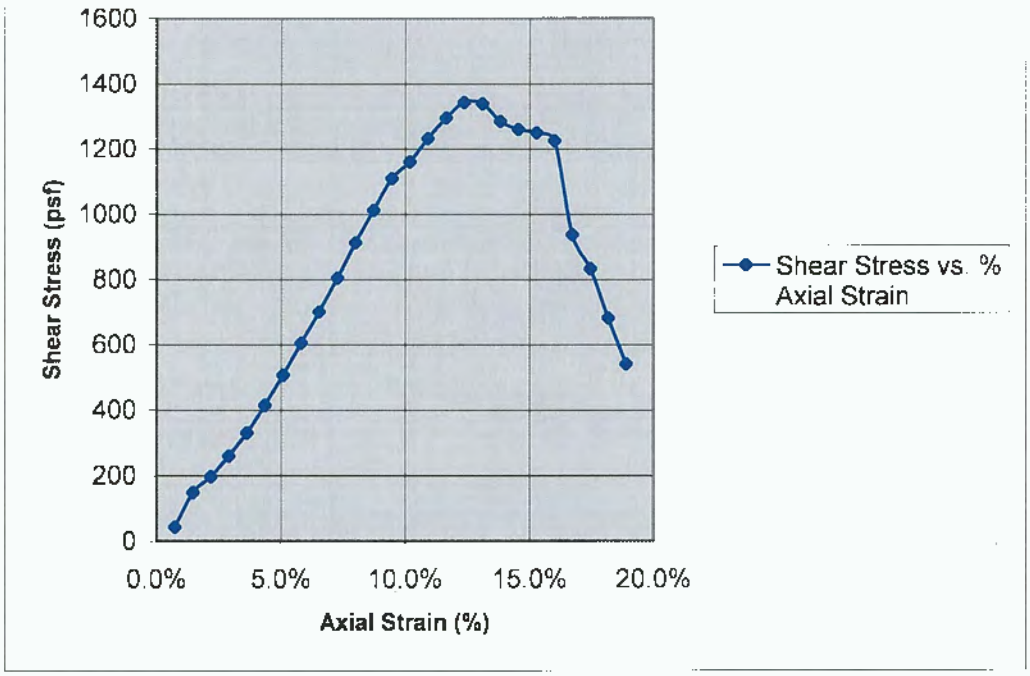
Water Content (% Dry Wt.)	24.7%
Wet Density (pcf)	135.1
Dry Density (pcf)	108.3
Specific Gravity	
lb/Tick From Calibration	.17121+(.878)

Unconfined Confined Compressive Strength

Initial Diameter (D_o)	1.375
Initial Area (A_o)	0.0103
Initial Height (H_o)	2.75
Initial Volume (V_o)	0.0024

$$\text{Stress} = \frac{\text{Load}}{\text{Corr. Area}}$$

$$\text{Corr. Area} = \frac{A_o}{\text{1-Unit Stain}}$$



Specimen Data:

Initial Dry Density (pcf):	108.3
Initial Water Content (%):	24.7%
Height-to-Diameter Ratio:	2.00

Failure Data:

Strain %	4.3%
Peak Shear (psf):	1340
Peak Unconf. (psf)	2680

TRAFFIC IMPACT STUDY

for

Lompa Ranch North Residential

September 16, 2021

PREPARED FOR:

Blackstone Development Group Inc.

PREPARED BY:

HEADWAY TRANSPORTATION

Headway Transportation, LLC
5482 Longley Lane, Suite B, Reno, Nevada 89511
775.322.4300
www.HeadwayTransportation.com

YOUR QUESTIONS ANSWERED QUICKLY

Why did you perform this study?

This Traffic Impact Study evaluates the potential traffic impacts associated with the development of a residential phase north of Robinson Street within Lompa Ranch West in Carson City, NV. This study was undertaken to determine the existing and future traffic conditions, quantify traffic volumes generated by the proposed project, identify potential impacts, and develop recommendations to mitigate impacts, if any are found. A key aspect of this study was to collect new traffic counts and establish updated 2025 and Future Year conditions within the Lompa Ranch study area using the latest signal timing and CAMPO Travel Demand Model.

What does the project consist of?

The proposed project consists of 137 single-family dwelling units and an ancillary clubhouse north of Robinson Street.

How much traffic will the project generate?

The project is anticipated to generate approximately 1,293 Daily trips, 101 AM peak hour trips, 102 Afternoon peak hour trips, and 136 PM peak hour new trips.

Does this project cause any traffic impacts?

With the addition of project traffic, all study intersections are anticipated to operate at acceptable level of service conditions (LOS “D” or better). The proposed project is in conformance with the traffic sections of the Lompa Ranch North SPA criteria for the 2025 Plus Project and 2040 Plus Project scenarios.

Are any improvements recommended?

Following is a list of the proposed improvements:

- The project will construct three separate points of access to the north residential area including the Lompa Ranch Spine Road / Robinson Street roundabout and two additional points of access on Robinson Street.
- The project will extend Lompa Ranch Spine Road in the SPA Planned alignment to the northwesterly edge of this phase where Spine Road intersects Phase C1 (for a future north connection to William Street).
- The project will construct the north leg of the Lompa Ranch Spine Road / Robinson Street roundabout and an east leg of the roundabout as a local street connection.
- The project will construct bike lanes and a separated multi-use path on Lompa Ranch Spine Road.

LIST OF FIGURES

LIST OF APPENDICES

INTRODUCTION

This report summarizes the results of a Traffic Impact Study completed to assess the potential impacts to the local roadway network associated with the development of a north residential phase within Lompa Ranch West in Carson City, NV. The proposed project consists of 137 single-family dwelling units.

Study Area and Evaluated Scenarios

The proposed project is generally located west of I-580 and north of Robinson Street. The project site is situated on the northeast corner of the Lompa Ranch West development, as shown on **Figure 1**. The preliminary site plan is shown on **Figure 2**.

Study Intersections

The following intersections are evaluated in this analysis:

- William Street / Saliman Road
- Saliman Road / Robinson Street
- Saliman Road / 5th Street
- Robinson Street / Lompa Ranch Spine Road
- 5th Street / Lompa Ranch Spine Road

Study Scenarios

This study includes analysis of intersections during the weekday school peak hours (7-8 AM, 2-3 PM) and the weekday PM peak hour (4:30-5:30 PM) as these are the periods of time in which peak traffic occurred during data collection. The evaluated development scenarios are:

- 2025 Conditions – evaluates existing traffic conditions plus Lompa Ranch Phase 1, Lompa Ranch Phase 2, Lompa Ranch Multifamily phase, Little Lane Village, and Carson Lofts.
- 2025 Plus Project Conditions – evaluates 2025 conditions plus the proposed north residential phase.
- Future Year Conditions – evaluates 20-year horizon traffic conditions including Lompa Ranch Phase 1, Lompa Ranch Phase 2, Lompa Ranch Multifamily phase, Little Lane Village, and Carson Lofts. The Lompa Ranch East, Blackstone Ranch South, and development of the Lompa remainder parcel south of 5th Street (APN 010-041-82) are included in the travel demand model growth in this scenario.
- Future Year Plus Project Conditions – evaluates future year traffic conditions plus the proposed north residential phase.

ANALYSIS METHODOLOGY

Level of service (LOS) is a term commonly used by transportation practitioners to measure and describe the operational characteristics of intersections, roadway segments, and other facilities. This term equates seconds of delay per vehicle at intersections to letter grades "A" through "F" with "A" representing optimum conditions and "F" representing breakdown or over capacity flows.

Intersections

Intersection level of service methodology is established in the *Highway Capacity Manual (HCM) 6th Edition*, published by the Transportation Research Board (TRB). The methodology for signalized intersections determines the level of service by comparing the average control delay for the overall intersection to the delay thresholds in **Table 1**. Level of service at unsignalized (side-street stop controlled) intersections is determined by comparing the average control delay for the worst movement/approach to the delay thresholds in **Table 1**. For roundabouts, the volume-to-capacity (v/c) ratio is a better indicator of roundabout performance than LOS. Roundabouts should operate with a v/c of less than 0.85 on all approaches. Therefore, average delay, level of service, and v/c are presented.

Table 1: Level of Service Definition for Intersections

Level of Service	Brief Description	Average Delay (seconds per vehicle)	
		Signalized Intersections	Unsignalized Intersections
A	Free flow conditions.	< 10	< 10
B	Stable conditions with some affect from other vehicles.	10 to 20	10 to 15
C	Stable conditions with significant affect from other vehicles.	20 to 35	15 to 25
D	High density traffic conditions still with stable flow.	35 to 55	25 to 35
E	At or near capacity flows.	55 to 80	35 to 50
F	Over capacity conditions.	> 80	> 50

Source: Highway Capacity Manual (2010), Chapters 18 through 21

Level of service calculations were performed using the Vistro 2020 software package with results reported in accordance with the current *HCM 6th Edition* methodology.

Level of Service Policies

Nevada Department of Transportation

The Nevada Department of Transportation (NDOT) *Traffic Impact Study Requirements* publication states:

- Level of Service "C" will be the design objective for capacity and under no circumstances will less than Level of Service "D" be accepted for site and non-site traffic.

This level of service policy is not specific to minor side street approaches, but rather focuses on maintaining quality operations on the mainline corridors. LOS "E" or "F" on a side street approach does not constitute an exceedance of the level of service policy as this is understood to be a common and manageable condition on high volume arterials, particularly during peak hours. Overall intersection operation is the measure to which the level of service policy applies.

These policies apply to intersections on NDOT jurisdiction roadways (William Street).

Carson City

The Carson City Code of Ordinances Section 18.12.13 establishes Level of Service (LOS) "D" as the citywide level of service standard. The policy does not specifically address unique situations at minor street approaches. It is important to note that there is commonly a side-street volume which causes exceedance of LOS "D", but does not warrant a traffic signal or other improvement. Special consideration of the analysis and situation is needed in these cases.

These policies apply to intersections on Carson City jurisdiction roadways.

Phasing Plan Traffic Conditions

The traffic section (4.5) of the Lompa Ranch North SPA (August 2017) identifies the following additional requirements:

- The developer is actively seeking the Gold Dust West Way connection and believes that the required right-of-way for this connection will be obtained. In case this connection or a substitute connection cannot be made, no more than 810 single family residential unit building permits (or permits for the equivalent trip generation) shall be issued in the Specific Plan Area west of Highway 580.
- The segment of N Saliman Rd between E William St and E Robinson St will have a projected level of service of C or better for year 2025 unless the North-South Spine Road is connected to William Street. The North-South Spine Road must connect to William Street prior to any development that would cause a level of service worse than C for this segment of road." The Lompa Ranch West Build-Out Traffic Impact identifies the peak hour capacity for LOS "C" as 1,750 vehicles on a four-lane road. This criteria was a component of establishing the threshold (810 single family units) for the number of units that could be constructed prior to a north connection to William Street. The value of 1,750 bi-directional movements as the maximum for LOS "C" in the peak hour is confirmed by the 2000 Highway Capacity Manual, Exhibit 10-7 "Service Volumes for Urban Streets" (provided in **Appendix H**) which indicates a range of 1,510 to 2,580 bi-directional movements as the upper end of LOS C for roadways similar to Saliman Road. The 1,750 threshold for this study falls within the lower end of that spectrum and is deemed an appropriate value consistent with the Lompa Ranch West Build-Out Traffic Impact Study. This condition applies to the 2025 Plus Project scenario during school hours.
- Traffic studies required for all phases must demonstrate that the northbound leg and the westbound left turning movement of the N Saliman Road / E William Street intersection and the overall

intersection will have a projected level of service of D or better for year 2025 unless the North-South spine road is connected to William Street. The North-South spine road must connect to E. William Street prior to any development that would cause a level of service worse than D for the northbound leg or the westbound left turning movement of this intersection during school hours. This condition applies to the 2025 Plus Project scenario.

- A future traffic signal is identified in the Lompa Ranch North SPA when either of the following conditions are met:
  - The AM peak hour bidirectional traffic volume on Robinson Street east of Saliman Road reaching 600 total vehicles.
  - The completion of 460 housing units that contribute trips directly to Robinson Street (Phases A2 and A3 in the southwest corner of the property are not considered contributors to Robinson Street).
  - The traffic signal shall not be constructed until MUTCD traffic signal warrant criteria are formally met.
  - This condition applies to the 2025 Plus Project and Future Year Plus Project scenarios.

EXISTING TRANSPORTATION FACILITIES

Roadway Facilities

A brief description of the key roadways in the study area is provided below:

E. William Street is a five-lane roadway with two travel lanes in each direction and a center turn lane that runs generally in the east-west direction. The posted speed limit is 40 miles per hour (mph) in the project area.

Saliman Road is a five-lane roadway with two travel lanes in each direction and a center-turn-lane that runs generally in the north-south direction. The posted speed limit is 25 mph between William Street and Pinto Court and 35 mph south of Pinto Court. There is an existing school zone on Saliman Road with a 15 mph speed requirement, when flashing, between William Street and Robinson Street.

5th Street is an east-west roadway with three lanes (one lane in each direction and a center-turn-lane) west of Saliman Road and three lanes starting just east of Saliman Road (the two eastbound lanes merge into one lane approximately 800’ east of Saliman Road). The posted speed limit on 5th Street is 30 miles per hour (mph) west of Saliman Road and 40 mph east of Saliman Road. Improvements are planned on 5th Street with the multifamily phase. The subject Phase 2 project will build from those in-progress improvements.

Crash History

Crash data was obtained from the *Nevada Department of Transportation (NDOT)* for the latest 5-year period (January 2015 to January 2020) for the following existing intersections:

- William Street / Saliman Road
- Saliman Road / Robinson Street
- Saliman Road / 5th Street

A total of 64, 15, and 22 crashes were reported at the William Street / Saliman Road, Saliman Road / Robinson Street, and Saliman Road / 5th Street intersections within the 5-year period, respectively. No fatalities were reported at any of the three intersections. The most common type of reported crashes were angle, rear-end, and sideswipe. **Table 2** shows a brief summary and complete crash data is provided in **Appendix A**.

Table 2. NDOT Crash Data Summary

ID	Intersection	Total	Fatalities	Injuries	PDO	Angle	Rear-End	Side-Swipe
1	William Street / Saliman Rd	64	0	20	44	16	28	15
	Percentage (%)	100%	0%	31%	69%	25%	44%	23%
2	Saliman Rd / Robinson St	15	0	5	10	6	4	3
	Percentage (%)	100%	0%	33%	67%	40%	27%	20%
4	Saliman Rd / 5th St	22	0	4	18	11	3	3
	Percentage (%)	100%	0%	18%	82%	50%	14%	14%

Alternative Mode Facilities

Within the project vicinity, sidewalks are present on both sides of William Street, Saliman Road, and intermittently on 5th Street. Future Lompa Ranch West phases are in the process of constructing sidewalk on the north side of 5th Street. Marked bicycle lanes exist on both sides of William Street, Saliman Road, and 5th Street. Fixed transit routes are not provided within the project vicinity.

2025 CONDITIONS

Traffic Volumes

New vehicle turning movement, pedestrian, and bicycle volumes were collected on August 18, 2021 and August 19, 2021 with Carson High School in regular session at the following intersections:

- William Street / Saliman Road
- Saliman Road / Robinson Street
- Saliman Road / 5th Street

The projects included in the 2025 scenario are the following:

- Lompa Ranch Phase 1
- Lompa Ranch Phase 2
- Lompa Ranch Multifamily
- Little Lane Village
- Carson Lofts

Time of day distribution for single-family residential sites was obtained from the Institute of Transportation Engineers (ITE) online website and is provided in **Appendix B**. It was determined that the 2-3 PM afternoon peak hour is approximately 27 percent less intense than the PM peak hour. To be conservative, the afternoon peak hour uses a trip generation rate that is 75 percent that of the PM peak hour.

Traffic volumes for the anticipated near-term projects listed above were manually added to the existing traffic volumes to obtain 2025 Condition traffic volumes. The 2025 Condition lane configurations, intersection controls, and peak hour traffic volumes are shown in **Figure 3**.

Signal Timings

Existing signal timing was obtained from Carson City for the William Street / Saliman Road and Saliman Road / 5th Street intersections. Both intersections operate as "free-running uncoordinated" during the school peak hours. Analysis using free-running operations at the William Street / Saliman Road intersection resulted in optimistic traffic operations and level of service results (less delay and shorter queues). Therefore, signal timing was approximated during the school hours based on video recording collected for the counts. A 150 second cycle was used with the most highly utilized crosswalks (east and south legs) being activated (forced on) every cycle for conservative analysis purposes. The William Street / Saliman Road intersection operates in a coordinated system during the PM peak hours and city timings were used for this period.

