

LOG OF TEST BORING NO. B-1

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈750' S. OF WATERASH ST., SB SHOULDER OF LEMMON DR.
 CLIENT: TMWA DATE 7/30/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,924' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	GP		S	1A	15	MED. DENSE	MOIST	0-1.25': FILL-POORLY GRADED GRAVEL WITH SILT AND SAND, mostly angular to subangular gravel, dark brown							
	SC					MED. DENSE	MOIST	1.25'-2½': CLAYEY SAND WITH GRAVEL, mostly fine to medium sand, little subangular gravel, low plasticity, brown							
2.5	CH		S	1B	11	STIFF	MOIST	2½'-7½': FAT CLAY, few very fine sands, fetid odor, grey							
5			U	1C	15			Note: Color change to olive brown							
7.5	CL		S	1D	10	STIFF	MOIST	7½'-11½': LEAN CLAY WITH SAND, little very fine sand, olive brown							
10			S	1E	9			Note: Poorly Graded Sand lense approximately 1/4" thick at 11.25'							
12.5								TERMINATED AT 11½ FEET, NO FREE WATER OBSERVED, HOLE LEFT OPEN OVERNIGHT PRIOR TO BACKFILLING							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3A

DEPTH	HOUR	DATE

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-2

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈1500' S. OF WATERASH ST., SB SHOULDER OF LEMMON DR.
 CLIENT: TMWA DATE 7/30/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,922' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	GP SC		S	2A	12	MED. DENSE	MOIST	0-2": FILL-POORLY GRADED GRAVEL WITH SILT AND SAND, mostly angular to subangular gravel, dark brown	33	34	20			11.1	A, G
	SC						MOIST	2"-1": FILL-CLAYEY SAND WITH GRAVEL, mostly fine to medium sand, little subangular gravel, low plasticity, dark brown							
2.5	CH		S	2B	8	STIFF	MOIST	1'-2½": CLAYEY SAND, mostly fine to medium sand, little angular gravel, low plasticity, brown							
								2½"-11½": FAT CLAY, trace very fine sands, fetid odor, grey							
5			U	2C	13				96	80	54		75.7	43.6	A, G
7.5			S	2D	10			Note: Few very thin sand lenses at 8 and 8½ feet.							
10			S	2E	12			Note: Poorly Graded Sand lense at 10½ feet, <1/4 inch thick							
12.5								TERMINATED AT 11½ FEET, NO FREE WATER OBSERVED							
								Note: Bulk sample was collected at a depth of 0.25 to 1½ feet (Sample 2F)							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3B

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-3

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈2250' S. OF WATERASH ST., SB SHOULDER OF LEMMON DR.
 CLIENT: TMWA DATE 7/30/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,920' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	GM		S	3A	7	MED. DENSE	MOIST	0-1½': FILL-SILTY GRAVEL WITH SAND, mostly angular to subangular gravel, little fine to medium sand, dark brown							
2.5	CH		S	3B	6	MED. STIFF	MOIST	1½'-10': FAT CLAY, trace to few very fine sands, brown							
5			U	3C	11							1			
7.5			S	3D	6			Note: Few very thin sand lenses scattered throughout the sample							
10	CH		S	3E	11	STIFF	MOIST	10'-11½': FAT CLAY, little fine to medium sand, brown Note: Few stratified layers of sand							
12.5								TERMINATED AT 11½ FEET, NO FREE WATER OBSERVED Note: Bulk sample was collected at a depth of 0.25 to 1½ feet (Sample 3F)							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3C

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-4

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. **RIG & BORING TYPE** CME 55 DRILL RIG
LOCATION ≈3000' S. OF WATERASH ST., SB SHOULDER OF LEMMON DR., NEAR THE INTERSECTION OF NECTAR ST AND LEMMON DR
CLIENT: TMWA **DATE** 7/30/2014
PROJECT NO. 1660 **LOGGED BY:** SAM **SURFACE ELEVATION** ≈4,920' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected **HAMMER TYP.:** CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	GP-GM SC		S	4A	11	MED. DENSE MED. DENSE	MOIST MOIST	0-0.25': FILL- POORLY GRADED GRAVEL WITH SILT AND SAND, mostly angular to subangular gravel, little fine to medium sand, dark brown	24	29	19			8.9	A, G
2.5	CH		S	4B	6	MED. STIFF	MOIST	0.25'-1½': FILL-CLAYEY SAND, mostly fine to medium sand, low plasticity, brown 1½'-10': FAT CLAY, trace very fine to fine sand, brown Note: Decomposed root visible in sample				1			
5			S	4C	6										
7.5			S	4D	6			Note: POORLY GRADED SAND LENSE AT 9.25 FEET							
10			S	4E	9	STIFF	MOIST	10'-11½': FAT CLAY WITH SAND, little fine to medium sand, brown Note: Few stratified layers of sand							
12.5								TERMINATED AT 11½ FEET, NO FREE WATER OBSERVED Note: Bulk sample collected from 0 to 1½ feet (Sample No. 4F)							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3D

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube






A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial



LOG OF TEST BORING NO. B-5

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈3750' S. OF WATERASH ST., SB SHOULDER OF LEMMON DR.
 CLIENT: TMWA DATE 7/30/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,918' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	GP-GM GC		S	5A	8	MED. DENSE	MOIST	0-0.25': FILL- POORLY GRADED GRAVEL WITH SILT AND SAND, mostly angular to subangular gravel, little fine to medium sand, dark brown							
2.5			S	5B	5	MED. DENSE	MOIST	0.25'-2.75': FILL-CLAYEY GRAVEL WITH SAND, mostly fine to coarse angular gravel, few cobbles, little sand, low plasticity, brown Note: Flat boulder encountered at 1.7 feet							
5	CH		U	5C	15			3.75-11½': FAT CLAY WITH SAND, little very fine to fine sand, brown	78	89	60	1		44	A, G
7.5			S	5D	6	MED. STIFF	MOIST	Note: Scattered Poorly Graded Sand lenses encountered from a depth of 7½ to 9 feet				1.5			
10			S	5E	10										
12.5								TERMINATED AT 11½ FEET, NO FREE WATER OBSERVED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3E

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-6

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈4500' S. OF WATERASH ST., SB SHOULDER OF LEMMON DR.
 CLIENT: TMWA DATE 7/30/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,920' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	GP SC		S	6A	8	MED. DENSE	MOIST	0-2": FILL-POORLY GRADED GRAVEL WITH SAND, mostly angular to subangular gravel, little fine to medium sand, dark brown							
2.5	CH		S	6B	8	MED. STIFF TO	MOIST	2"-2': FILL-CLAYEY SAND WITH GRAVEL, mostly fine medium sand, little subangular gravel, low plasticity, brown							
5			S	6C	9			2'-7½': FAT CLAY, few very fine to fine sands, brown				1			
7.5	CH		S	6D	14	STIFF	MOIST	7½'-11½': SANDY FAT CLAY, little very fine to fine sand, brown							
10			S	6E	7										
12.5								TERMINATED AT 11½ FEET, NO FREE WATER OBSERVED							
15								Note: Bulk sample collected from 0 to 1½ feet (Sample No. 4F) Note: Bulk sample was collected at a depth of 0.25 to 1½ feet (Sample 2F)							
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3F

