

August 15, 2019



ENTECH
ENGINEERING, INC.

505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907
PHONE (719) 531-5599
FAX (719) 531-5238

Mule Creek Gravel
1050 County Road 231
Woodland Park, CO 80863

Attn: Ryan Middleton

Re: Laboratory Testing – Classification Testing and California Bearing Ratio Testing
21094 Highway 67
Divide, Colorado

Dear Mr. Middleton:

As requested, personnel of Entech Engineering, Inc. performed sieve testing and a California Bearing Ratio Test on a Class 6 sample delivered to our lab.

The laboratory sieve test results are attached to this report in Figure No.1. The California Bearing Ratio and the associated testing are attached in Figures 2 through 4.

We trust that this has provided you with the information you required. If you have any questions or need additional information, please do not hesitate to contact us.

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Daniel P. Stegman

DPS/ts

Encl.

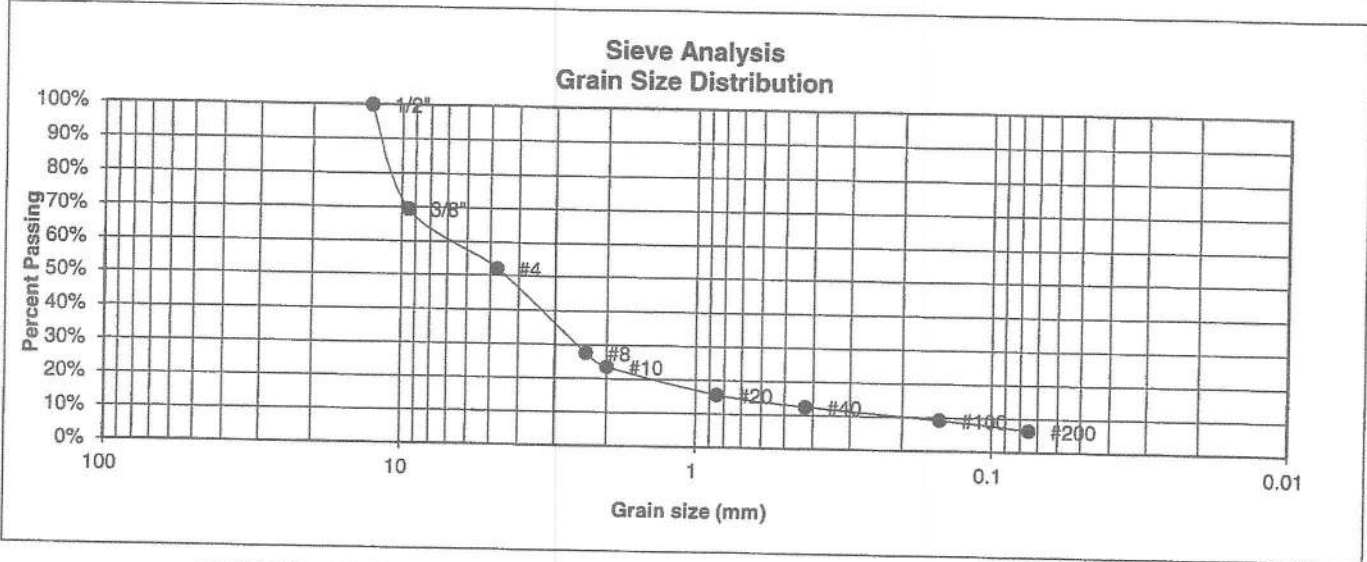
Entech Job No. 190854
AAprojects/2019/190854 cbr-a



Reviewed by:

Mark H. Hauschild, P.E.
Senior Engineer

SOIL TYPE # 1, CBR #1	UNIFIED CLASSIFICATION SM-SW	TEST BY BL
CLIENT MULE CREEK	AASHTO CLASSIFICATION	JOB NO. 190854
PROJECT MULE CREEK, CLASS 6		



U.S. Sieve #	SAMPLE CLASS 2 CLASS 5 CLASS 6			
	Percent Finer	Base Aggregates		
3"		95-100		
1 1/2"			100	
1"			95-100	
3/4"				100
1/2"	100.0%			
3/8"	69.5%			
4	52.1%		30-70	30-65
8	27.7%			25-55
10	23.6%			
20	15.7%			
40	12.5%			
100	9.2%			
200	6.5%	3-15	3-15	3-12

Atterberg Limits
 Plastic Limit NP
 Liquid Limit NV
 Plastic Index NP

FHA Swell
 Moisture at start
 Moisture at finish
 Moisture increase
 Initial dry density (pcf)
 Swell (psf)