Intersection Level of Service Analysis

Table 3 presents the level of service analysis for 2025 Conditions and the calculation sheets are provided in **Appendix C**, attached. The bicycle and pedestrian volumes observed during data collection are included in this analysis. The Saliman Road / 5th Street analysis incorporates the signal modification improvements (westbound right turn lane) being implemented by the multifamily phase.

Table 3: 2025 Conditions Intersection Level of Service

ID	Intersection	Intersection Control	Movement	AM Peak		Afternoon		PM Peak	
				LOS	Delay	LOS	Delay	LOS	Delay
1	William St / Saliman Rd	Signalized	Overall	C	31.6	C	34.9	C	31.2
			Northbound Approach	C	27.0	C	24.9	C	32.9
			Westbound Left	D	48.6	D	50.4	D	50.5
2	Saliman Rd / Robinson St	All-Way STOP	Overall	C	17.0	C	17.5	B	14.7
3	Saliman Rd / 5th St	Signalized	Overall	B	15.2	B	13.5	B	14.4
4	Robinson St / Lompa Ranch Spine Rd	Roundabout	Overall Delay	A	3.1	A	3.1	A	3.2
			Overall v/c Ratio		0.1		0.1		0.1
5	5th St / Lompa Ranch Spine Rd	Side Street STOP	Southbound Left	C	21.6	C	15.7	C	19.9
			Southbound Right	B	13.7	B	10.4	B	10.6
			Eastbound Left	A	9.0	A	8.1	A	8.2

Under 2025 conditions, all study intersections are anticipated to operate at acceptable levels of service (LOS "D" or better). It is estimated that the westbound left-turn queue at the William Street / Saliman Road intersection will have a length of 246 feet and queue outside of the existing turn pocket as it does today.

FUTURE YEAR CONDITIONS

Traffic Volumes

Future Year (20-year horizon) traffic volumes were developed to assess potential impacts on the future transportation system. It is expected that anticipated development and planned roadway projects will generally increase volumes and shift traffic patterns by the Future Year scenario. To obtain Future Year traffic volumes, background growth rates and factors were obtained from the most recent (April 2021) CAMPO travel demand model. Travel demand outputs from the model are included in **Appendix D**. The CAMPO Model (without a north connection to William Street) indicates that the Lompa Ranch West project area will generate approximately 8,633 daily trips in the 2050 horizon. This is higher than the daily trips estimated through the ITE trip generation, as shown in **Table 4**.

The currently proposed Lompa Ranch West development, including the proposed north residential phase, is estimated to generate approximately 7,638 daily trips as shown in **Table 4**.

Table 4: Proposed Development Phases

Land Use Mix	Weekday	AM Peak			PM Peak		
		Total	Entry	Exit	Total	Entry	Exit
Phase 1 (189 SF)	1,784	140	35	105	187	118	69
Phase 2 (204 SF)	1,926	151	38	113	202	127	75
MF Site - Ryder (360 MF)	2,635	166	38	128	202	127	75
North Residential (137 S.F. units)	1,293	101	25	76	136	85	51
Total	**7,638**	**558**	**136**	**422**	**727**	**457**	**270**

Notes: Proposed Project

This demonstrates that the Lompa Ranch West project at the currently proposed levels is sufficiently loaded into the travel demand model.

Table 5 shows the future growth rate calculations for the study area.

Table 5: CAMPO Growth Rates

Location -->	Williams W/O Saliman	Williams E/O Saliman	Saliman S/O Williams	Robinson W/O Saliman	Robinson E/O Saliman	Saliman N/O 5th	Saliman S/O 5th	5th W/O Saliman	5th E/O Spine Road
1. Demand Model Volumes									
2020 CAMPO	18,931	25,573	11,768	2,624	989	11,095	10,557	8,241	5,273
2050 CAMPO	22,477	29,458	15,884	3,291	2,892	15,027	14,563	9,324	6,792
Model Difference 2050-2020	3,546	3,885	4,116	667	1,903	3,932	4,006	1,083	1,519
2. Growth Rate Method									
30 Years % Change	19%	15%	35%	25%	192%	35%	38%	13%	29%
% per year	0.6%	0.5%	1.2%	0.8%	6.4%	1.2%	1.3%	0.4%	1.0%
Adjusted %/year	0.6%	0.5%	1.2%	0.8%	6.4%	1.2%	1.3%	0.4%	1.0%
20 years growth factor	**1.12**	**1.10**	**1.23**	**1.17**	**2.28**	**1.24**	**1.25**	**1.09**	**1.19**
3. Resultant Peak Hour Segment Volumes									
Existing AM	1597	1843	1237	278	204	729	694	726	805
Existing PM	1609	2055	838	158	140	705	746	807	782
2040 AM	1837	2205	1608	323	409	924	901	870	949
2040 PM	1870	2487	1237	194	391	934	995	981	940
AM Growth Rate	1.15	1.20	1.30	1.16	2.00	1.27	1.30	1.20	1.18
PM Growth Rate	1.16	1.21	1.48	1.23	2.79	1.32	1.33	1.22	1.20
Resultant Growth Rate	**1.16**	**1.20**	**1.39**	**1.19**	**2.40**	**1.30**	**1.32**	**1.21**	**1.19**

As shown in **Table 5**, it is estimated from less impacted roadways (Williams Street west of Saliman and 5th Street west of Saliman) that the background growth rate is approximately 0.5% per year between 2020 and 2050. Therefore, the Future Year (20-year horizon) traffic volumes were obtained by the following methodology:

- Apply a 1.1 growth factor (approximately 0.5% per year for 20 years) to the 2021 existing traffic volumes.
    - Blackstone Ranch South, Lompa Ranch East, and the south remainder parcel (equivalent to 83 single-family homes) are included in the model.
- Assign anticipated project traffic volumes to the study intersections for the following projects:
    - Lompa Ranch Phase 1
    - Lompa Ranch Phase 2
    - Lompa Ranch Multifamily
    - Little Lane Village (Not included in CAMPO Model)
    - Carson Lofts (Not included in CAMPO Model)

As shown in **Table 5**, the resultant peak hour segment volumes were then compared to the CAMPO Travel Demand model to confirm that the resultant peak hour growth rates are equal to or higher than the calculated growth rates from the CAMPO Travel Demand Model. This methodology is equal to or slightly more conservative on all study segments than what is anticipated within the CAMPO Travel Demand Model.

Intersection Level of Service Analysis

A traffic signal is assumed at the 5th Street / Lompa Ranch Spine Road intersection under the Future Year scenario consistent with the Traffic Impact Study for Blackstone Ranch South (Headway Transportation, 2019).

The Future Year traffic volumes, lane configurations, and controls are shown in **Figure 4**. **Table 6** shows the Future Year (20-year horizon) conditions level of service analysis results. The technical calculations are provided in **Appendix E**.

Table 6: Future Year Intersection Level of Service

ID	Intersection	Intersection Control	Movement	AM Peak		Afternoon		PM Peak	
				LOS	Delay	LOS	Delay	LOS	Delay
1	William St / Saliman Rd	Signalized	Overall	C	33.8	D	38.8	C	32.6
			Northbound Approach	C	28.1	C	25.3	C	31.6
			Westbound Left	D	50.2	D	52.0	D	50.1
2	Saliman Rd / Robinson St	All-Way STOP	Overall	C	19.5	C	20.4	C	16.1
3	Saliman Rd / 5th St	Signalized	Overall	B	16.1	B	14.1	B	15.1
4	Robinson St / Lompa Ranch Spine Rd	Roundabout	Overall Delay	A	3.1	A	3.1	A	3.2
			Overall v/c Ratio		0.1		0.1		0.1
5	5th St / Lompa Ranch Spine Rd	Signal	Overall	B	11.0	B	10.2	A	8.5

Under Future Year conditions, all studied intersections operate at acceptable levels of service (LOS "D" or better). It is estimated that the westbound left-turn queue at William Street / Saliman Road will have a length of 261 feet and queue outside of the existing turn pocket as it does today.

PROJECT CONDITIONS

Project Description

The proposed 137 unit single-family residential project is located in the northeast corner of the Lompa Ranch West development, as shown in **Figure 2**, attached. The project proposes to construct the following improvements:

- The project will construct three separate points of access to the north residential area including the Lompa Ranch Spine Road / Robinson Street roundabout and two additional points of access on Robinson Street.
- The project will extend Lompa Ranch Spine Road to the northern edge of this phase (for a future north connection to William Street).
- The project will construct the north leg of the Lompa Ranch Spine Road / Robinson Street roundabout and an east leg of the roundabout as a local street connection.
- The project will construct bike lanes and a separated multi-use path on Lompa Ranch Spine Road.

Trip Generation

Vehicular trip generation rates for the proposed project were obtained from the *Trip Generation Manual, 10th Edition*, published by the Institute of Transportation Engineers (ITE). **Table 7** provides the Daily, AM Peak Hour, and PM Peak Hour trip generation calculations for the proposed project. As noted earlier, it is estimated that the Afternoon peak hour trip rate is approximately 75 percent of the PM peak hour trip rate.

Table 7: Vehicular Trip Generation Estimates

(ITE #) Land Use	Quantity	Daily	AM Peak			Afternoon			PM Peak		
			Total	In	Out	Total	In	Out	Total	In	Out
Single-Family Detached Housing (210)	137 units	1,293	101	25	76	102	64	38	136	85	51

As shown in the table, the project is anticipated to generate approximately 1,293 Daily trips, 101 AM peak hour trips, 102 Afternoon Peak hour trips, and 136 PM peak hour trips.

Trip Generation Equivalent

The phasing plan for the Lompa Ranch North SPA project states:

- The developer is actively seeking the Gold Dust West Way connection and believes that the required right-of-way for this connection will be obtained. In case this connection or a substitute connection cannot be made, no more than 810 single family residential unit building permits (or permits for the equivalent trip generation) shall be issued in the Specific Plan Area west of Highway 580.

Table 8 shows the trip generation comparison between 810 single-family units (allowable max), the approved land use mix to date, and the calculated remaining units that could be constructed prior to a north connection and without a Masterplan amendment.

Table 8. Trip Generation Comparison & Calculations

Scenario	Weekday	AM Peak			PM Peak		
		Total	Entry	Exit	Total	Entry	Exit
810 S.F. Units (Allowable Max)	7,646	599	149	450	802	505	297
Approved Land Uses to Date[1]	-6,345	-457	-111	-346	-591	-372	-219
Remainder	**1,301**	**142**	**38**	**104**	**211**	**133**	**78**
Trips Generated by 137 S.F. Units	-1,293	-101	-25	-76	-136	-85	-51
Remaining Surplus Trips	**8**	**41**	**13**	**28**	**75**	**48**	**27**

Notes: [1]Phase 1, Phase 2, Multifamily

As shown in the table, an additional 137 single-family units is estimated to generate 8 Daily, 41 AM peak hour, and 75 PM peak hour fewer primary trips than allowed, prior to a north connection, by the Lompa Phasing Plan. Thus, the proposed project is in accordance with the phasing plan allowed trip generation.

Project Access

Access to/from the north residential phase is proposed via the Lompa Ranch Spine Road / Robinson Street Roundabout and two other points of access on Robinson Street. The project will construct the north leg of the Lompa Ranch Spine Road / Robinson Street roundabout and an east leg as a local street to serve this phase.

Trip Distribution

Traffic generated by the project was distributed to the road network based on the location of the project in relation to major activity centers and the roadway network. The trip distribution and assignment for the 2025 Plus Project scenario does not include a north connection to Gold Dust Way because it will not be in place until a later phase. The project trips for this scenario were distributed as follows:

- 25% to/from the south via Saliman Road
- 15% to/from the north via I-580
- 15% to/from the east via William Street
- 15% to/from the west via William Street
- 10% to/from the west via 5th Street
- 10% to/from the east via 5th Street
- 5% to/from the south via I-580
- 5% to/from the west via Robinson Street

The project trip distribution and assignment is shown on **Figure 5**.

2025 PLUS PROJECT CONDITIONS

Traffic Volumes

2025 Plus Project traffic volumes were developed by adding the project generated trips (**Figure 5**) to the 2025 Conditions traffic volumes (**Figure 3**). The 2025 Conditions Plus Project lane configurations, controls and peak hour turning movement volumes are shown in **Figure 6,** attached.

Intersection Level of Service Analysis

Table 9 shows the 2025 Plus Project intersection level of service results for the AM and PM peak hours. The technical calculations are provided in **Appendix F**.

Table 9: 2025 Plus Project Intersection Level of Service

ID	Intersection	Intersection Control	Movement	AM Peak		Afternoon		PM Peak	
				LOS	Delay	LOS	Delay	LOS	Delay
1	William St / Saliman Rd	Signalized	Overall	C	32.2	D	35.8	C	31.8
			Northbound Approach	C	27.7	C	25.4	C	32.7
			Westbound Left	D	49.2	D	50.8	D	49.9
2	Saliman Rd / Robinson St	All-Way STOP	Overall	C	18.1	C	18.6	C	15.7
3	Saliman Rd / 5th St	Signalized	Overall	B	15.4	B	13.6	B	14.5
4	Robinson St / Lompa Ranch Spine Rd	Roundabout	Overall Delay	A	3.4	A	3.4	A	3.5
			Overall v/c Ratio		0.1		0.1		0.1
5	5th St / Lompa Ranch Spine Rd	Side Street STOP	Southbound Left	C	22.7	C	16.3	C	21.1
			Southbound Right	B	13.9	B	10.4	B	10.7
			Eastbound Left	A	9.1	A	8.2	A	8.3

With the addition of project traffic, all study intersections are anticipated to operate at acceptable levels of service (LOS "D" or better). It is anticipated that westbound left-turn queuing at William Street / Saliman Road will increase by approximately 15 feet which is a less than significant impact.

2025 Phasing Plan Conditions Review

The phasing plan requirements for the Lompa Ranch North SPA project applicable to the 2025 scenario are the following:

- The segment of N Saliman Rd between E William St and E Robinson St will have a projected level of service of C or better for year 2025 unless the North-South Spine Road is connected to William Street. The North-South Spine Road must connect to William Street prior to any development that would cause a level of service worse than C for this segment of road. The Lompa Ranch West Build-Out Traffic Impact identifies the peak hour capacity for LOS "C" as 1,750 vehicles on a four-lane road.

It is anticipated that with the proposed project, Saliman Road will carry approximately 1,533 bi-directional peak hour vehicles during the highest hour. Therefore, it is anticipated that Saliman Road will operate at LOS "C" or better during the school peak hours and is accordance with this condition of approval.

- Traffic studies required for all phases must demonstrate that the northbound leg and the westbound left turning movement of the N Saliman Road / E William Street intersection and the overall intersection will have a projected level of service of D or better for year 2025 unless the North-South spine road is connected to William Street. The North-South spine road must connect to E. William Street prior to any development that would cause a level of service worse than D for the northbound leg or the westbound left turning movement of this intersection during school hours.

As shown in the **Table 9**, it is anticipated that the northbound approach, westbound left turn movement, and the overall intersection will operate at level of service "D" or better under 2025 plus project conditions. Thus, the proposed project is in accordance with this condition.

- A future traffic signal is identified in the Lompa Ranch North SPA when either of the following conditions are met:
  - The AM peak hour bidirectional traffic volume on Robinson Street east of Saliman Road reaching 600 total vehicles.
  - The completion of 460 housing units that contribute trips directly to Robinson Street (Phases A2 and A3 in the southwest corner of the property are not considered contributors to Robinson Street).
  - The traffic signal shall not be constructed until MUTCD traffic signal warrant criteria are formally met, which is anticipated prior to reaching the triggers stated above.

With addition of the project, it is anticipated that the peak hour bi-directional traffic volume on Robinson Street will be 477 total vehicles. With construction of this project, the Lompa Ranch West development will contain 530 applicable housing units which is greater than the 460 housing units. However, not all housing units in the prior phases or this project phase will directly contribute to Robinson Street. The Saliman Road / Robinson Street intersection is anticipated to operate at LOS "C" during the peak hours and preliminary analysis indicates that signal warrants will not formally be met with this project phase.