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-7

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. **RIG & BORING TYPE** CME 55 DRILL RIG
LOCATION ≈5,250' S. OF WATERASH ST., NEAR THE ARKANSAS DR. INTERSECTION, SB SHOULDER OF LEMMON DR.
CLIENT: TMWA **DATE** 7/31/2014
PROJECT NO. 1660 **LOGGED BY:** SAM **SURFACE ELEVATION** ≈4,922' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected **HAMMER TYP.:** CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	GM		S	7A	25	MED. DENSE	MOIST	0-4½': <u>FILL-SILTY GRAVEL WITH SAND</u> , mostly fine subangular gravel, little sand, dark brown							
2.5			S	7B	14			Note: No sample recovered at 2½ feet. Auger grinding on gravel from 1½ to 2 ½ feet.							
5	SC CH		S	7c	11	STIFF	MOIST	4½'-5': <u>CLAYEY SAND</u> , mostly fine to medium sand, brown 5'-10': <u>FAT CLAY</u> , few very fine to fine sand, brown				1.5			
7.5			S	7d	7							1.5			
10	CH		S	7e	8	STIFF	MOIST	10-11½': <u>SANDY LEAN CLAY</u> , some fine to medium sand, brown							
12.5								TERMINATED AT 11½ FEET, NO FREE WATER OBSERVED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3G

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial



LOG OF TEST BORING NO. B-8

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. **RIG & BORING TYPE** CME 55 DRILL RIG
LOCATION ≈6,000' S. OF WATERASH ST., BETWEEN ARKANSAS DR. AND DEODAR WAY ON SB SHOULDER OF LEMMON DR.
CLIENT: TMWA **DATE** 7/31/2014
PROJECT NO. 1660 **LOGGED BY:** SAM **SURFACE ELEVATION** ≈4,920' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected **HAMMER TYP.:** CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM		S	8A	15	MED. DENSE	MOIST	0-2½': <u>FILL SILTY SAND WITH GRAVEL</u> , mostly fine to medium sand, some subangular gravel, dark brown							
2.5	CH		S	8B	11	STIFF	MOIST	2½'-7½': <u>FAT CLAY</u> , little very fine to fine sand, brown	78	53	32			28.7	A, G
5			S	8C	9							3.0			
7.5	CH		S	8D	14	STIFF	MOIST	7½'-11½': <u>SANDY FAT CLAY</u> , some fine to medium sand, brown							
10			S	8E	11			Note: Clayey sand lense ½-inch thick encountered at 8 feet Note: Thin interbedded layers of clayey sand visible in sample							
12.5								TERMINATED AT 11½ FEET, NO FREE WATER OBSERVED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3H

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial



LOG OF TEST BORING NO. B-9

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. **RIG & BORING TYPE** CME 55 DRILL RIG
LOCATION ≈6,750' S. OF WATERASH ST., BETWEEN ARKANSAS DR. AND DEODAR WAY ON SB SHOULDER OF LEMMON DR.
CLIENT: TMWA **DATE** 7/31/2014
PROJECT NO. 1660 **LOGGED BY:** SAM **SURFACE ELEVATION** ≈4,922' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected **HAMMER TYP.:** CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SC-SM		S	9A	21	MED. DENSE	MOIST	0'-2': <u>FILL-SILTY, CLAYEY SAND WITH GRAVEL</u> , mostly fine to medium sand, little subangular gravel, dark brown							
2.5	SC CH		S	9B	6	MED. STIFF TO	MOIST	2'-2½': <u>CLAYEY SAND</u> , mostly fine to medium sand, brown 2½'-11½': <u>FAT CLAY WITH SAND</u> , little very fine to fine sand, brown Note: 3 inch thick clayey sand lense encountered at 3 feet							
5			S	9C	14	STIFF						1.75			
7.5			S	9D	8			poorly graded sand lense encountered at 7.75 feet approximately ½-inch thick				1.75			
10			S	9E	12										
12.5								TERMINATED AT 11½ FEET, NO FREE WATER OBSERVED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3I

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial



LOG OF TEST BORING NO. B-10

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. **RIG & BORING TYPE** CME 55 DRILL RIG
LOCATION ≈7,500' S. OF WATERASH ST., BETWEEN ARKANSAS DR. AND DEODAR WAY ON SB SHOULDER OF LEMMON DR.
CLIENT: TMWA **DATE** 7/31/2014
PROJECT NO. 1660 **LOGGED BY:** SAM **SURFACE ELEVATION** ≈4,923' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected **HAMMER TYP.:** CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SC		S	10A	14	MED. DENSE	MOIST	0'-2': CLAYEY SAND WITH GRAVEL, mostly fine to medium sand, some fine gravels, dark brown	22	24	9			6.7	A, G
2.5	SC					LOOSE	MOIST	2'-2.75': CLAYEY SAND, mostly fine to coarse sand, brown							
	CH		S	2B	7	MED. STIFF TO	MOIST	2.75'-7½': FAT CLAY, few fine to medium sands, brown							
5			S	10C	12	STIFF						2.0			
7.5	CH		S	10D	6	MED. STIFF	MOIST	7½'-11½': FAT CLAY WITH SAND, little fine to medium sand, brown							
10			S	10E	11			Note: Abundant thin sand lenses <½-inch thick visible in sample							
12.5								TERMINATED AT 11½ FEET, NO FREE WATER OBSERVED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3J

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial



LOG OF TEST BORING NO. B-11

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈8,250' S. OF WATERASH ST., ACROSS FROM DEODAR WAY ON SB SHOULDER OF LEMMON DR.
 CLIENT: TMWA DATE 7/31/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,922' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM		S	11A	19	MED. DENSE	MOIST	0'-1½': FILL SILTY SAND WITH GRAVEL, mostly fine to medium sand, little gravel, dark brown							
2.5	CH		S	11B	10	STIFF	MOIST	1½'-11½': FAT CLAY, few very fine to fine sand, olive brown	90	71	48			35.7	A, G
5			S	11C	17			Note: Sand pocket encountered from 6.25 to 6½ feet							
7.5			S	11D	9										
10			S	11E	11			Thin poorly graded sand lenses stratified throughout sample 11E.							
12.5								TERMINATED AT 11½ FEET, NO FREE WATER OBSERVED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3K

DEPTH	HOUR	DATE
N.E.		


A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-12

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈200' NE OF PALACE DR ON SB SHOULDER OF LEMMON DR.
 CLIENT: TMWA DATE 7/31/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,922' (WASHOE CO. GIS)
 BLOW COUNTS: Corrected Not Corrected X HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	GC		S	12A	35	DENSE	MOIST	0-1½" FILL-CLAYEY GRAVEL WITH SAND, mostly subangular gravel, dark brown							
2.5								REFUSAL AT 1½ FEET ON POSSIBLE ROAD BED MODIFICATION, MOVED RIG AND HIT REFUSAL AGAIN AT SAME DEPTH. NO FREE WATER ENCOUNTERED							
5															
7.5															
10															
12.5															
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3L

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-13

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈312' NE OF E. PATRICIAN DR. ON SB SHOULDER OF LEMMON DR.
 CLIENT: TMWA DATE 7/31/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,918' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	GM SM		S	13A	27	MED. DENSE MED. DENSE	SL. MOIST SL. MOIST	0'-0.25': FILL-SILTY GRAVEL WITH SAND, mostly subangular gravel, some fine to medium sand, grey brown 0.25'-2½': FILL-SILTY SAND, mostly fine to medium sand, brown Note: Redox staining of soil pore lining							
2.5	SC		S	13B	20	MED. DENSE	MOIST	2½'-3½': FILL-CLAYEY SAND, mostly fine to medium sand, few subangular gravels, mottled yellow brown and brown							
	SP-SM						MOIST	3½'-4': POORLY GRADED SAND WITH SILT, mostly very fine to fine sand, non-plastic, brown							
5								REFUSAL AT 4 FEET, MOVED RIG 5 FEET ENCOUNTERED REFUSAL AT A DEPTH OF 3½', NO FREE WATER ENCOUNTERED							
7.5															
10															
12.5															
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3M

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-14

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈ 813' SW OF E. PATRICIAN DR. ON SB SHOULDER OF LEMMON DR.
 CLIENT: TMWA DATE 7/31/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈ 4,924' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SC-SM		S	14A	27	MED. DENSE	MOIST	0'-2½': <u>FILL-SILTY, CLAYEY SAND WITH GRAVEL</u> , mostly fine to medium sand, little subangular gravel, low plasticity, brown	25	18	4			6.3	A, G
2.5	SM		S	14B	12	MED. DENSE	MOIST	2½'-5': <u>SILTY SAND</u> , mostly fine to medium sand, few rounded gravels, mottled yellow brown and brown							
5	SC		S	14C	7	LOOSE	MOIST	5'-10': <u>CLAYEY SAND</u> , mostly fine to medium sand, low plasticity, brown							
7.5			S	14D	20	TO MED. DENSE		Note: Increased plasticity at 7½ feet.							
10	CH		S	14E	24	STIFF	MOIST	10'-11½': <u>FAT CLAY</u> , trace sand, brown Note: Soil gleying observed, white calcareous stringers visible in sample							
12.5								TERMINATED AT 11½', NO FREE WATER OBSERVED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3N

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-15

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. **RIG & BORING TYPE** CME 55 DRILL RIG
LOCATION \approx 160' N OF FLEETWOOD DRIVE, IN THE CENTER DIVIDE OF LEMMON DR.
CLIENT: TMWA **DATE** 7/31/2014
PROJECT NO. 1660 **LOGGED BY:** SAM **SURFACE ELEVATION** \approx 4,938' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected **HAMMER TYP.:** CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM		S	15A	33	DENSE	MOIST	0'-2½': <u>FILL- SILTY SAND WITH GRAVEL</u> , mostly fine to medium sand, some angular to subangular gravel, dark brown							
2.5	SM		S	15B	31	DENSE	MOIST	2½'-4': <u>FILL-SILTY SAND</u> , mostly fine to medium sand, few rounded gravels, brown							
5	SM		S	15C	16	MED. DENSE	MOIST	4'-7½': <u>SILTY SAND WITH GRAVEL</u> , mostly fine to medium sand, little subrounded gravel, non-plastic, brown							
7.5	SP		S	15D	20	MED. DENSE	MOIST	7½'-10': <u>POORLY GRADED SAND WITH GRAVEL</u> , mostly fine to coarse sand, little subrounded to rounded gravel, brown							
10	SC		S	15E	14	MED. DENSE	MOIST	10'-11': <u>CLAYEY SAND</u> , mostly fine to medium sand, brown							
	CH							11'-11½': <u>LEAN CLAY WITH SAND</u> , little fine to medium sand, brown							
12.5								TERMINATED AT 11½, NO FREE WATER ENCOUNTERED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-30

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial



LOG OF TEST BORING NO. B-16

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈300' N OF SURGE ST. IN CENTER DIVIDE OF LEMMON DR.
 CLIENT: TMWA DATE 7/31/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,952' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM					DENSE	MOIST	0'-1/2': FILL-SILTY SAND WITH GRAVEL, mostly fine to medium sand, some gravel, grey							
	SM		S	16A	33	DENSE	MOIST	1/2'-2 1/2': SILTY SAND WITH GRAVEL, mostly fine to medium sand, little gravel, dark brown							
2.5	SC-SM		S	16B	15	MED. DENSE	MOIST	2 1/2'-5': SILTY, CLAYEY SAND, mostly fine to medium sand, low plasticity, brown	26	23	5			10.9	A, G
5	SC		S	16C	14	MED. DENSE	MOIST	5'-7 1/2': CLAYEY SAND WITH GRAVEL, some fine to medium sand, little angular gravel, brown							
7.5	SC		S	16D	21	MED. DENSE	MOIST	7 1/2'-11 1/2': CLAYEY SAND, mostly very fine to medium sand, few subangular gravel, low plasticity, brown							
10			S	16E	15										
12.5								TERMINATED AT 11 1/2 FEET, NO FREE WATER ENCOUNTERED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3P

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-17

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈533' SW OF SURGE ST. IN CENTER DIVIDE OF LEMMON DR.
 CLIENT: TMWA DATE 08/01/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,956' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	GP-GM		S	17A	26	MED. DENSE	MOIST	0-2": FILL-POORLY GRADED GRAVEL WITH SILT AND SAND, roadway shoulder treatment course							
2.5	SM							2"-2½": FILL-SILTY SAND, mostly fine to medium sand, few subangular gravel, brown							
2.5	GP-GM		S	17B	24	MED. DENSE	MOIST	2½"-4": SILTY SAND, mostly fine to medium sand, few subangular gravels, brown							
5	GP-GM		S	17C	22	MED. DENSE	MOIST	4"-7½": POORLY GRADED GRAVEL WITH SILT AND SAND, mostly subangular gravel, little sand, grey brown Note: Rock in shoe at 5 feet							
7.5	SP-SM		S	17D	14	MED. DENSE	MOIST	7½"-11.3": POORLY GRADED SAND WITH SILT, mostly fine to medium sand, non-plastic, yellow brown							
10			S	17E	14										
12.5	SC					MED. DENSE	MOIST	11.3"-11½": CLAYEY SAND, mostly fine to medium sand, plastic, yellow brown TERMINATED AT 11½', NO FREE WATER ENCOUNTERED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3Q