FUTURE YEAR PLUS PROJECT CONDITIONS

Traffic Volumes

Future Year Plus Project traffic volumes were developed by adding the project generated trips (**Figure 5**) to the Future Year traffic volumes (**Figure 4**). The Future Year lane configurations, controls and peak hour turning movement volumes are shown in **Figure 7,** attached.

Intersection Level of Service Analysis

Table 10 shows the Future Year Plus Project condition level of service analysis results. The technical calculations are provided in **Appendix G**.

Table 10: Future Year Plus Project Intersection Level of Service

ID	Intersection	Intersection Control	Movement	AM Peak		Afternoon		PM Peak	
				LOS	Delay	LOS	Delay	LOS	Delay
1	William St / Saliman Rd	Signalized	Overall	C	34.5	D	39.9	C	33.3
			Northbound Approach	C	28.9	C	25.9	C	31.5
			Westbound Left	D	50.8	D	52.6	D	49.5
2	Saliman Rd / Robinson St	All-Way STOP	Overall	C	20.9	C	21.9	C	17.5
3	Saliman Rd / 5th St	Signalized	Overall	B	16.3	B	14.3	B	15.3
4	Robinson St / Lompa Ranch Spine Rd	Roundabout	Overall Delay	A	3.4	A	3.4	A	3.6
			Overall v/c Ratio		0.1		0.1		0.1
5	5th St / Lompa Ranch Spine Rd	Signal	Overall	B	11.5	B	10.2	A	8.6

Under Future Year Plus Project conditions, all study intersections are anticipated to operate at acceptable level of service conditions (LOS "D" or better). It is anticipated that westbound left-turn queuing at William Street / Saliman Road will increase by approximately 15 feet compared to Future Year Conditions (without project) which is a less than significant impact.

Conditions of Approval

The conditions of approval for the Lompa Ranch North SPA applicable to the 2040 scenario are the following:

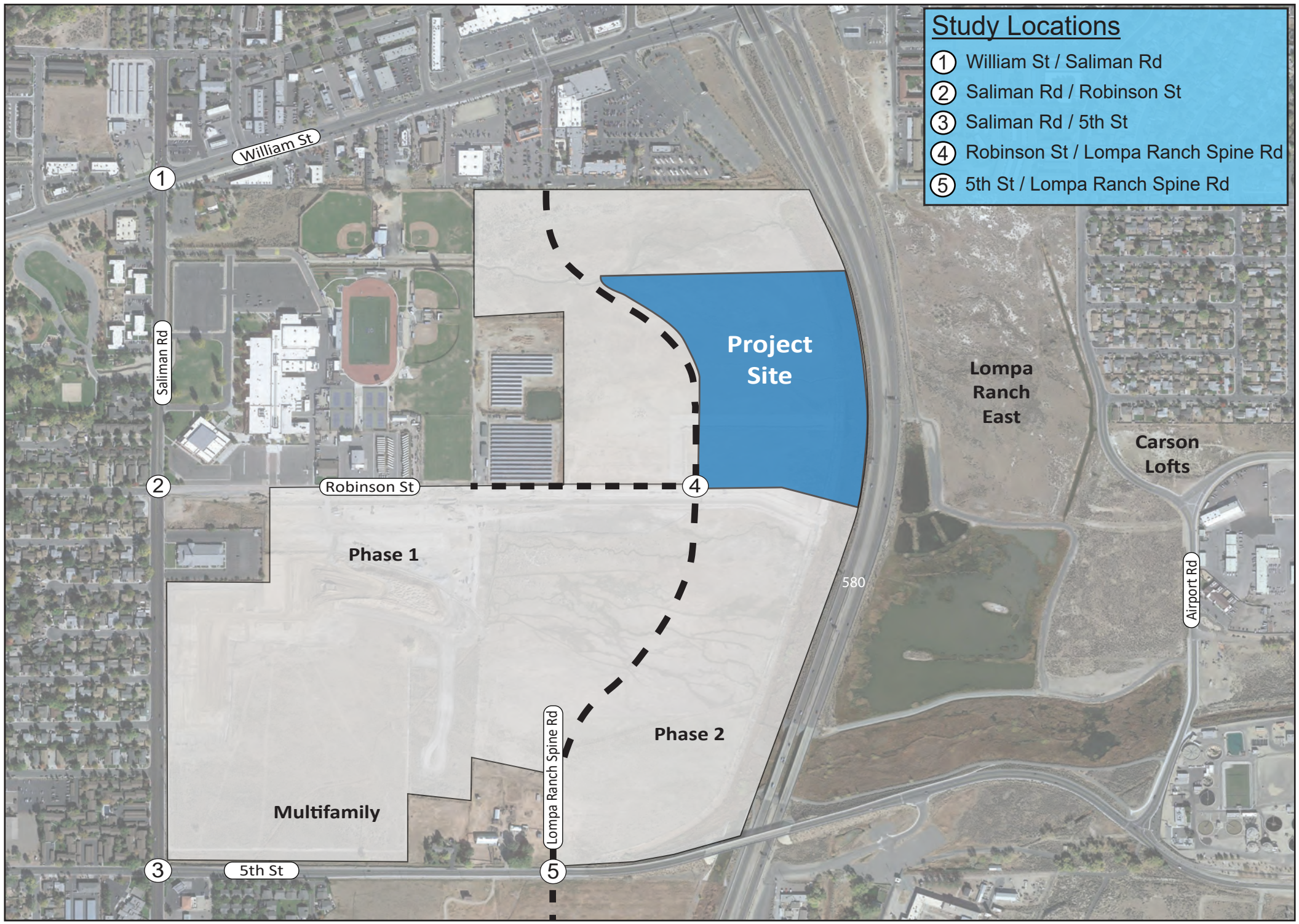
- A future traffic signal is identified in the Lompa Ranch North SPA when either of the following conditions are met:
  - The AM peak hour bidirectional traffic volume on Robinson Street east of Saliman Road reaching 600 total vehicles.
  - The completion of 460 housing units that contribute trips directly to Robinson Street (Phases A2 and A3 in the southwest corner of the property are not considered contributors to Robinson Street).
  - The traffic signal shall not be constructed until MUTCD traffic signal warrant criteria are formally met, which is anticipated prior to reaching the triggers stated above.

With addition of the project it is anticipated that the peak hour bi-directional traffic volume on Robinson Street will be 491 total vehicles. With construction of this project, the Lompa Ranch West development will contain 530 applicable housing units. However, not all housing units in the prior phases or this project phase will directly contribute to Robinson Street. The Saliman Road / Robinson Street intersection is anticipated to operate at LOS "C" during the peak hours and preliminary analysis indicates that signal warrants will not be formally be met with this project phase.

CONCLUSIONS & RECOMMENDATIONS

The following is a list of key findings and recommendations:

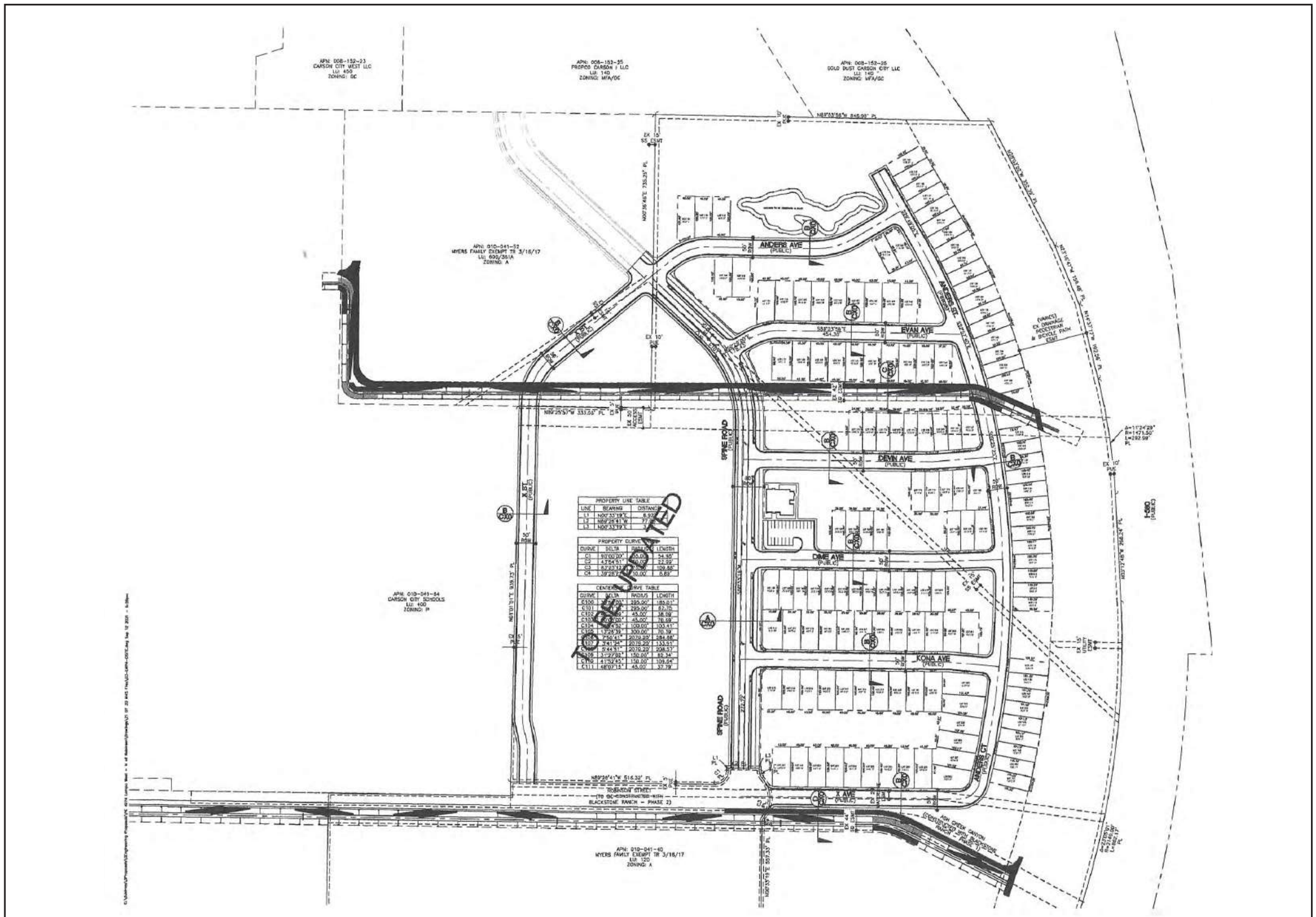
- The proposed 137 unit single-family residential phase is anticipated to generate approximately 1,293 Daily trips, 101 AM peak hour trips, 102 Afternoon peak hour trips, and 136 PM peak hour new trips.
- The project will construct three separate points of access including the Lompa Ranch Spine Road / Robinson Street roundabout and two additional point of access on Robinson Street.
- The project will extend Lompa Ranch Spine Road to the northwesterly edge of this phase where Spine Road intersects with Phase C1 (for a future north connection to Williams Street).
- The project will construct the remaining north leg of the Lompa Ranch Spine Road / Robinson Street roundabout and an east leg of the roundabout as a local street.
- The project will construct bike lanes and a separated multi-use path on Lompa Ranch Spine Road.
- With the addition of project traffic, all study intersections are anticipated to operate at acceptable levels of service (LOS “D” or better) under 2025 Plus Project conditions.
- The proposed project meets the Lompa Ranch North SPA traffic section requirements under the 2025 Plus Project scenario.
- With the addition of project traffic, all study intersections are anticipated to operate at acceptable levels of service (LOS “D” or better) under Future Year Plus Project conditions.
- The proposed project meets the Lompa Ranch North SPA traffic section requirements under the 2040 Plus Project scenario.



NO SCALE

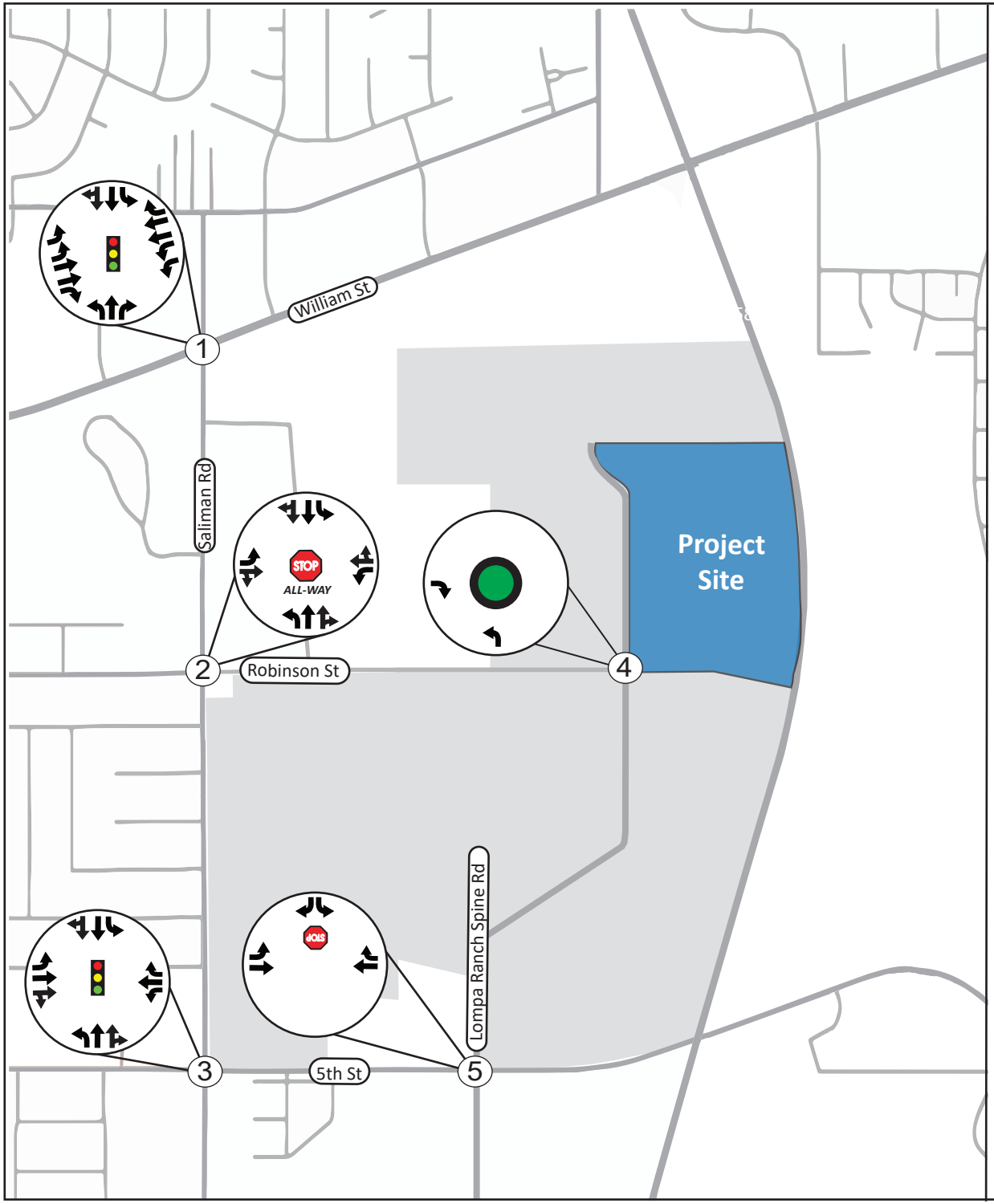
(#) Study Intersection | Project Site | Future Collector Roadway

Figure 1
Lompa Ranch North Residential Traffic Impact Study
Project Location



NO SCALE

Figure 2
Lompa Ranch North Residential
Traffic Impact Study
Preliminary Site Plan