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-18

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. **RIG & BORING TYPE** CME 55 DRILL RIG
LOCATION \approx 100' S. OF THE INTERSECTION OF HYDRAULIC ST. AND LEMMON DR., IN CENTER DIVIDE OF LEMMON DR.
CLIENT: TMWA **DATE** 08/01/2014
PROJECT NO. 1660 **LOGGED BY:** SAM **SURFACE ELEVATION** \approx 4,962' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected **HAMMER TYP.:** CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM		S	18A	26	MED. DENSE	MOIST	0-1½': <u>FILL- SILTY SAND WITH GRAVEL</u> , mostly fine to medium sand, little subrounded gravel, strong brown							
2.5	SM		S	18B	8	LOOSE	MOIST	1½'-5': <u>SILTY SAND</u> , mostly fine to medium sand, few subrounded gravel, brown	22	NV	NP			8.9	A, G
5	SC		S	18C	50/O"	MED. DENSE	MOIST	5'-10': <u>CLAYEY SAND WITH GRAVEL</u> , mostly fine to medium sand, some subangular fine to coarse gravel, brown Note: Possible cobble at 5 feet no sample recovered, auger broke through to next sample							
7.5			S	18D	15										
10	GC		S	18E	23	MED. DENSE	MOIST	10'-11½': <u>CLAYEY GRAVEL WITH SAND</u> , mostly fine to medium subrounded gravel, some fine to coarse sand, low plasticity, yellow brown							
12.5								TERMINATED AT 11½ FEET, NO FREE WATER ENCOUNTERED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3R

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial



LOG OF TEST BORING NO. B-19

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈400' N. OF BERNOULLI ST., IN CENTER DIVIDE OF LEMMON DR.
 CLIENT: TMWA DATE 08/01/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,972 (WASHOE CO. GIS)
 BLOW COUNTS: Corrected Not Corrected X HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM		S	19A	20	MED. DENSE	MOIST	0-2': <u>SILTY SAND WITH GRAVEL</u> , mostly fine to medium sand, little subangular gravel, brown							
2.5	SM		S	19B	15	MED. DENSE	MOST	2'-4': <u>SILTY SAND WITH GRAVEL</u> , mostly fine to medium sand, some subangular gravel, brown							
5	SC		S	19C	14	MED. DENSE	MOIST	4'-10': <u>CLAYEY SAND</u> , mostly fine to medium sand, few subangular gravel, yellow-brown Note: Auger grinding at 5½ feet							
7.5			S	19D	27			Mottled from 7½ to 9 feet							
10	GC		S	19E	41	DENSE	MOIST	10'-11½': <u>CLAYEY GRAVEL WITH SAND</u> , mostly fine to medium subangular gravel, some fine to coarse sand, yellow brown							
12.5								TERMINATED AT 11½ FEET, NO FREE WATER ENCOUNTERED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3S

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube



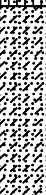


A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-20

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈291' SW OF BERNOULLI ST., IN CENTER DIVIDE OF LEMMON DR.
 CLIENT: TMWA DATE 08/01/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,976' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	GP-GM SM		S	20A	24	MED. DENSE	MOIST	0-0.25': <u>FILL-POORLY GRADED GRAVEL WITH SILT SAND SAND</u> , roadway shoulder treatment fill, grey-brown	12	NV	NP			7.8	A, G
2.5	SP-SM		S	20B	13	MED. DENSE	MOIST	0.25'-1½': <u>FILL-SILTY SAND WITH GRAVEL</u> , mostly fine to medium sand, little subangular gravel, brown							
							1½'-5': <u>POORLY GRADED SAND WITH SILT</u> , mostly fine to coarse sand, few angular fine gravels, yellow brown								
5	SP-SC		S	20C	25	MED. DENSE TO	MOIST	5'-7½': <u>POORLY GRADED SAND WITH CLAY</u> , mostly fine to coarse sand, little gravel, low plasticity, yellow brown							
7.5	SC		S	20D	38	DENSE	MOIST	7½'-11½': <u>CLAYEY SAND WITH GRAVEL</u> , mostly fine to medium sand, some angular gravel, yellow brown							
10			S	20E	50	VERY DENSE									
12.5								TERMINATED AT 11½ FEET, NO FREE WATER ENCOUNTERED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3T

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-21

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION \approx 1,040' SW OF BERNOULLI ST., IN CENTER DIVIDE OF LEMMON DR.
 CLIENT: TMWA DATE 08/01/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION \approx 4,986' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	GP-GM SM		S	21A	44	DENSE	MOIST	0-0.33': FILL-POORLY GRADED GRAVEL WITH SILT SAND SAND, roadway shoulder treatment gravel fill, grey-brown							
2.5	SC SM		S	21B	11	MED. DENSE	MOIST	0.33'-1½': FILL-SILTY SAND WITH GRAVEL, mostly fine to medium sand, some gravel, strong brown 1½'-1.75': CLAYEY SAND, mostly fine to medium sand, brown 1.75'-5': SILTY SAND, mostly fine to coarse sand, few subrounded gravel, brown							
5	SP-SM		S	21C	35	DENSE	MOST	5'-7½': POORLY GRADED SAND WITH SILT AND GRAVEL, mostly fine to coarse sand, little subangular gravel, non-plastic, yellow brown							
7.5	GC		S	21D	41	DENSE	MOIST	7½'-11½': CLAYEY GRAVEL WITH SAND, mostly subangular gravel, some fine to coarse sand, yellow brown							
10			S	21E	41										
12.5								TERMINATED AT 11½ FEET, NO FREE WATER ENCOUNTERED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3U

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-22

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈400' NE OF MILITARY ROAD, IN CENTER DIVIDE OF LEMMON DR.
 CLIENT: TMWA DATE 08/01/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈4,992' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM		S	22A	35	DENSE	MOIST	0'-2': <u>FILL-SILTY SAND</u> , mostly fine to medium sand, few subangular gravel, non-plastic, strong brown							
2.5	SM		S	22B	25	MED. DENSE	MOIST	2'-5': <u>SILTY SAND WITH GRAVEL</u> , mostly fine to coarse sand, some subangular gravel, yellow brown	15	20	2			7.2	A, G
5	SP-SM		S	22C	43	DENSE	MOIST	5'-6.25': <u>POORLY GRADED SAND WITH GRAVEL AND SILT</u> , mostly fine to medium sand, some gravel, yellow brown							
7.5	CH SC		S	22D	39	DENSE	MOIST	6.25'-6½': <u>SANDY FAT CLAY</u> , few very fine to fine sands, reddish brown 6½'-10': <u>CLAYEY SAND WITH GRAVEL</u> , mostly fine to coarse sand, some subangular gravel, yellow brown							
10	GC		S	22E	37	DENSE	MOIST	10'-11½': <u>CLAYEY GRAVEL WITH SAND</u> , mostly subangular gravel, some fine to coarse sand, yellow brown							
12.5								TERMINATED AT 11½ FEET, NO FREE WATER ENCOUNTERED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3V

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-23

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈1,300' SW OF MILITARY ROAD, WB LANE LEMMON DRIVE
 CLIENT: TMWA DATE 08/21/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈5,008' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0-7½": ASPHALT CONCRETE PAVEMENT							
	GM							7½"-1.16': AGGREGATE BASE, similar to a Silty Gravel with Sand, mostly subangular gravel, some fine to coarse sand, dark grey brown							
	SC		B	23A		MED. DENSE	MOIST	1.16'-3': FILL-CLAYEY SAND WITH GRAVEL, mostly fine to medium sand, some subrounded gravel, brown				2.0			
2.5			S	23B	14			Note: Possible roadway subbase material.							
	CH					STIFF	MOIST	3'-5.75': FAT CLAY, few fine sands, trace gravel, dark grey brown							
5															
	SM		U	23C	61/11"	DENSE	MOIST	5.75'-7½': SILTY SAND, mostly fine to medium sand, non-plastic, brown				1.0			
7.5															
	CH		S	23D	27	STIFF	MOIST	7½'-9': FAT CLAY, few angular gravels, few fine sands, reddish brown							
10								TERMINATED AT 9 FEET, NO FREE WATER ENCOUNTERED							
12.5															
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3W