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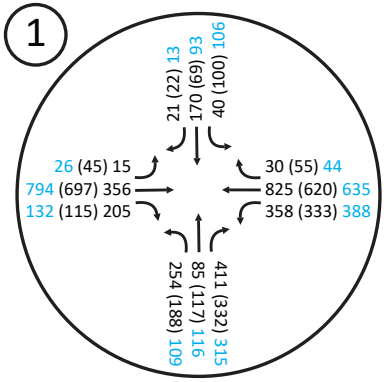
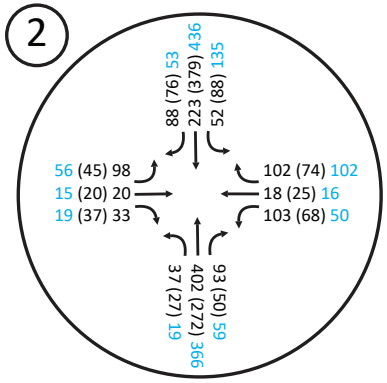
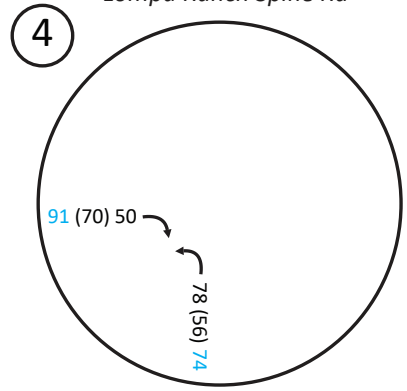


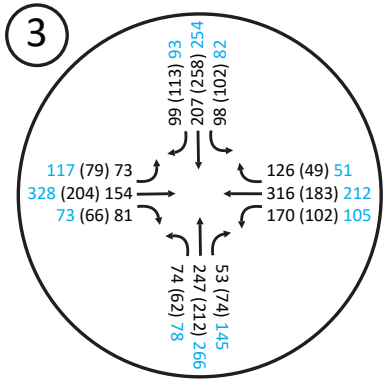
Saliman Rd / Robinson St



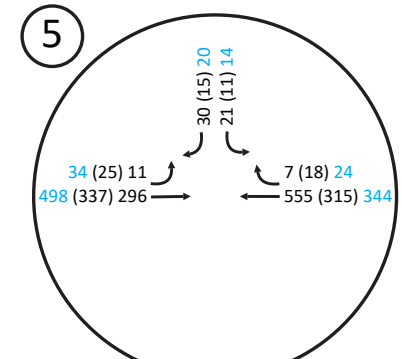
Robinson St / Lompa Ranch Spine Rd



Saliman Rd / 5th St



5th St / Lompa Ranch Spine Rd



HEADWAY TRANSPORTATION

NO SCALE

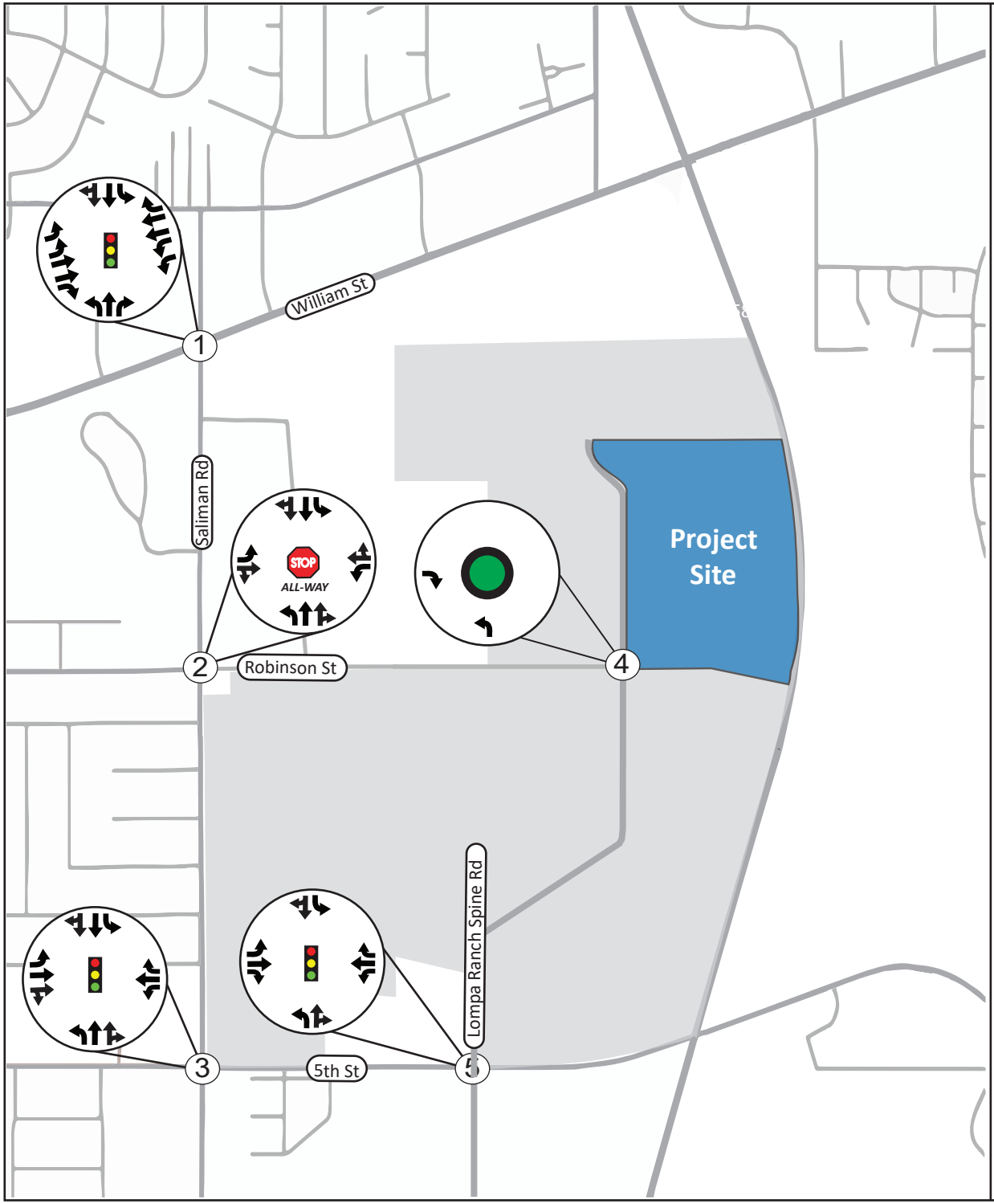
AM Peak Hour Volume
(Afternoon Peak Hour Volume)
PM Peak Hour Volume

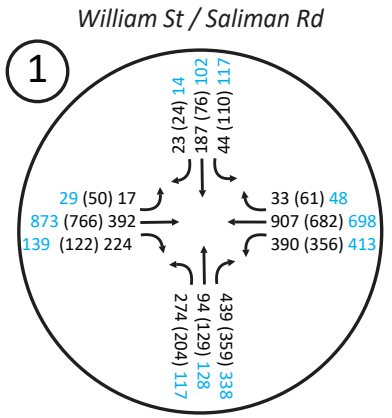
(#) Study Intersection

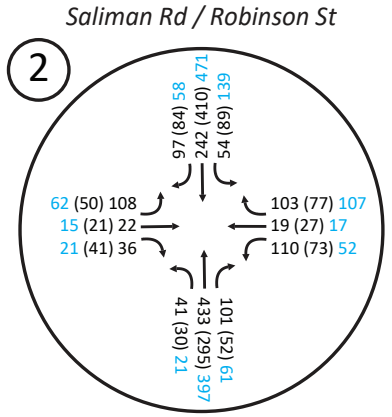
- Project Site
- Stop
- Traffic Signal
- Roundabout

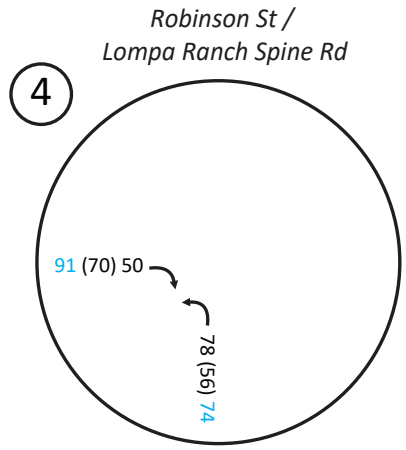
Figure 3
Lompa Ranch North Residential
Traffic Impact Study

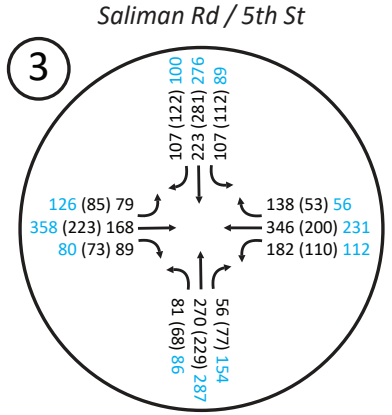
2025 Conditions Traffic Volumes, Lane Configurations, and Controls

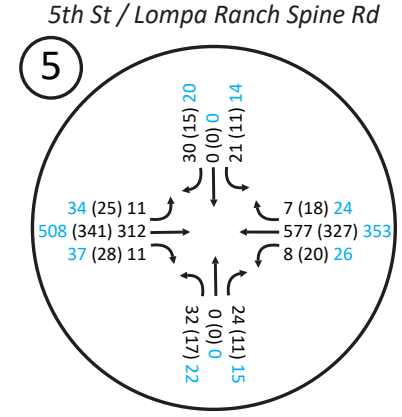












NO SCALE

AM Peak Hour Volume
(Afternoon Peak Hour Volume)
PM Peak Hour Volume

(#) Study Intersection

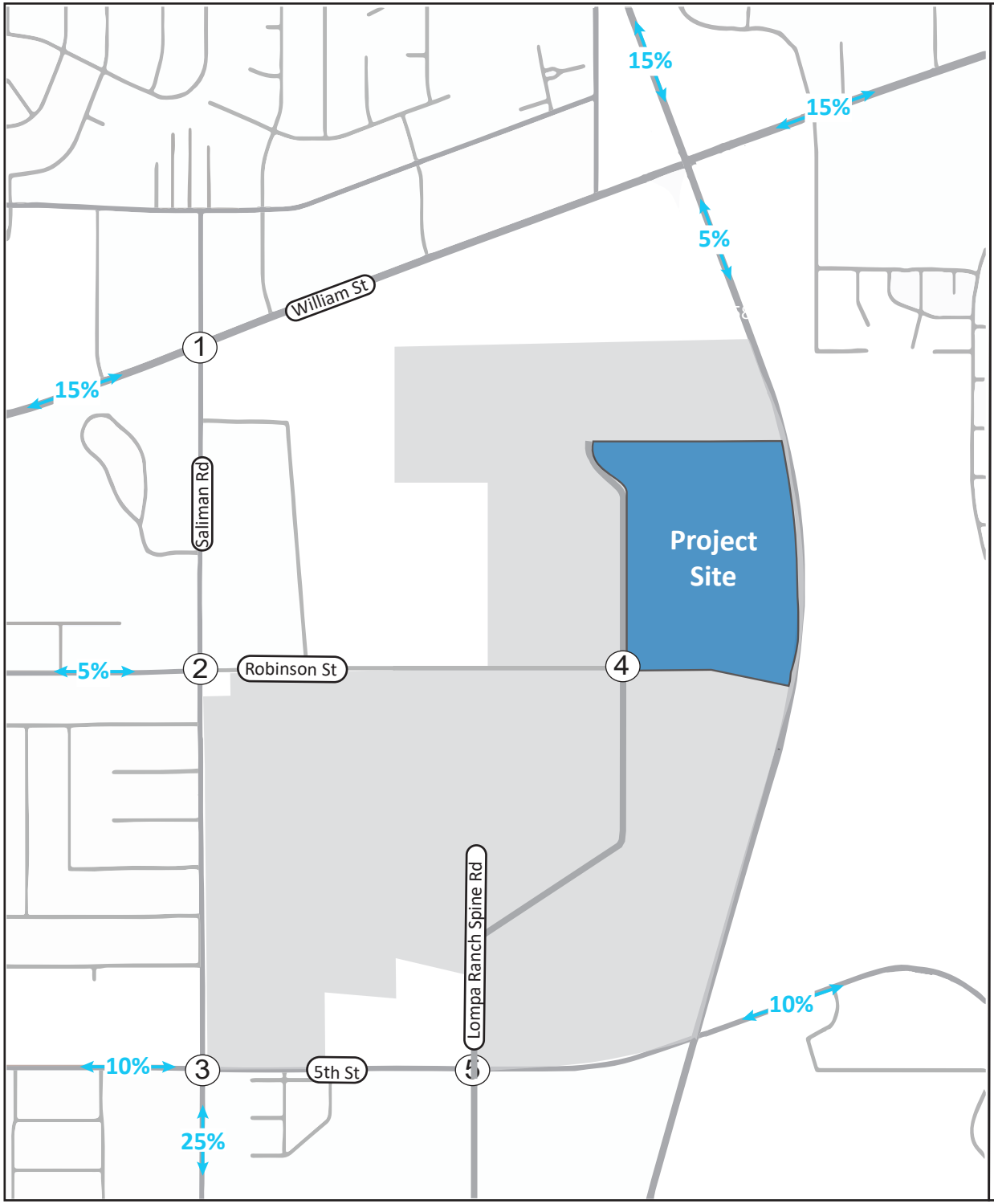
- Project Site

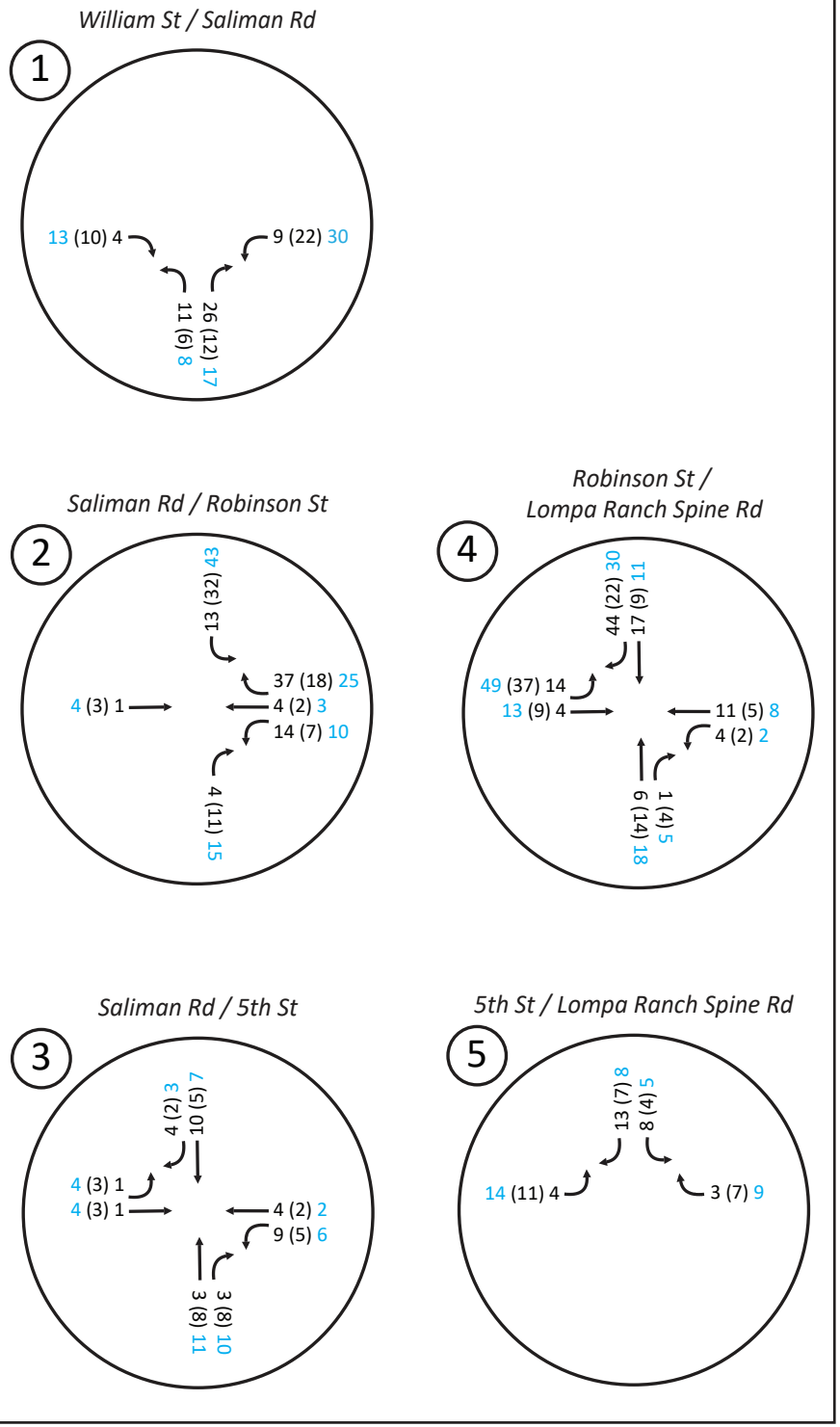
- Stop

- Traffic Signal

- Roundabout

Figure 4
Lompa Ranch North Residential
Traffic Impact Study
Future Year Traffic Volumes, Lane Configurations, and Controls