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-24

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION \approx 1,370' NE OF SKY VISTA PARKWAY, WB LANE LEMMON DRIVE
 CLIENT: TMWA DATE 08/21/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION \approx 5,035' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0-8": ASPHALT CONCRETE PAVEMENT							
	GM							8"-1.42': <u>AGGREGATE BASE</u> , similar to a Silty Gravel with Sand, mostly fine subangular gravel, some fine to coarse sand, dark grey brown							
	GM		B	24A				1.42'-2': <u>FILL-SILTY GRAVEL WITH SAND</u> , mostly fine to coarse rounded gravel, some fine to coarse sand, brown							
2.5	CL		S	24B	24	STIFF	MOIST	Note: Possible subbase material 2'-5': <u>SANDY LEAN CLAY WITH GRAVEL</u> , some fine sands, few fine gravels, yellow brown	51	48	21			22	A, G
5	SM		S	24C	10	MED. DENSE	MOIST	5'-9': <u>SILTY SAND</u> , mostly fine to medium sand, low plastic, pale yellow brown							
7.5			S	24D	73	VERY DENSE		Note: White stringers visible in sample, color change at 7½ to dark yellow brown.							
10								TERMINATED AT 9 FEET, NO FREE WATER ENCOUNTERED							
12.5															
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3X

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-25

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. **RIG & BORING TYPE** CME 55 DRILL RIG

LOCATION ≈768' NE OF SKY VISTA PARKWAY, WB LANE LEMMON DRIVE

CLIENT: TMWA

DATE 08/21/2014

PROJECT NO. 1660

LOGGED BY: SAM

SURFACE ELEVATION ≅5,050' (WASHOE CO. GIS)

BLOW COUNTS:	Corrected	Not Corrected
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
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99		
100		

HAMMER TYP.: CATHEAD

[illegible]

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3Y

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial



LOG OF TEST BORING NO. B-26

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. RIG & BORING TYPE CME 55 DRILL RIG
 LOCATION ≈300' SW OF SKY VISTA PARKWAY, WB TURN LANE LEMMON DRIVE
 CLIENT: TMWA DATE 08/21/2014
 PROJECT NO. 1660 LOGGED BY: SAM SURFACE ELEVATION ≈5,084' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected X
 HAMMER TYP.: CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0-8½": ASPHALT CONCRETE PAVEMENT							
	GM							8½"-1.58': AGGREGATE BASE, similar to a Silty Gravel with Sand, mostly angular gravel, little sand, grey brown				3.0			
2.5	SC		S	26A	27	MED. DENSE	MOIST	1.58'-11': CLAYEY SAND, mostly fine to medium sand, high plasticity, mottled, yellow brown							
							to								
5			S	26B	43	DENSE		Note: Higher fines content at 5 feet, some fine to medium sand, red brown							
7.5			S	26C	37			Note: Few angular gravel at 7½, decomposed andesite gravel visible in sample, colors red, yellow, and light yellow				4.5			
10			S	26D	50/6"			Note: Mottled at 10 feet							
12.5								TERMINATED AT 11 FEET , NO FREE WATER ENCOUNTERED							
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3Z

DEPTH	HOUR	DATE
N.E.		

A - Drill Cuttings B - Bulk Sample
 R - 3" O.D. 2.42" I.D. Ring Sample
 S - 2" O.D. 1.38" I.D. Sampler
 U - 3" O.D. 2.42" I.D. Tube Sample
 T - 3" O.D. Thin-Walled Shelby Tube


A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear
 TX - Triaxial



LOG OF TEST BORING NO. B-27

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. **RIG & BORING TYPE** CME 55 DRILL RIG
LOCATION NB OFF-RAMP FOR LEMMON DR. FROM HIGHWAY 395, S SHOULDER ≈300' SE LEMMON DR.
CLIENT: TMWA **DATE** 08/21/2014
PROJECT NO. 1660 **LOGGED BY:** SAM **SURFACE ELEVATION** ≈5,094' (WASHOE CO. GIS)

BLOW COUNTS: Corrected Not Corrected **HAMMER TYP.:** CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SC-SM		S	27A	26	MED. DENSE	MOIST	0-2½': <u>SILTY, CLAYEY SAND</u> , mostly fine to coarse sand, low plasticity, yellow brown	23	25	6	105.7	8.3	A, G	
2.5	SC		S	27B	56	DENSE	MOIST	2½'-5': <u>CLAYEY SAND</u> , mostly fine to coarse sand, low plasticity, yellow brown							
5	SC-SM		U	27C	50/5"	VERY DENSE	MOIST	Note: Difficult drilling from 4½', drill pressure up to 1,500 psi 5'-7': <u>SILTY, CLAYEY SAND</u> , mostly fine to medium sand, low plasticity, brown Note: White clumps visible in sample about 3-5 mm nominal diameter, possible calcareous deposit							
7.5	SC		U	27D	50/5"	DENSE	MOIST	7'-8.42': <u>CLAYEY SAND</u> , mostly fine to coarse sand, few angular gravel, yellow brown							
10							TERMINATED AT 8.42 FEET, NO FREE WATER ENCOUNTERED								
12.5															
15															
17.5															

GROUNDWATER

SAMPLE TYPE

LABORATORY TESTS

PLATE NO.: A-3AA

DEPTH	HOUR	DATE
N.E.		





A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial



LOG OF TEST PIT NO. TPWL-1

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. EQUIPMENT TYPE DEERE 310 SG
 CLIENT TMWA
 LOCATION ≈48' E. OF NORTH VIRGINIA ST. & ≈40' S. OF LEMMON DRIVE
 PROJECT NO. 1660 DATE 09/05/2014 LOGGED BY: SAM SURFACE ELEVATION

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SC-SM		B	1A		SL. MOIST	0-1': SILTY, CLAYEY SAND WITH GRAVEL FILL, mostly fine to medium sand, little subangular gravel, yellow brown							
2.5	CL		B	1B		MOIST	1'-5': SANDY LEAN CLAY, some fine to medium sand, few angular gravels, low plasticity, yellowish brown Note: Blocky when excavated, redox spotting in blocks as well as tiny black spots visible	51	36	19			12	A, G
5	SC		B	1c		MOIST	5'-8': CLAYEY SAND WITH GRAVEL, mostly fine to medium sand, little rounded gravel, plastic, yellow brown							
7.5	GP-GC		B	1D		MOIST	8'-10': POORLY GRADED GRAVEL WITH SAND AND CLAY, mostly coarse angular gravel and cobbles up to 6 inches nominal diameter, low plasticity, dark yellow brown							
10							TERMINATED AT 10 FEET, NO FREE WATER ENCOUNTERED							
12.5														
15														

GROUNDWATER

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS PLATE NO.: A-3AB

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear

CME CONSTRUCTION
MATERIALS
ENGINEERS, INC.

DEPTH	HOUR	DATE
N.E.		

LOG OF TEST PIT NO. TPWL-2

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. EQUIPMENT TYPE DEERE 310 SG
 CLIENT TMWA
 LOCATION ≈26' E. OF NB ON-RAM & ≈100' S. OF LEMMON DRIVE
 PROJECT NO. 1660 DATE 09/05/2014 LOGGED BY: SAM SURFACE ELEVATION

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SC					MOIST	0-5½': CLAYEY SAND, mostly fine to coarse sand, few fine angular gravel, weakly cemented, low plasticity, yellow brown Note: Abundant cobbles and small boulders up to 14 inches nominal diameter visible at ground surface above excavation elevation on existing cut slope	23	27	9			5.8	A, G
2.5			B	2A										
5														
7.5	SC		B	2B		MOIST	5½'-10': CLAYEY SAND, mostly fine to medium sand, little fine angular gravel, blocky, yellowish brown Note: Minor fibrous roots visible at 9 feet							
10							TERMINATED AT 10 FEET, NO FREE WATER ENCOUNTERED							
12.5														
15														

GROUNDWATER

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS PLATE NO.: A-3AC

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear

CME CONSTRUCTION
MATERIALS
ENGINEERS, INC.

DEPTH	HOUR	DATE
N.E.		

LOG OF TEST PIT NO. TPWL-3

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. EQUIPMENT TYPE DEERE 310 SG
 CLIENT TMWA
 LOCATION ≈200' NE OF PALACE DR ON SB SHOULDER OF LEMMON DR. ADJ. TO B-12
 PROJECT NO. 1660 DATE 09/05/2014 LOGGED BY: SAM SURFACE ELEVATION ≈4,922' (WASHOE CO. GIS)

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM		B	3A		SL. MOIST	0-2.6': SILTY SAND WITH GRAVEL FILL, mostly fine to medium sand, little to some gravel, isolated cobbles up to 6 inches nominal diameter, low plasticity, light yellow brown							
2.5	SP		B	3B		SL. MOIST	2.6'-4': POORLY GRADED SAND FILL, mostly fine to coarse sand, non-plastic, dark grey brown							
	CH		B	3C		MOIST	4'-5': SANDY FAT CLAY, little fine to coarse sand, plastic, grey brown							
5	CH		B	3D		MOIST	5'-10': FAT CLAY, trace very fine sand, plastic, grey							
7.5														
10							TERMINATED AT 10 FEET, NO FREE WATER OBSERVED							
12.5														
15														

GROUNDWATER

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS PLATE NO.: A-3AD

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear

CME CONSTRUCTION
MATERIALS
ENGINEERS, INC.

DEPTH	HOUR	DATE
N.E.		

LOG OF TEST PIT NO. CS-1

PROJECT NORTH VALLEY WATERLINE ALIGNMENT GEOTECHNICAL INV. EQUIPMENT TYPE DEERE 310 SG
 CLIENT TMWA
 LOCATION ≈600' SOUTH OF B-23
 PROJECT NO. 1660 DATE 09/05/2014 LOGGED BY: SAM SURFACE ELEVATION

Depth in Feet	Unified Soil Classification	Graphic Log	Sample Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM						0'-2': <u>SILTY SAND WITH GRAVEL AND COBBLES</u> , mostly fine to medium sand, some angular yellow brown and red brown, cobbles up to 24 inches nominal diameter, brown							
2.5	ROCK						2'-12': <u>WEATHERED ANDESITE ROCK</u> , intensely fractured, moderately weathered with less weathered corestones visible in sidewall, completely weathered zones located between core stones, random fracturing, moderately hard rock, color ranges from predominately yellow to isolated pockets of red brown and grey.							
5														
7.5														
10														
12.5							BOTTOM OF EXPOSED SLOPE Note: This cut slope log represents the visual observations of the existing exposed cut slope adjacent to Lemmon Drive on the west side. Total exposed height ranges from 10 to 12 feet at highest point							
15														

GROUNDWATER

SAMPLE TYPE
B - Bulk Sample








LABORATORY TESTS PLATE NO.: A-3AE

A - Atterberg Limits
 G - Grain Size
 C - Consolidation
 MD - Moisture/Density
 DS - Direct Shear

CME CONSTRUCTION
MATERIALS
ENGINEERS, INC.

DEPTH	HOUR	DATE
N.E.		

UNIFIED SOIL CLASSIFICATION CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)		
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)		SILTS AND CLAYS Liquid limit less than 50%		ML Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
	 GW Well-graded gravels, gravel-sand mixtures, little or no fines	GP Poorly-graded gravels, gravel-sand mixtures, little or no fines			CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	Gravels with fines (More than 12% fines)				OL Organic silts and organic silty clays of low plasticity
	 GM Silty gravels, gravel-sand-silt mixtures	GC Clayey gravels, gravel-sand-clay mixtures	SILTS AND CLAYS Liquid limit 50% or greater		MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	Clean Sands (Less than 5% fines)				CH Inorganic clays of high plasticity, fat clays
	 SW Well-graded sands, gravelly sands, little or no fines	SP Poorly graded sands, gravelly sands, little or no fines			OH Organic clays of medium to high plasticity, organic silts
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Sands with fines (More than 12% fines)		HIGHLY ORGANIC SOILS		PT Peat and other highly organic soils
	 SM Silty sands, sand-silt mixtures	SC Clayey sands, sand-clay mixtures			

ESTIMATED PERCENTAGES OF GRAVEL, SAND, AND FINES BASED ON VISUAL DESCRIPTION

TRACE	<5%
FEW	5%-15%
LITTLE	15%-30%
SOME	30%-50%
MOSTLY	>50%

CORRELATION OF PENETRATION RESISTANCE WITH RELATIVE DENSITY

SAND AND GRAVEL		SILT AND CLAY	
NO. OF BLOWS	RELATIVE DENSITY	NO. OF BLOWS	CONSISTENCY
0-4	VERY LOOSE	0-1	VERY SOFT
5-10	LOOSE	2-4	SOFT
11-30	MEDIUM DENSE	5-8	MEDIUM STIFF
31-50	DENSE	9-15	STIFF
OVER 50	VERY DENSE	16-30	VERY STIFF
		OVER 31	HARD