HEADWAY TRANSPORTATION

AM Peak Hour Volume
(Afternoon Peak Hour Volume)
PM Peak Hour Volume

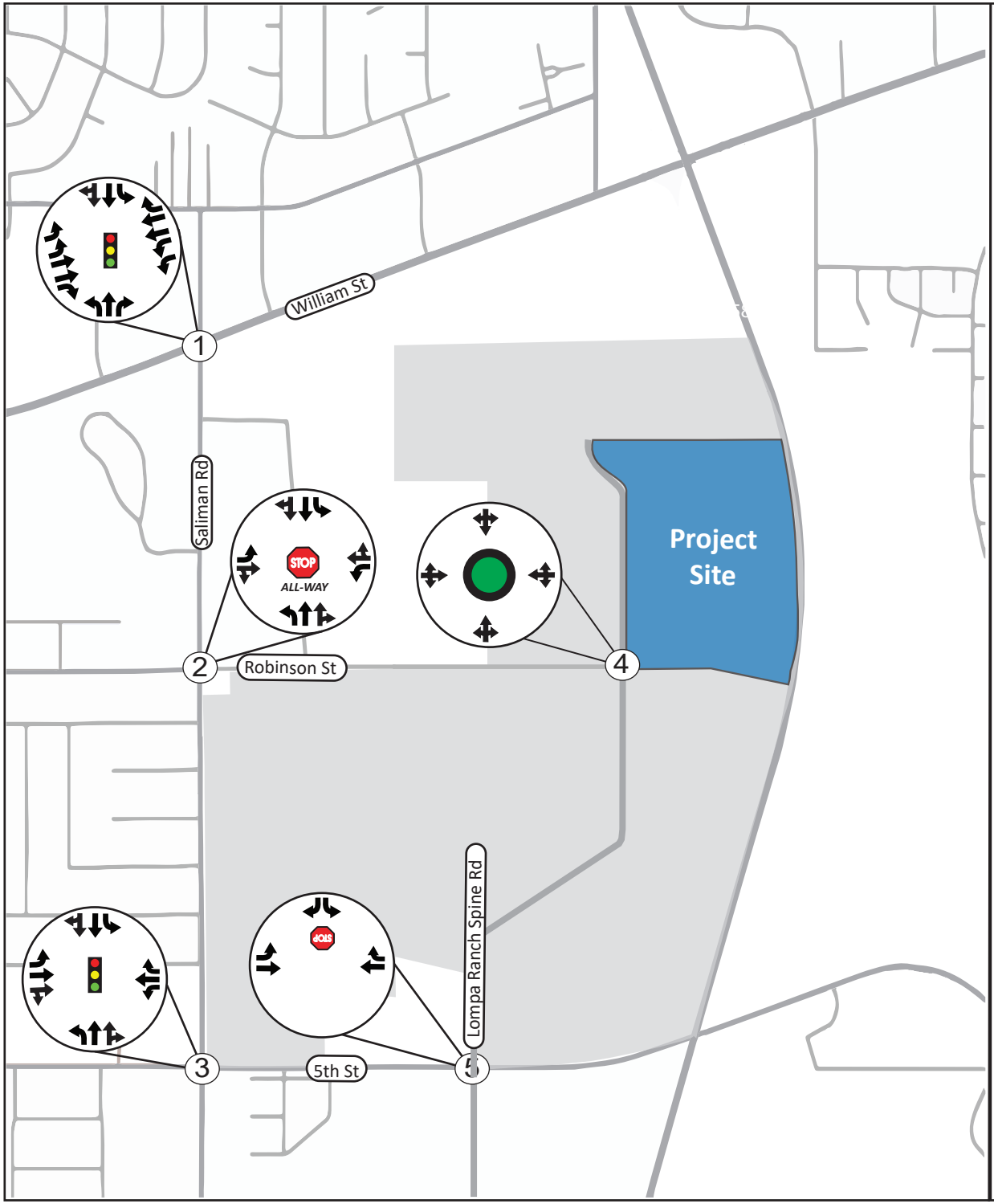
NO SCALE

(#) Study Intersection

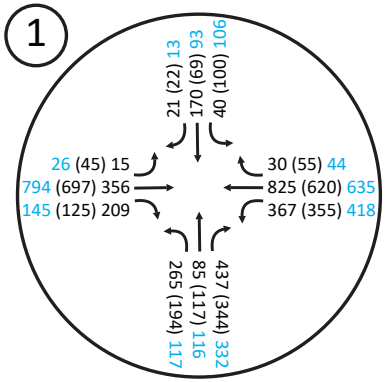
Project Site

XX% Trip Distribution

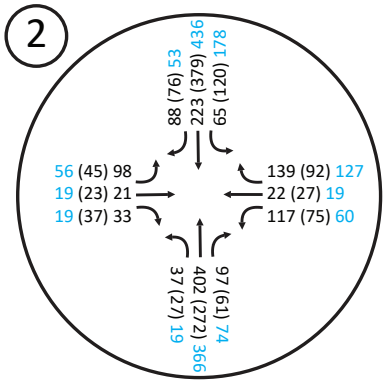
Figure 5
Lompa Ranch North Residential
Traffic Impact Study
Project Trip Distribution and Assignment



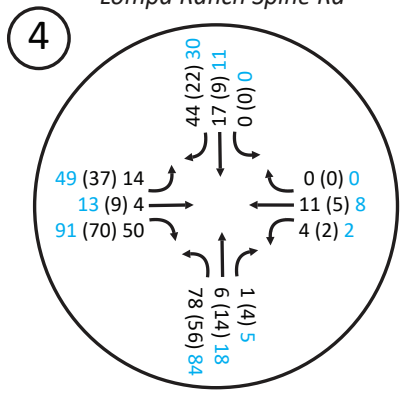
William St / Saliman Rd



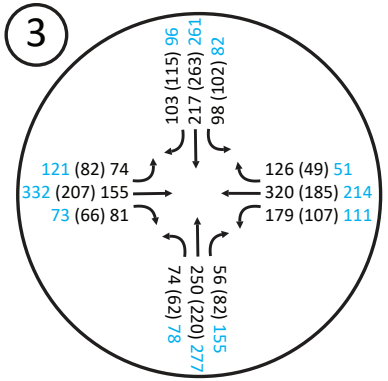
Saliman Rd / Robinson St



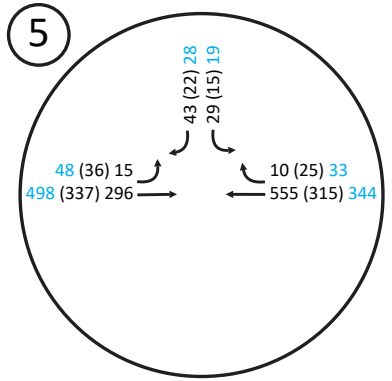
Robinson St / Lompa Ranch Spine Rd



Saliman Rd / 5th St



5th St / Lompa Ranch Spine Rd

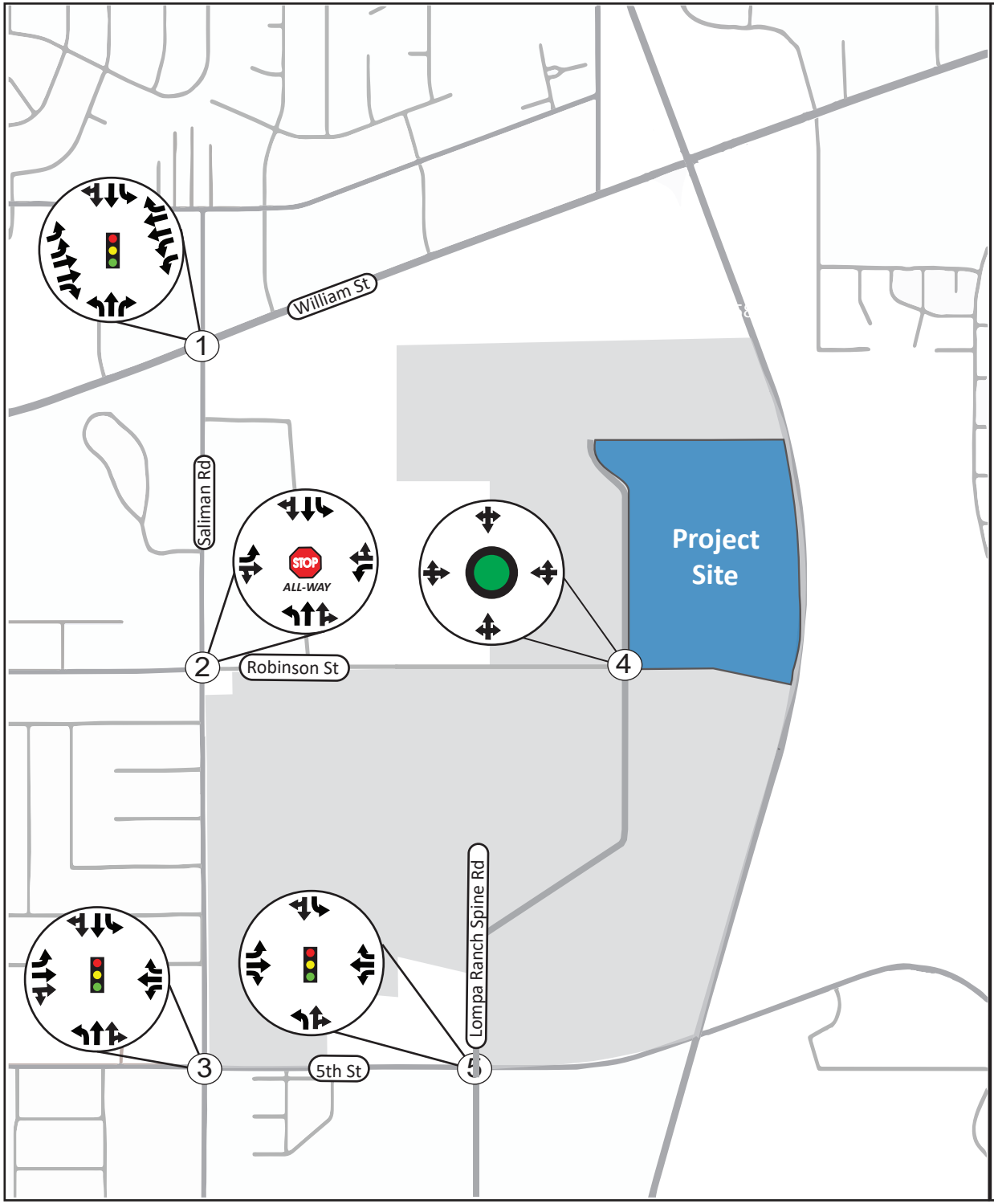


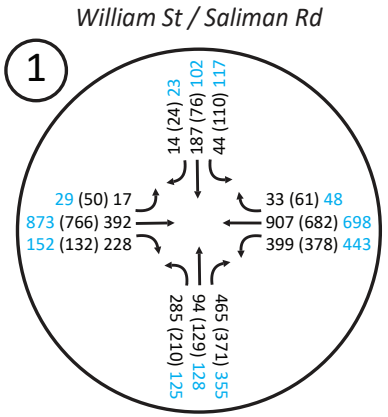
NO SCALE

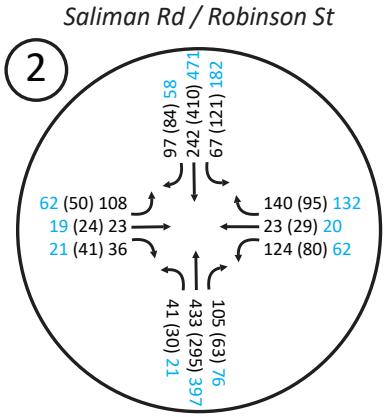
AM Peak Hour Volume
(Afternoon Peak Hour Volume) # Study Intersection - Project Site - Stop - Traffic Signal - Roundabout
PM Peak Hour Volume

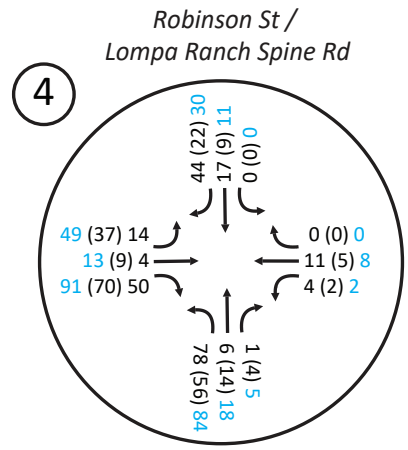
Figure 6
Lompa Ranch North Residential
Traffic Impact Study

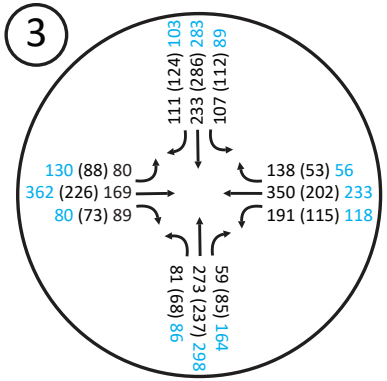
2025 Conditions Plus Project Traffic Volumes, Lane Configurations, and Controls

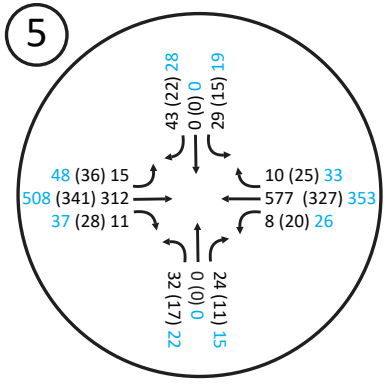












NO SCALE

AM Peak Hour Volume
(Afternoon Peak Hour Volume)
PM Peak Hour Volume

Study Intersection

- Project Site
- Stop
- Traffic Signal
- Roundabout

Figure 7
Lompa Ranch North Residential
Traffic Impact Study

Future Year Plus Project Traffic Volumes, Lane Configurations, and Controls

BLACKSTONE RANCH – NORTH, 137 LOT SFR SUBDIVISION

WATER FEASIBILITY STUDY

(A PORTION OF PARCEL NO. 10-041-39 AND 10-041-52)

CARSON CITY, NEVADA

Prepared for:

BLACKSTONE DEVELOPMENT GROUP

439 Plumb Lane
Reno, Nevada 89509
775.352.4200 p
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Prepared by:

Encore Engineering LLC

7272 S. El Capitan Way, #2
Las Vegas, Nevada 89148
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702.946.0865 f

November 3, 2021

November 3, 2021

Mr. Stephen Pottéy, PE
Carson City Development Services
108 E. Proctor Street
Carson City, NV 89701

RE: WATER FEASIBILITY STUDY FOR BLACKSTONE RANCH NORTH, 137 SFR LOT TENTATIVE MAP ("TM")

Dear Mr. Pottéy:

Encore Engineering LLC is pleased to provide a Water Feasibility Study for the Blackstone Ranch North, 137 SFR Lot TM (a portion of 10-041-39 and 10-041-52). The development proposes to connect to water facilities on the peripheral of the project.

The data presented herein was compiled from as-builts, fire flow test data, survey data provided by Blackstone Development Group, previously prepared utility plans and analyses in the vicinity of the project and run books provided by Carson City Public Works. Pursuant to the analysis presented in this study, the surrounding water network system shall adequately service the proposed development.

If you have any questions or require additional information, please do not hesitate to call me at (702) 325-2114. Thank you.

Sincerely,

Jaimee Yoshizawa, P.E.

TABLE OF CONTENTS

APPENDICES

1 APPENDIX 1

Blackstone Ranch North - Maps

Figure 1: Vicinity Map

Figure 2: Location Map

Figure 3: Assessor's Parcel Map

Figure 4: Blackstone Ranch North - Overall Utility Plan

2 APPENDIX 2

Water References

- *Table 1 – Average Water Consumption for Various Types of Developments*
- *Table B105.1 – Required Fire Flow and Flow Duration for Buildings*
- *Table A – Domestic Water Meter Chart*
- *Run Books*
- *Fire Flow Test Data Sheets*

3 APPENDIX 3

Hydraulic Analysis

Hydraulic Analysis Calculations

- *Maximum Day Scenario*
- *Peak Hour Scenario*
- *Maximum Day Plus Fire Scenario*
- *Node Map*

1 GENERAL INFORMATION OF SITE

1.1 Introduction

Encore Engineering LLC has prepared a Water Feasibility Study for the Blackstone Ranch North. The site is currently undeveloped with existing public utility infrastructure to the west and south of the subject property.