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ENGINEERS INC.**

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Reno, NV 89511

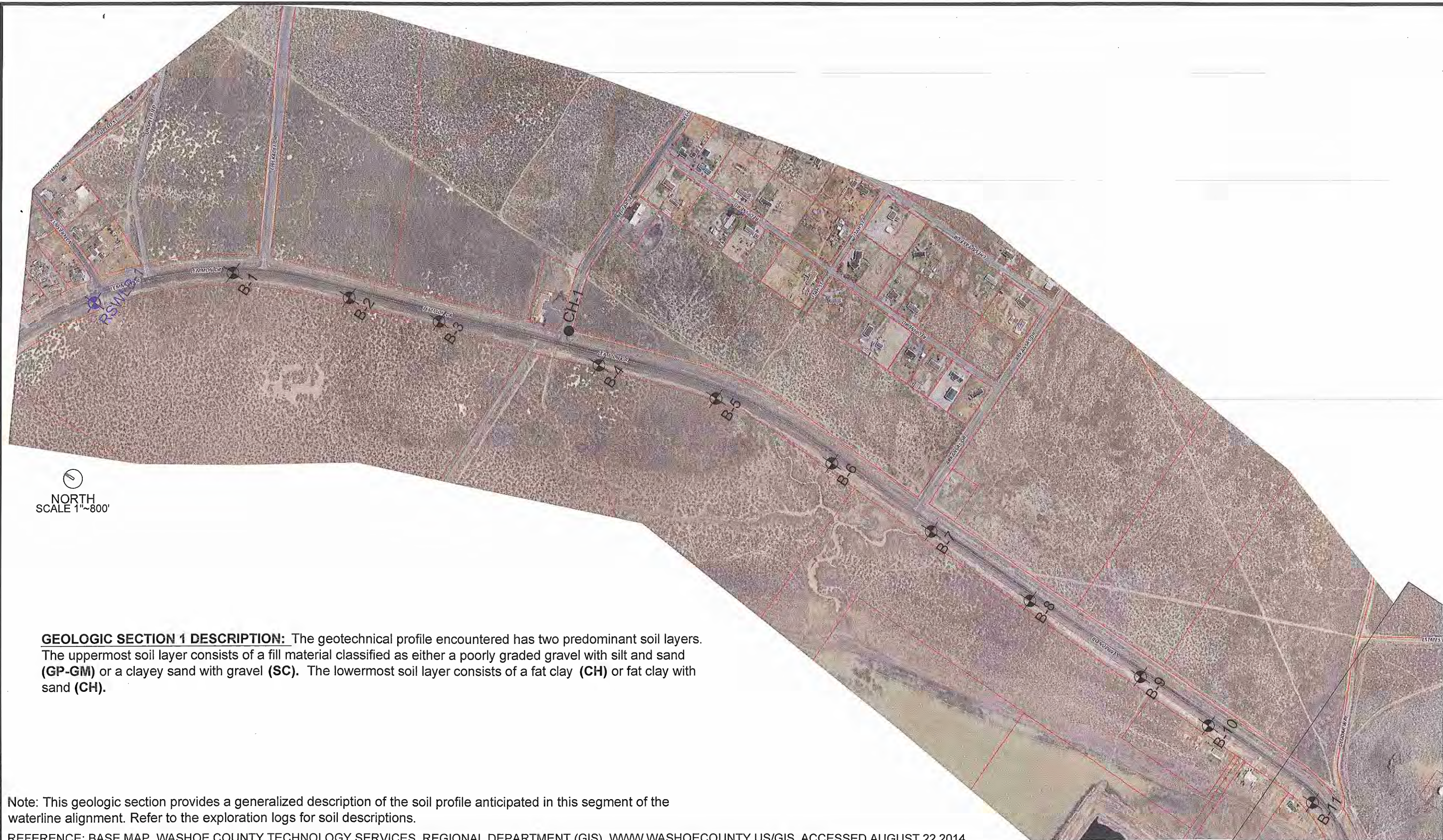
TMWA
NORTH VALLEYS WATERLINE ALIGNMENT
SOIL CLASSIFICATION CHART
CLEAR CREEK TAHOE

PROJECT NO.:1660

DATE: 11/2/2014

PLATE

A-4



GEOLOGIC SECTION 1 DESCRIPTION: The geotechnical profile encountered has two predominant soil layers. The uppermost soil layer consists of a fill material classified as either a poorly graded gravel with silt and sand (GP-GM) or a clayey sand with gravel (SC). The lowermost soil layer consists of a fat clay (CH) or fat clay with sand (CH).

Note: This geologic section provides a generalized description of the soil profile anticipated in this segment of the waterline alignment. Refer to the exploration logs for soil descriptions.

REFERENCE: BASE MAP, WASHOE COUNTY TECHNOLOGY SERVICES, REGIONAL DEPARTMENT (GIS), WWW.WASHOECOUNTY.US/GIS, ACCESSED AUGUST 22, 2014

CME

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Reno, NV 89511

TMWA
NORTH VALLEYS WATERLINE ALIGNMENT
GEOLOGIC SECTION 1
LEMMON VALLEY

PROJECT NO: 1660
DATE: 09/15/2014

LEGEND

B-1

APPROXIMATE BORING LOCATION THIS INVESTIGATION (2014)

RSWLB-1

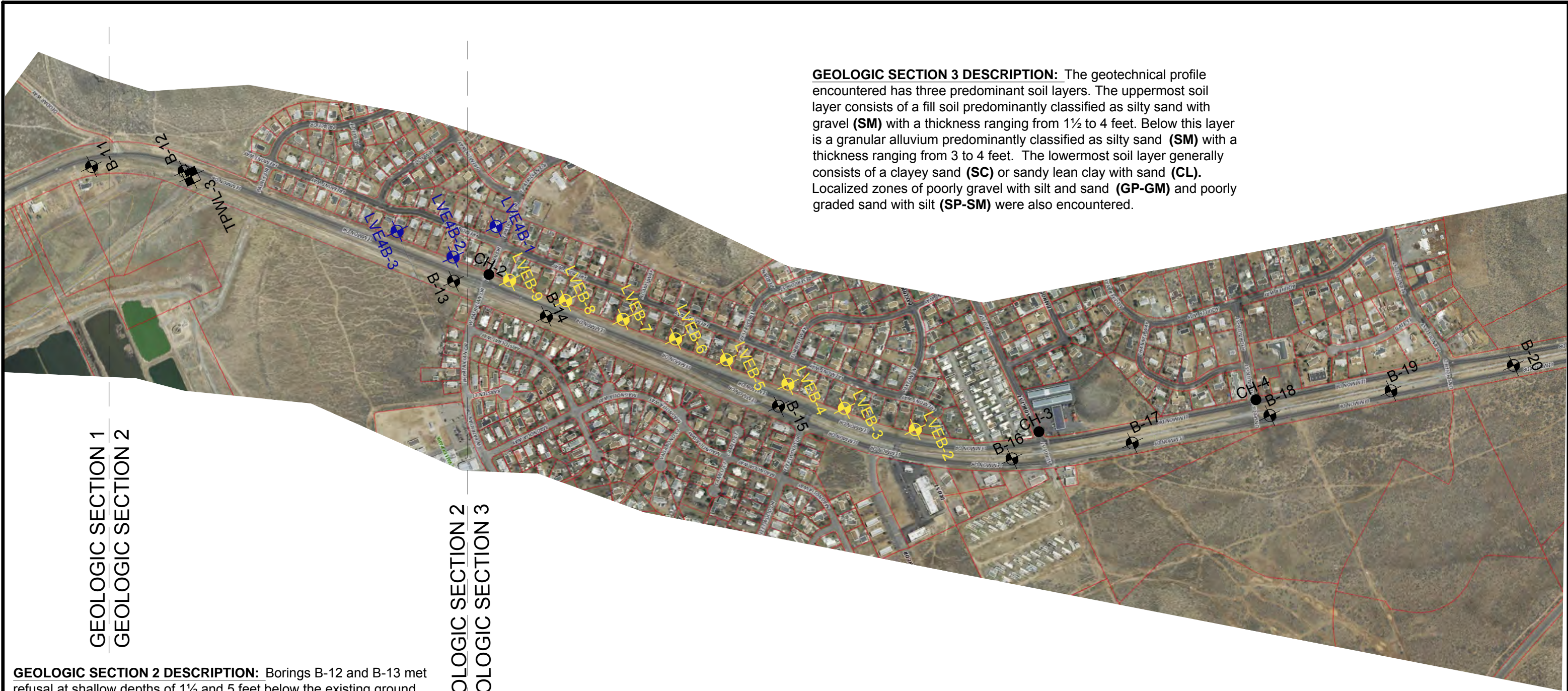
APPROXIMATE BORING LOCATION PREVIOUS GEOTECHNICAL INVESTIGATION FOR RENO-STEAD WATERLINE PHASE 1