The purpose of this Water Feasibility Study is to investigate the options for delivering domestic and fire protection water services. This study was conducted in accordance with the criteria set forth by the Carson City Municipal Code ("CCMC").

1.2 Project Site

Blackstone Ranch North is 137 lot Tentative Map ("TPUD") located in Carson City, Nevada. The net acreage, excludes the NDOT easement parallel to US Route 395 and a 2.47 acre proposed parcel on the north of the existing wetlands. The property is generally located east of North Saliman Road, north of 5th Street and Robinson Street and west of US Route 395, more specifically described as a portion of Assessor's Parcel No. 10-041-39. The project site also includes the parcel 010-041-52 for a road that serves as a secondary access, running parallel to the west property line of the future school and connecting to Robinson Road.

Reference **Appendix 1, Figure 1** for a Vicinity Map, **Figure 2** for a Location Map and **Figure 3** for a proposed Utility Plan for the subject property.

2 WATER DEMANDS

2.1 Domestic Demand Calculations

Domestic water demands for this analysis are derived from the proposed use and acreage of the subject property and **Appendix 2**, *Table 1 – Average Water Consumption for Various Types of Developments*. The rates are reasonable and have been accepted statewide by numerous jurisdictions. The following minimum pressures are maintained while demands pursuant to Table 1 were applied:

- Max Day: 162 GPM at 40 PSI
- Peak Hour: 248 GPM at 30 PSI

2.2 Max Day + Fire Protection Demand Calculations

Fire protection water demands are determined from the size and construction type of the largest building onsite. Reference **Appendix 2**, The International Building Code (IBC) Table B105.1 – Minimum Required Fire Flow and Flow Duration for Buildings was utilized to determine the fire protection demands for the proposed development.

A reduction in required fire-flow of 50 percent, as approved, is typically allowed when the building is equipped with an approved automatic sprinkler system. No sprinkler systems are anticipated to be utilized within the subdivision. The largest Type V-B building is anticipated to have a building footprint of no more than 4,800 square feet.

Reference **Appendix 2,** *Minimum Required Fire Flow and Flow Duration for Buildings,* International Building Code (IBC), Table B105.1. The largest Type V-B building's fire flow is 1,750 GPM.

- Fire Flow = 1,750 GPM

Water service from a municipal system is pressurized. As a result, the water demand reduces the pressure in the water system. It is recommended that the minimum pressure be maintained in the onsite water distribution system while the Max Day + Fire Protection demands are applied:

- 162 GPM (Max Day) + 1,750 GPM (Fire Protection) = 1,912 GPM at 20 PSI

3 PROJECT WATER ANALYSIS

3.1 Jurisdiction

The proposed project site is located within Carson City and falls under the service jurisdiction of the Carson City Utilities Department ("CCUD") for public water.

3.2 Exiting Public Water Facilities

Pursuant to available data obtained from CCUD, 2 potential points-of-connections ("POCs") to the public water distribution system were identified.

8" Main on Robinson Street: As denoted in Carson City's Public Works Utility Run Books and recent correspondence from CCUD, a proposed POC is an 8" main on Robinson Street, approximately 1,000 ft west of the subject site.

16" Main on 5th Street: An existing 16" main in 5th Street, between Saliman Road and US-395 is a 2nd proposed POC. Carson City Public Works does not currently have as-built drawings for this facility. Therefore, depth of cover and location information shall be verified prior to construction.

Reference **Appendix 2** for the *Carson City Run Books* depicting the 8" and 16" existing mains west and south of the subject property.

3.3 Carson City Utilities Department Pressure Zone Designation

For this preliminary analysis, the data provided by Carson City validates that the site is located within the 4880 Pressure Zone designation.

3.4 Carson City Utilities Department Hydraulic Grade Lines (HGL's)

Fire Flow Test Data for the 8" main in Robinson Street, west of Saliman Road and in 5th Street south of the subject site is provided in **Appendix 2**. Utilizing the Fire Flow Test Data Sheets, the HGLs were calculated for 1,750 GPM Fire Flow.

The HGL for the Max Day was reasonably assumed to be about 10 GPM more than the HGL for the Peak Hour. The HGL for the Max Day + 1,750 Fire Flow was reasonably assumed to be about 6 GPM less than the HGL for the Peak Hour.

For this preliminary analysis, the following HGL estimates are utilized.

Reservoir 1 – Robinson Street & Saliman Road

- Maximum Day 4,790 feet
- Peak Hour 4,780 feet
- Max Day + 1,750 gpm Fire Flow 4,774 feet

Reservoir 2 – 5th Street & Spine Road

- Maximum Day 4,842 feet
- Peak Hour 4,832 feet
- Max Day + 1,750 gpm Fire Flow 4,826 feet

4 ANALYSIS

4.1 Water System

The water system for Blackstone North was analyzed using Bentley's WaterCAD software. The results of the analyses are shown in Table 1. The fire hydrant demand was applied at nodes H-14 and H-25 (at 875 GPM each hydrant). The analyses has been provided to assure minimum residual recommended pressures under the Max Day, Peak and Max Day + Fire Flow scenarios. The results of the analyses are summarized in the Appendix.

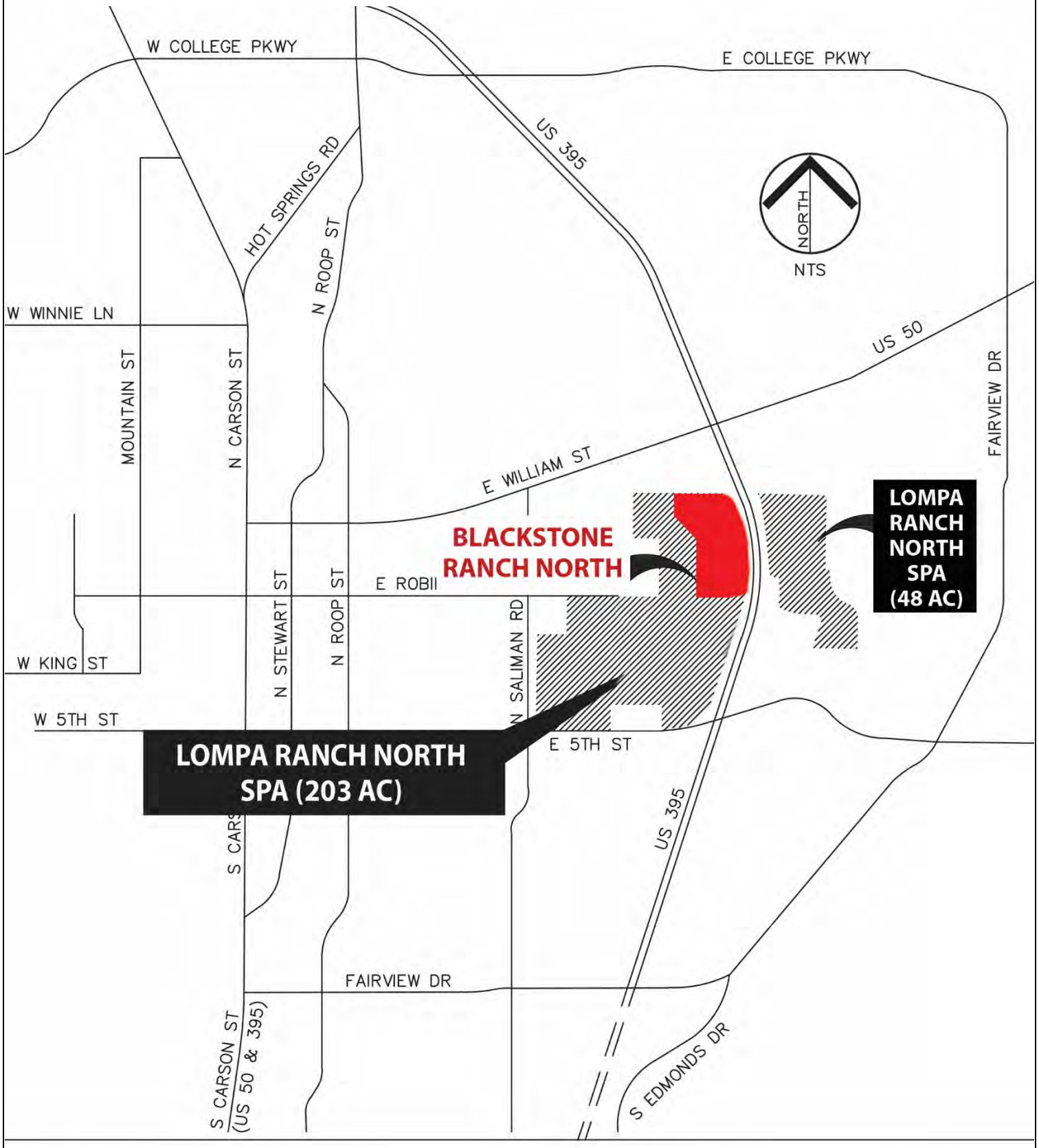
5 CONCLUSION

The density has been substantially reduced from the high-density residential and master utility study prepared for the North Lompa Ranch SPA. Utilizing the assumed pressure zone and HGLs as provided, the existing and proposed water infrastructure, and Point of Connections (POCs) for the subject property is required to meet the required domestic and fire flow water demands. Any new findings shall require a supplement/update to be furnished to Carson City.

Appendix 1

MAPS AND PLANS

- FIGURE 1: VICINITY MAP
- FIGURE 2: LOCATION MAP
- FIGURE 3: ASSESSORS PARCEL MAP
- FIGURE 4: BLACKSTONE RANCH NORTH - OVERALL UTILITY PLAN



THE RED LTD

BLACKSTONE RANCH NORTH | Vicinity Map

APN: 008-152-23
CARSON CITY WEST LLC
LU: COMMUNITY / REGIONAL COMMERCIAL
ZONING: GC

APN: 008-152-25
PROPCO CARSON I LLC
LU: MIXED-USE COMMERCIAL
ZONING: MFA/GC

APN: 008-152-26
GOLD DUST CARSON CITY LLC
LU: MIXED-USE COMMERCIAL
ZONING: MFA/GC

APN: 010-041-52
MYERS FAMILY EXEMPT TR 3/16/17
LU: MIXED-USE COMMERCIAL
ZONING: GC

APN: 010-041-64
CARSON CITY SCHOOLS
LU: PUBLIC / QUASI-PUBLIC
ZONING: P

APN: 010-041-40
RD LOMPA LLC
LU: MEDIUM DENSITY RESIDENTIAL
ZONING: SF6

2.49 ACRES
NOT A PART

10.68 ACRE SCHOOL SITE

10.10 ACRE PARK SITE

BLACKSTONE RANCH – PH II
NOT A PART

WETLANDS TO BE PRESERVED IN PLACE

VICEE CANYON
REFER TO IMPROVEMENT PLANS FOR LRN SPA FLOOD CONTROL CHANNELS

ASH CREEK CANYON
CONSTRUCTED WITH BLACKSTONE RANCH – PHASE 1)

MONROE ST (PUBLIC)
MONROE ST (PUBLIC)
MONROE ST (PUBLIC)
HARVEY ST (PUBLIC)
HARVEY ST (PUBLIC)
MATTERHORN LANE (PUBLIC)
MATTERHORN LANE (PUBLIC)
DOLLY AVE (PUBLIC)
DEVIN AVE (PUBLIC)
DIME AVE (PUBLIC)
KONA AVE (PUBLIC)
ROBINSON ST (PUBLIC)
I-580 (PUBLIC)

OPEN SPACE
RECREATIONAL OPEN SPACE
COMMUNITY CENTER

(VARIES) EX DRAINAGE PEDESTRIAN & BICYCLE PATH ESMT

WL POC 1
CONNECTION TO 8" PVC WATER MAIN IN ROBINSON STREET

WL POC 2
CONNECTION TO PROPOSED 12" WATER MAIN (BLACKSTONE RANCH – PHASE 2)
THE 12" WATER MAIN CONNECTS TO EX 16" WATER MAIN IN 5TH STREET

SS POC

ROBINSON STREET
(TO BE CONSTRUCTED WITH BLACKSTONE RANCH – PHASE 2)

PROPOSED 12" WL
(BLACKSTONE RANCH – PHASE 2)

MATTERHORN LANE & ROUNDABOUT
(TO BE CONSTRUCTED WITH BLACKSTONE RANCH – PHASE 2)

N89°03'58"W 846.98' PL
633.55' PL
213.43' PL
280.49' PL
S60°10'46"E
207.79' PL
S60°10'46"W
N28°03'02"W 352.39' PL
N23°16'47"W 159.48' PL
N14°37'17"W 192.56' PL
Δ=11°24'29"
R=1471.50'
L=292.99'
PL
N03°12'48"W 266.24' PL
N00°36'46"E 735.25' PL
176.54' PL
N89°23'14"W 496.08' PL
N89°25'57"W 333.06' PL
356.71' PL
N01°01'01"E 939.23' PL
N00°33'19"E 557.33' PL
N89°26'41"W 516.32' PL
N89°26'41"W 643.43' PL
Δ=2°20'01"
R=2142.00'
L=87.17'
PL

EX 10' PUE
EX 15' SS ESMT
EX 5' PUE
EX 42" SD ESMT
EX 20' SS ESMT
EX 15' SD ESMT
EX 50' ACCESS ESMT
EX 15' UTILITY ESMT
EX 48" RCP/PVC SS
EX 12" PVC SS
EX 8" WL
EX 12" WL
EX 16" WL
EX 8" SS
EX 10' WATERLINE ESMT
40' WATERLINE ESMT
20' DRAINAGE ESMT
20' SS ESMT
20' WATERLINE ESMT
20' SD ESMT

NORTH

GRAPHIC SCALE
100 0 50 100 200
(IN FEET)
1 inch = 100 ft.

ENCORE
7272 S EL CAPITAN WAY
SUITE 2
Las Vegas, NV 89148
(702) 528-7804 office
www.theredltd.com
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E | ENGINEERING
D | DEVELOPMENT

PROFESSIONAL ENGINEER-STATE OF NEVADA
MARK A. STEFL
Exp: 6/30/22
CIVIL
No. 21261
11/3/21

CLIENT:
BLACKSTONE DEVELOPMENT GROUP
439 PLUMB LANE
RENO, NV 89509
CONTACT: JOSHUA MYERS
PHONE: (775) 352-4200

DATE	NO.	REVISIONS	APPROVED

OVERALL UTILITY PLAN

BLACKSTONE RANCH NORTH
CARSON CITY NEVADA

PC JOB NO.	LMPN
DESIGNED BY	JY/MS
DRAWN BY	JY/MS
CHECKED BY	JY/MS
DATE	2021 11 03

SHT CU0 14 OF 19

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Appendix 2

WATER REFERENCES

- TABLE 1 – AVERAGE WATER CONSUMPTION FOR VARIOUS TYPES OF DEVELOPMENTS
- TABLE B105.1 – REQUIRED FIRE FLOW AND FLOW DURATION FOR BUILDINGS
- TABLE A – DOMESTIC WATER METER CHART
- EXISTING WATER INFORMATION FROM CARSON CITY PUBLIC WORKS

TABLE 1

WATER CONSUMPTION RATES FOR VARIOUS TYPES OF DEVELOPMENT

CUSTOMER CLASS/DESCRIPTION	DEMAND FLOW RATES					
	AVERAGE DAY		MAXIMUM DAY		PEAK HOUR	
	GPM per Unit	GPM per Acre	GPM per Unit	GPM per Acre	GPM per Unit	GPM per Acre
Single Family Residential	0.52	2.30	1.18	5.20	1.81	8.00
Multi-Family (12 Units or Less per Acre)	0.52	2.30	1.18	5.20	1.81	8.00
Residential, Duplex and Triplex	0.52	2.30	1.18	5.20	1.81	8.00
Apartments, Condominiums and Townhouses	0.21	5.70	0.53	14.00	0.63	16.80
Mobile Home Parks	N/A	2.40	N/A	3.70	N/A	5.70
Hotels	0.29	N/A	0.36	N/A	0.45	N/A
Golf Courses, Parks and Open Spaces	N/A	4.40	N/A	8.40	N/A	8.40
Industrial Park (Light Industry)	N/A	1.10	N/A	1.50	N/A	2.30
Commercial	N/A	2.10	N/A	3.00	N/A	4.60
Schools	N/A	1.70	N/A	3.50	N/A	5.40

TABLE B105.1
MINIMUM REQUIRED FIRE-FLOW AND FLOW DURATION FOR BUILDINGS

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)b	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
-	-	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
-	-	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
-	-	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
-	-	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
-	-	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
-	-	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
-	-	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
-	-	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. Types of construction are based on the International Building Code.
b. Measured at 20 psi residual pressure.

Exception: A reduction in required fire-flow of 50 percent, as approved, is allowed when the building is equipped with an approved automatic sprinkler system.

TABLE A
DOMESTIC WATER METER CHART
Characteristics

TYPE	DISPLACEMENT (1)			COMPOUND (2)			TURBINE (3)		
SIZE	GPM		PSI*	GPM		PSI*	GPM		PSI*
	MAX	CONT	@ MAX GPM	MAX	CONT	@ MAX GPM	MAX	CONT	@ MAX GPM
5/8 X 3/4"	20	10	15						
3/4"	30	15	15				30 (4)		
1"	50	25	15				50 (4)		
1-1/2"	100	50	15				100 (4)		
2"	160	80	15				160 (4)		
3"				320	160	20	350	240	7
4"				500	250	20	630	420	7
6"				1000	500	20	1400	920	7
8"				1600	800	20	2400	1600	7
10"				2300	1150	20	3800	2500	7

* Maximum pressure loss at safe maximum operating capacity.

(1) AWWA C700 Cold-Water Meters – Displacement Type, Bronze Main Case, Table 1.
(2) AWWA C702 Cold Water Meters – Compound Type, Table 1.
(3) AWWA C701 Cold-Water Meters – Turbine Type For Customer Service, Table 1. Class II In-line (High Velocity Types – Pressure Losses do not include strainer).
(4) Max flow for residential fire service - continuous flow and psi loss characteristics are similar to displacement meters.

Fire Flow Test Data Sheet

Location of Test (Street and Cross Street): N. Saliman Rd. and E. Robinson St.

Address Nearest Residual Hydrant: 1111 N. Saliman Road

Test Date: 5/2/2018 Test Time: 900

Testing Personnel: MT, NR

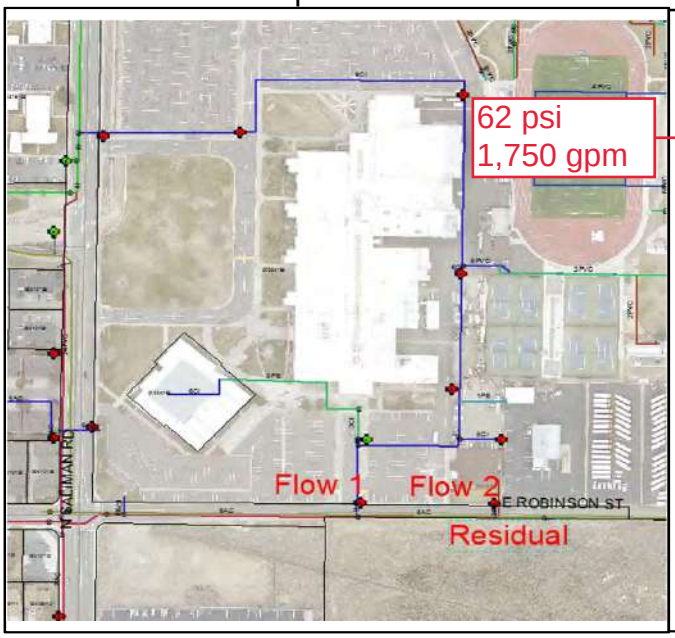
Pressure Zone: 4880 Main Size: 8"

Comments: Test on 8" main in Robinson. Residual taken in 1" pit setter adjacent to Flow 2 hydrant.

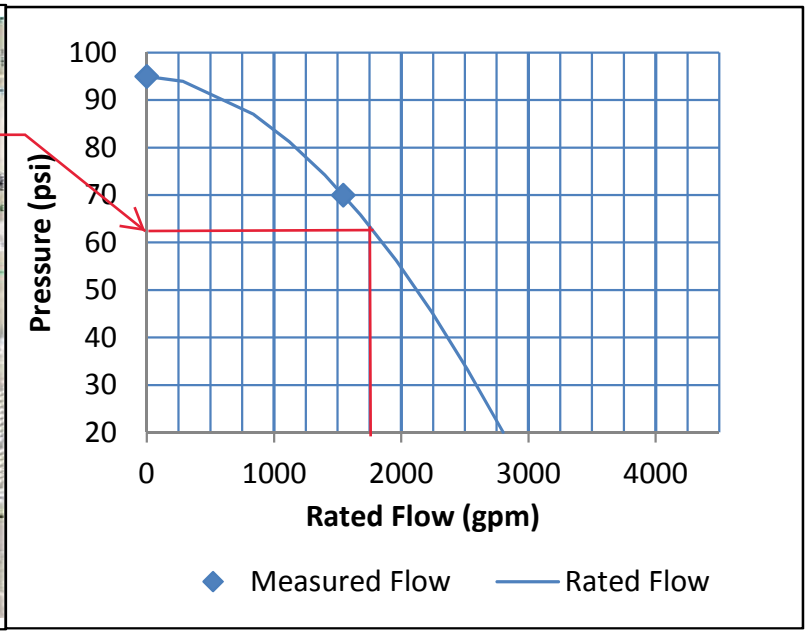
Test Results:

Residual Hydrant		Flow Hydrant(s)					
			Hydrant Tester	Pitot Pressure (psi)	Discharge Diameter (in)	Outlet Coeff. (c)	Pitot Flow (gpm)
Static:	95 psi						
Residual:	70 psi						
Pressure Drop:	25 psi	Flow 1	HM1	25	2	1.307	780
	26 %	Flow 2	HM2	24	2	1.307	764
		Flow 3					
						Total	1544

Area Map



Rated Flow



Rated Pressure (for Rated Capacity Calculation) 20 psi

Rated Capacity at 20 psi residual pressure. 2,800 gpm

Based on NFPA 291 - 2016 Edition and APWA Manual 17 - Fourth Edition

Pursuant to NFPA 291, fire flow test data over five years old should not be used.

Hydrant OBJECTID: FD Runbook Page: 116X00

Data Sheet File Name: Saliman-Robinson4.pdf

Hydraulic Grade Line (HGL) Calculations @ 1,750 GPM Fire Flow

ROBINSON & SALIMAN

Note:

2.31 ft of head = 1 psi

Per Fire Flow Test Data Sheet, the rated flow of 1750 GPM exerts a pressure of 62 psi.

Per record drawings for the Fremont Elementary School, the elevation near the vicinity of the Fire Flow Tests is approximately 4636 ft.

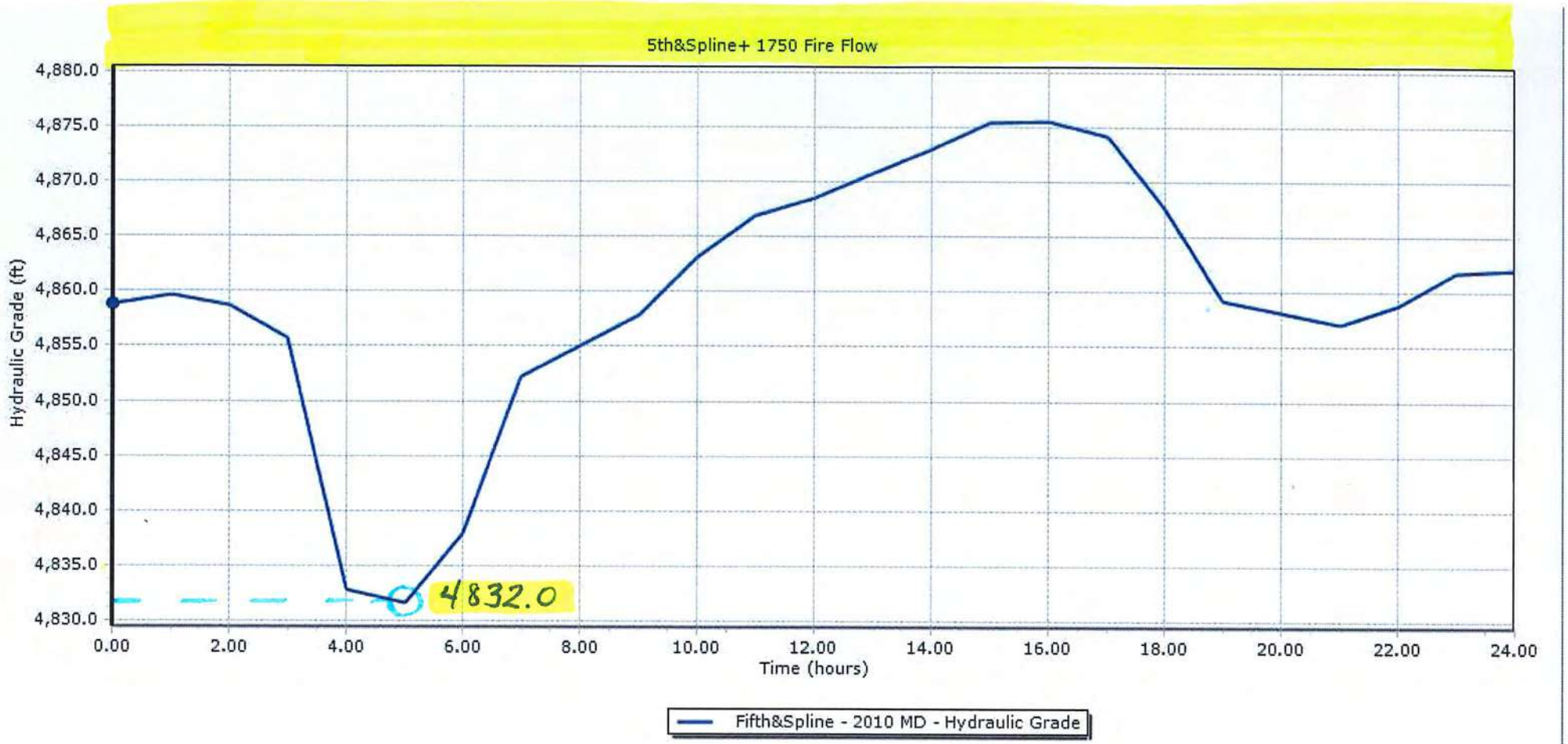
Calculations:

HGL = [Pressure (psi) x 2.31 ft/psi] + Elevation (ft)

HGL = [62 psi x 2.31 ft/psi] + 4636 ft

HGL ≈ 4780 ft


Fifth&Spline + 1500 gpm Fire Flow
Hydraulic Grade (ft)
4,880.0
4,875.0
4,870.0
4,865.0
4,860.0
4,855.0
4,850.0
4,845.0
4,840.0
4,835.0
4,830.0
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
Time (hours)
Fifth&Spline - 2010 MD - Hydraulic Grade


5th&Spline+ 1750 Fire Flow
Hydraulic Grade (ft)
4,880.0
4,875.0
4,870.0
4,865.0
4,860.0
4,855.0
4,850.0
4,845.0
4,840.0
4,835.0
4,830.0
4832.0
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
22.00
24.00
Time (hours)
Fifth&Spline - 2010 MD - Hydraulic Grade

Appendix 3

HYDRAULIC ANALYSES

- HYDRAULIC ANALYSIS CALCULATIONS
  - MAXIMUM DAY SCENARIO
  - PEAK HOUR SCENARIO
  - MAXIMUM DAY PLUS FIRE SCENARIO
- NODE MAP

BLACKSTONE NORTH - 137 LOT SFR SUBDIVISION

SCENARIO: Max Day
FlexTable: Junction Table **Date: 3-Nov-21**

ID	Label	Elevation	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
188	J-55	4,630.00	0	4,776.02	63
190	J-56	4,630.00	0	4,775.93	63
192	J-57	4,631.00	0	4,775.18	62
194	J-58	4,630.00	0	4,774.81	63
196	J-59	4,630.00	81	4,774.81	63
198	J-60	4,629.00	81	4,774.79	63
200	J-61	4,627.00	0	4,774.82	64
202	J-62	4,627.00	0	4,774.83	64
204	J-63	4,626.00	0	4,774.85	64
206	J-64	4,626.00	0	4,774.85	64
210	J-65	4,626.00	0	4,774.88	64
212	J-66	4,626.00	0	4,774.88	64
214	J-67	4,626.00	0	4,774.88	64
216	J-68	4,626.00	0	4,774.88	64
218	J-69	4,629.00	0	4,774.93	63
220	J-70	4,628.00	0	4,774.93	64
222	J-71	4,627.00	0	4,774.93	64
224	J-72	4,629.00	0	4,774.98	63
226	J-73	4,628.00	0	4,774.98	64
228	J-74	4,629.00	0	4,774.97	63
230	J-75	4,630.00	0	4,774.98	63
232	J-76	4,630.00	0	4,775.00	63
234	J-77	4,629.00	0	4,775.01	63
236	J-78	4,628.00	0	4,775.04	64
238	J-79	4,627.00	0	4,775.05	64
240	J-80	4,626.00	0	4,775.12	65
242	J-81	4,625.00	0	4,775.00	65
243	J-82	4,627.00	0	4,775.00	64
245	J-83	4,627.00	0	4,775.00	64
248	J-84	4,629.00	0	4,774.95	63
251	J-85	4,629.00	0	4,774.99	63
254	J-86	4,627.00	0	4,774.93	64
260	J-89	4,626.00	0	4,774.88	64
264	J-90	4,626.00	0	4,774.85	64
266	J-91	4,630.00	0	4,774.81	63
295	J-92	4,625.00	0	4,775.34	65
304	J-93	4,627.00	0	4,775.00	64

BLACKSTONE NORTH - 137 LOT SFR SUBDIVISION

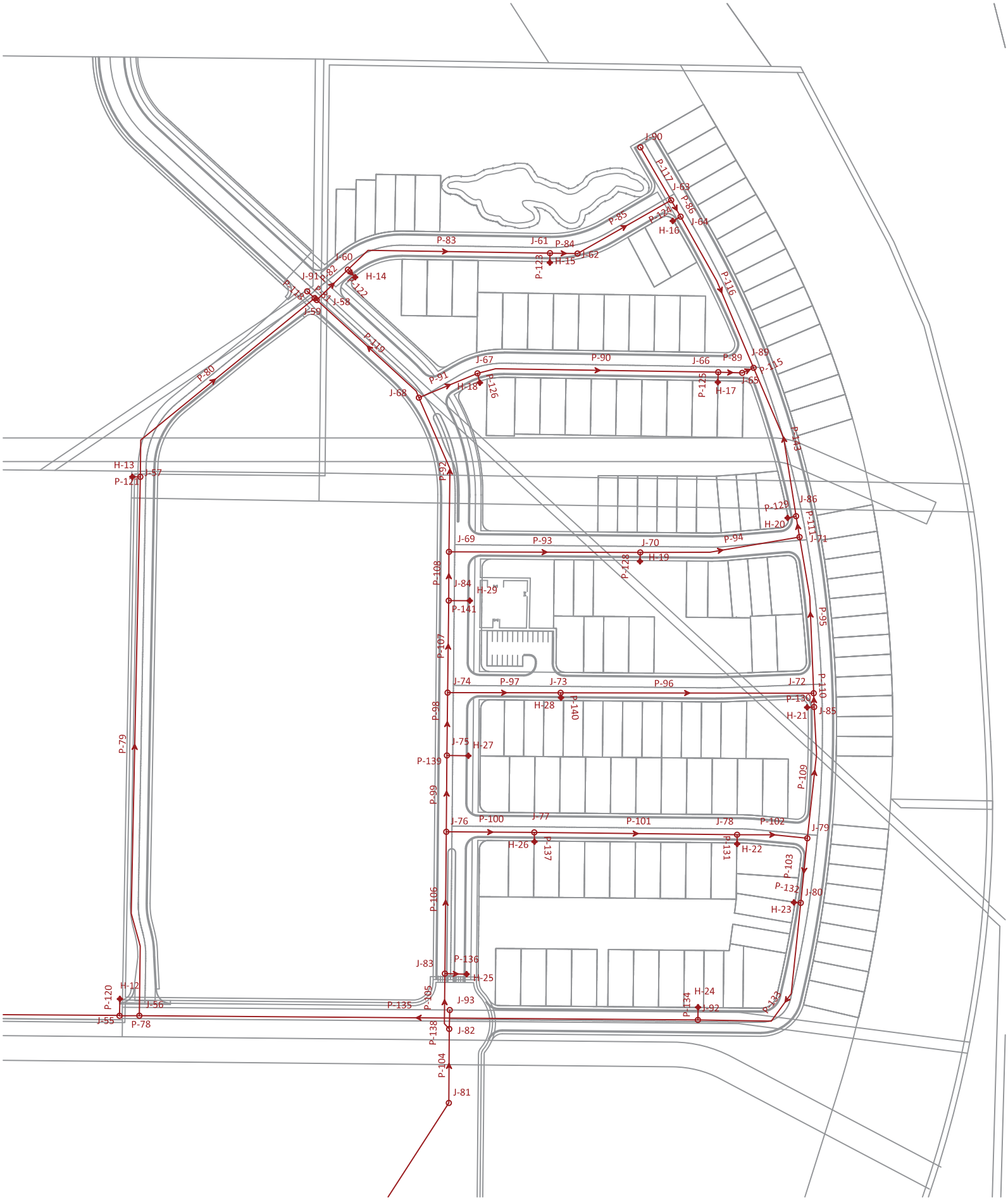
SCENARIO: Peak
FlexTable: Junction Table **Date: 3-Nov-21**