CH-1

APPROXIMATE COREHOLE LOCATION (2014)

PLATE

A-5a



GEOLOGIC SECTION 3 DESCRIPTION: The geotechnical profile encountered has three predominant soil layers. The uppermost soil layer consists of a fill soil predominantly classified as silty sand with gravel (**SM**) with a thickness ranging from 1½ to 4 feet. Below this layer is a granular alluvium predominantly classified as silty sand (**SM**) with a thickness ranging from 3 to 4 feet. The lowermost soil layer generally consists of a clayey sand (**SC**) or sandy lean clay with sand (**CL**). Localized zones of poorly gravel with silt and sand (**GP-GM**) and poorly graded sand with silt (**SP-SM**) were also encountered.

GEOLOGIC SECTION 2 DESCRIPTION: Borings B-12 and B-13 met refusal at shallow depths of 1½ and 5 feet below the existing ground surface (bgs). A subsequent test pit was completed near B-12 and was excavated to a depth of 10 feet bgs. The uppermost soil horizon encountered consists of granular fill soils classified as silty sand (**SM**), clayey sand (**SC**), poorly graded sand with gravel (**SP-SM**). In Boring B-13, it appears that a geotextile was encountered at 2 feet below the existing ground surface. Below the uppermost fill zone, native soils are anticipated to consist of sandy fat clays (**CH**).

NORTH
SCALE 1"=800'

Note: This geologic section provides a generalized description of the soil profile anticipated in this segment of the waterline alignment. Refer to the exploration logs for soil descriptions.

REFERENCE: BASE MAP, WASHOE COUNTY TECHNOLOGY SERVICES, REGIONAL DEPARTMENT (GIS), WWW.WASHOECOUNTY.US/GIS, ACCESSED AUGUST 22,2014

 CONSTRUCTION MATERIALS ENGINEERS INC. 6980 Sierra Center Parkway, Suite 90 Reno, NV 89511	TMWA NORTH VALLEYS WATERLINE ALIGNMENT GEOLOGIC SECTIONS 2 & 3 LEMMON VALLEY	LEGEND	 B-1 LVE4B-1 LVEB-1	 CH-1 LVEB-1	 TPWL-1	PLATE A-5b
		 B-1 LVE4B-1 LVEB-1				

GEOLOGIC SECTION 4 DESCRIPTION: The geotechnical profile encountered has three predominant soil layers. The uppermost soil layer consists of a fill material classified as silty sand (**SM**) or silty sand with gravel (**SM**) encountered to 1½ to 2 feet below grade. Below this layer is a silty with gravel (**SM**) encountered with a thickness of about 2 to 3 feet. The lowermost horizon encountered to the depth explored generally consists of clayey gravel with sand (**GC**).

GEOLOGIC SECTION 6 DESCRIPTION: This section of the alignment is located in finer grained alluvium. Two predominate soil horizons were encountered to the depth explored and were classified as either clayey sand (**SC**) or silty, clayey sand (**SC-SM**). The relative density of this soil horizons ranged from medium dense to dense.



GEOLOGIC SECTION 5 DESCRIPTION: This section of the alignment is located in Tertiary volcanic bedrock and alluvial fan deposits. A residual soil layer consisting of clay soils is generally encountered above the volcanic bedrock. The generalized geotechnical profile encountered in the roadway consists of a structural section including a granular subbase material to depths of 2 to 3 feet below grade. Below the subbase to the depth explored, clay soils were encountered consisting either of lean clay with sand (**CL**) or fat clay (**CH**). Clay soils were interbedded with silty sand (**SM**).

GEOLOGIC SECTION 7 DESCRIPTION: This section of the alignment is located in a coarser grained alluvial fan deposit. The predominant soil horizons encountered to the depth explored were clayey sand with gravel (**SC**) or silty gravel (**GM**). Some cobbles to about 12 inches in diameter were also encountered.

Note: This geologic section provides a generalized description of the soil profile anticipated in this segment of the waterline alignment. Refer to the exploration logs for soil descriptions.

REFERENCE: BASE MAP, WASHOE COUNTY TECHNOLOGY SERVICES, REGIONAL DEPARTMENT (GIS), WWW.WASHOECOUNTY.US/GIS, ACCESSED AUGUST 22,2014

V:\Active\1660\AutoCAD\Geologic section map.dwg

CME

CONSTRUCTION MATERIALS ENGINEERS INC.

6980 Sierra Center Parkway, Suite 90
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TMWA

NORTH VALLEYS WATERLINE ALIGNMENT

GEOLOGIC SECTIONS 4, 5, 6, & 7

LEMMON VALLEY

PROJECT NO : 1660

DATE : 10/22/2014

LEGEND

B-1

APPROXIMATE BORING LOCATION THIS INVESTIGATION (2014)

CS-1

APPROXIMATE LOCATION OF MAPPED CUT SLOPE (CS-1) PROFILE

LSBTP-1

APPROXIMATE TEST PIT LOCATION PREVIOUS GEOTECHNICAL INVESTIGATION FOR LEMMON DRIVE/SKY VISTA PARKWAY/BUCK DRIVE

LDEB-2

APPROXIMATE BORING LOCATION PREVIOUS GEOTECHNICAL INVESTIGATION FOR LEMMON DRIVE EXTENSION

TPWL-1

APPROXIMATE TEST PIT LOCATION CURRENT INVESTIGATION (2014)

LETP-9

APPROXIMATE TEST PIT LOCATION PREVIOUS GEOTECHNICAL INVESTIGATION FOR LEMMON DRIVE EXTENSION

MRB-1

APPROXIMATE BORING AND TEST PIT LOCATION PREVIOUS GEOTECHNICAL INVESTIGATION FOR MILITARY ROAD

M RTP-1

APPROXIMATE BORING AND TEST PIT LOCATION PREVIOUS GEOTECHNICAL INVESTIGATION FOR MILITARY ROAD

PLATE

A-5c