ID	Label	Elevation	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
188	J-55	4,630.00	0	4,766.96	59
190	J-56	4,630.00	0	4,766.58	59
192	J-57	4,631.00	0	4,763.49	57
194	J-58	4,630.00	0	4,762.00	57
196	J-59	4,630.00	124	4,761.98	57
198	J-60	4,629.00	124	4,761.91	58
200	J-61	4,627.00	0	4,761.96	58
202	J-62	4,627.00	0	4,761.96	58
204	J-63	4,626.00	0	4,761.99	59
206	J-64	4,626.00	0	4,761.99	59
210	J-65	4,626.00	0	4,762.02	59
212	J-66	4,626.00	0	4,762.02	59
214	J-67	4,626.00	0	4,762.02	59
216	J-68	4,626.00	0	4,762.02	59
218	J-69	4,629.00	0	4,762.05	58
220	J-70	4,628.00	0	4,762.06	58
222	J-71	4,627.00	0	4,762.08	58
224	J-72	4,629.00	0	4,762.17	58
226	J-73	4,628.00	0	4,762.09	58
228	J-74	4,629.00	0	4,762.05	58
230	J-75	4,630.00	0	4,762.04	57
232	J-76	4,630.00	0	4,762.02	57
234	J-77	4,629.00	0	4,762.12	58
236	J-78	4,628.00	0	4,762.34	58
238	J-79	4,627.00	0	4,762.42	59
240	J-80	4,626.00	0	4,762.75	59
242	J-81	4,625.00	0	4,761.44	59
243	J-82	4,627.00	0	4,761.60	58
245	J-83	4,627.00	0	4,761.72	58
248	J-84	4,629.00	0	4,762.05	58
251	J-85	4,629.00	0	4,762.20	58
254	J-86	4,627.00	0	4,762.07	58
260	J-89	4,626.00	0	4,762.02	59
264	J-90	4,626.00	0	4,761.99	59
266	J-91	4,630.00	0	4,762.00	57
295	J-92	4,625.00	0	4,763.75	60
304	J-93	4,627.00	0	4,761.60	58

BLACKSTONE NORTH - 137 LOT SFR SUBDIVISION

SCENARIO: Max Day + Fire Flow
FlexTable: Junction Table **Date: 3-Nov-21**

ID	Label	Elevation	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
188	J-55	4,630.00	0	4,768.03	60
190	J-56	4,630.00	0	4,767.68	60
192	J-57	4,631.00	0	4,764.84	58
194	J-58	4,630.00	0	4,763.46	58
196	J-59	4,630.00	124	4,763.45	58
198	J-60	4,629.00	124	4,763.38	58
200	J-61	4,627.00	0	4,763.43	59
202	J-62	4,627.00	0	4,763.43	59
204	J-63	4,626.00	0	4,763.46	59
206	J-64	4,626.00	0	4,763.46	59
210	J-65	4,626.00	0	4,763.50	59
212	J-66	4,626.00	0	4,763.50	59
214	J-67	4,626.00	0	4,763.50	59
216	J-68	4,626.00	0	4,763.49	59
218	J-69	4,629.00	0	4,763.53	58
220	J-70	4,628.00	0	4,763.55	59
222	J-71	4,627.00	0	4,763.56	59
224	J-72	4,629.00	0	4,763.65	58
226	J-73	4,628.00	0	4,763.58	59
228	J-74	4,629.00	0	4,763.54	58
230	J-75	4,630.00	0	4,763.54	58
232	J-76	4,630.00	0	4,763.53	58
234	J-77	4,629.00	0	4,763.62	58
236	J-78	4,628.00	0	4,763.82	59
238	J-79	4,627.00	0	4,763.89	59
240	J-80	4,626.00	0	4,764.19	60
242	J-81	4,625.00	0	4,763.10	60
243	J-82	4,627.00	0	4,763.22	59
245	J-83	4,627.00	0	4,763.31	59
248	J-84	4,629.00	0	4,763.54	58
251	J-85	4,629.00	0	4,763.67	58
254	J-86	4,627.00	0	4,763.55	59
260	J-89	4,626.00	0	4,763.50	59
264	J-90	4,626.00	0	4,763.46	59
266	J-91	4,630.00	0	4,763.46	58
295	J-92	4,625.00	0	4,765.10	61
304	J-93	4,627.00	0	4,763.22	59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J-63
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H-15
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J-91
P-82
H-14
P-122
P-116
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J-58
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P-133
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H-12
J-56
J-55
P-78
P-138
J-82
P-104
J-81

CONCEPTUAL DRAINAGE STUDY FOR BLACKSTONE RANCH NORTH
137 LOT SFR SUBDIVISION
(A PORTION OF PARCEL NO. 10-041-39)

CARSON CITY, NEVADA

Prepared for:

BLACKSTONE DEVELOPMENT GROUP

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November 3, 2021

November 3, 2021

Mr. Stephen Pottéy, PE
Carson City Development Services
108 E. Proctor Street
Carson City, NV 89701

RE: CONCEPTUAL DRAINAGE STUDY FOR BLACKSTONE RANCH NORTH, 137 LOT SFR TENTATIVE MAP ("TM")

Dear Mr. Pottey:

The Red Ltd is pleased to provide a Conceptual Drainage Study for Blackstone Ranch North, 36.0 gross acres, TM (a portion of parcel no. 10-041-39). The net acreage, excluding the NDOT easement parallel to US Route 395, is 28.3 acres. The 137 lot residential subdivision is generally located west of North Saliman Road, north of 5th Street and south of Robinson Street. The proposed project is generally located in the Lompa Ranch Specific Plan Area (SPA). The existing zoning, Multi Family Duplex (MFD) allows for 15.0 dwelling units/acre and Multi Family Apartments (MFA) allows for 26.0 dwelling units/acre – 39.0 dwelling units/acre. The proposed residential subdivision has a density of 4.84 units/acre with 70 lots with a minimum lot size of 3,500 sf and 67 lots with a minimum lot size of 4,500 sf. There is 11.2 acres of open space excluding the NDOT easement parallel to US Route 395.

The purpose of this report is to present a conceptual drainage analysis (Conceptual Drainage Study) to accompany the TM application. The findings herein are pursuant to analyses of existing and proposed drainage conditions to provide for recommendations for drainage facilities and/or easements to accommodate conveyance and storage functions. This study has been prepared in accordance with the Clark County Municipal Code, Section 14.8.

If you have any questions or require additional information, please do not hesitate to call me at (702) 325-2114.

Sincerely,
THE RED LTD

Jaimee Yoshizawa, P.E.

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

1.1 Description of Project

Blackstone Ranch North is 137 lot Tentative Map ("TM") encompassing approximately 41.07+/- acres (excluding the NDOT easement) and a proposed parcel north of the wetlands, and includes 010-041-52, located in Carson City, Nevada. The property is generally located east of North Saliman Road, north of 5th Street and Robinson Street and west of US Route 395, more specifically described as a portion of Assessor's Parcel No. 10-041-39. Reference **Appendix 1**, "*Location and Vicinity Map – Blackstone Ranch North (36.0 Acres)*". The approved land use of the property is Medium Density Residential and High Density Residential pursuant to the Lompa Ranch North Specific Plan Area (SPA) adopted in March of 2016. There are 67 lots with a minimum lot size of 3,500 sf and 70 lots with a minimum lot size of 4,500 sf. Reference **Appendix 2**, "*Blackstone Ranch North - Proposed Site Plan (137 Lot TM)"*.

The purpose of this report is to present a conceptual drainage analysis (Conceptual Drainage Study) to accompany the TM application. The findings herein are pursuant to analyses of existing and proposed drainage conditions to provide for recommendations for drainage facilities and/or easements to accommodate conveyance and storage functions. Measure to mitigate adverse storm water conditions shall be addressed and shown on the "*Grading and Drainage Plan*" provided as **Appendix 3**. This study was conducted in accordance with the criteria set forth by the *Carson City Municipal Code (CCMC).*

1.2 Existing Site Conditions

The project site is currently zoned MFD and MFA. The site is undeveloped open space including area that is in the floodplain. The subject property is relatively flat, generally draining from east to west with a slight average slope of 0.4% - 0.6%. The site discharges to Vicee Canyon Creek that traverses the site and Ash Canyon Creek drainage channel, south of the site, constructed with Blackstone Ranch – Phase1.

1.3 Conceptual Drainage Study References and Master Drainage Analyses Primary Resource

The primary resource for the Conceptual Drainage Study is the latest comprehensive drainage analyses update for Lompa Ranch North SPA, prepared by Kimley Horn, dated August 2018 (Master Drainage Study, Version 4) and the Conditional Letter of Map Revision (CLOMR) submitted March 2017 and approved February 5 2018. Lompa Ranch North is approximately 251.31 +/- acres. The 36.0 acre subject property is situated on the northeast portion of the 203.27 +/- acres located on the west side of US Route 395. The western portion of the property is located east of North Saliman Road, north of East 5th Street and south of US Highway 50 (East William Street). The remaining 48.04+/- acres

is located on the east side of US Route 395, west of Airport Road and south of West/East of Merdoc Court. Reference **Appendix 1**, "*Location and Vicinity Map – Lompa Ranch North (251.31 +/- Acres)*".

The Concept Drainage Study herein and the associated TM plans/application have been prepared to utilize the established on-site and off-site existing and proposed storm water 100-year peak flows, reference delineated drainage basins and incorporate the proposed drainage conveyance facilities applicable to the subject property. The intent is to reference the comprehensive drainage guideline established for the master planned community to mitigate adverse downstream conditions that may result from proposed development if measures in the master drainage study are not properly planned and implemented.

Other referenced material are itemized as follows:

1. *Lompa Ranch North Special Plan, Rubicon Design Group, March 17, 2016.*
2. *Drainage Master Plan v4 – Lompa Ranch East & West Developments, Kimley Horn, August 2018.*
3. *Carson City Municipal Code, Carson City, online content updated June 29, 2016.*
4. *Letter of Map Revision for the Kings Canyon Creek North Saliman Road to Fairview Drive (Carson City, Nevada) Technical Data Book", JR Fuller/Hydrology & Geomorphology, Inc., approved January 20, 2017 and effective June 5, 2017.*
5. *Hydraulic Analysis for Carson City Restudy, Flood Insurance Study, HDR, June 2010.*
6. *CLOMR, submitted March 2017 and approved February 5 2018.*

2 EXISTING AND PROPOSED HYDROLOGY

2.1 Existing and Proposed Drainage Basins and Design Flows

Existing Off-Site Drainage Basins Boundaries and Design Flows. An updated Flood Insurance Study was prepared by HDR for FEMA in June 2010 included hydraulic modeling for the regulatory watercourses adjacent to the project. Reference **Appendix 4** for an exhibit from HDR's study that delineates off-site sub-basins associated with ACC south of the subject site as well as VCC that traverses the project site from the east. The table below summarizes the peak discharges of the regulatory watercourses, Vice Canyon Creek and Ash Canyon Creek from the report:

TABLE 1: HYDRAULIC MODELING DISCHARGES FOR REGULATORY WATERCOURSES ADJACENT TO THE PROJECT SITE

	PEAK DISCHARGES (CFS)			
WATERCOURSE	10-YR	50-YR	100-YR	500-YR
Ash Canyon Creek	95	364	556	1208
Vicee Canyon Creek	193	214	219	235

Existing On-Site Drainage Basin Boundaries. The existing onsite basins have been excerpted from the Master Drainage Study and identified as EXOS-2 and EXOS-4. Refer to **Appendix 4**, "*Existing Conditions – Split by Proposed Commercial/Multi-family Land Use*"" for delineated basins and flow characteristics. Although relatively flat, EXOS-2 and EXOS-4 has a natural drainage pattern that generally drains 0.4% - 0.6% to the southeast. The 100-year peak flows is 6.6 cfs for EXOS-2 and 9.4 cfs for EXOS-4.

Proposed On-Site Drainage Basin Boundaries. The proposed onsite basins have been established in the Master Drainage Study as PR-2 and PR-4. Refer to **Appendix 4**, "*Proposed Conditions*" for delineated basins and flow characteristics. The 100-year peak flows for is 61.8 cfs for PR-2 and 70.4 cfs for PR-4.

2.2 Existing Drainage Problems

The property is currently undeveloped. Therefore, there are no known existing drainage problems.

2.3 Floodplain

Reference Federal Emergency Management Agency (FEMA), Flood Insurance Rate Map (FIRM), **Appendix 5**, "*FRIM Panel 3200010111H*" dated June 20, 2021, revised to reflect the Letter of Map Revision (LOMR) approved by FEMA, denotes the existing floodplain and floodway with respect to the subject property. The floodplain on VCC is generally located within Zone AO, flood depth of 1 feet. Portions of the project site have been revised to Zone X, 500-year annual chance of flooding. An approved Conditional Letter of Map Revision (CLOMR) with design recommendations for trapezoidal channels as presented in the Master Drainage Study, will accommodate 100-year peak flows in proposed drainage facilities, Vicee Canyon Channel (VCC) and the existing Ash Canyon

Channel (ACC). The TM subdivision layout incorporates the channel design parameters of the approved CLOMR, concentrating storm water flows conveyed through the site, hence allowing development within the floodplain. Prior to issuing a permit for relocation of the watercourse and construction of the channels, the developer will provide funds to the City for processing the Letter of Map Revision (LOMR).

2.4 Existing Irrigation

The property is not currently being used for agricultural purposes. There is no artificial or controlled irrigation of the property.

. 2.5 Tributary Exhibit

Reference Appendix 4, "*Carson City Restudy – Sub-Basins (HDR)*".

3 PROPOSED DRAINAGE FACILITIES (ON-SITE AND OFF-SITE)

3.1 Routing of On-Site Flows and Location of Drainage Facilities

On-site flows generated by the proposed development will be routed within the local street network of the residential subdivision via "L"-curb and gutter and cross/valley gutters as shown in **Appendix 2**, "*Grading and Drainage Plan*". The grading of the local street network and subdivision has been configured subject to the on-site basins as delineated in the Master Drainage Study and shown in the Grading and Drainage Plan. The proposed on-site drainage basin north of the proposed VCC, PR-2 generally conveys stormwater within the internal street network south, discharging to VCC, a 30-feet wide trapezoidal channel and east to the drainage easement adjacent to US Route 395. The proposed on-site drainage basin to the south of the VCC proposed channel, PR-4 generally conveys stormwater within the internal street network east to the drainage easement adjacent to US Route 580, south within Spine Road ROW as well as discharged from the cul-de-sac at the southernmost area of the site. The stormwater traversing south from the cul-de-sac discharges to the existing 34-feet wide trapezoidal channel, ACC. Ultimately, the stormwater discharged to the south converges with stormwater discharged to the east via the existing drainage easement situated west of US Route 395, to Kings Creek Canyon.