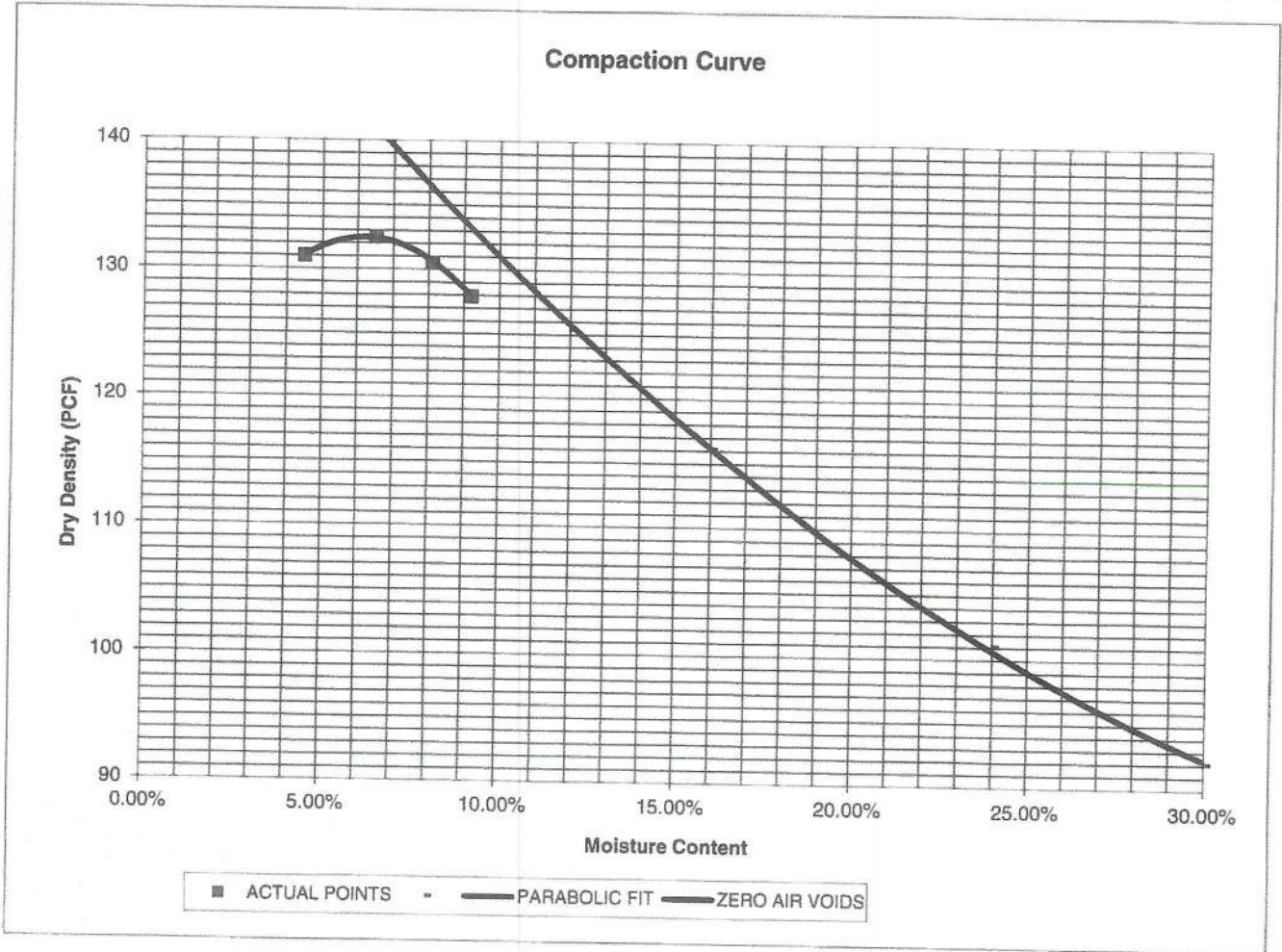
LABORATORY TEST RESULTS

DRAWN:	DATE:	CHECKED: DS	DATE: 8/21/19
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JOB NO.: 190854
 FIG NO.: 1

PROJECT	HIGHWAY 67	CLIENT	MULE CREEK
SAMPLE LOCATION	CLASS 6	JOB NO.	190854
SOIL DESCRIPTION	SAND, SL. SILTY, RED BROWN	DATE	07/29/19

IDENTIFICATION	SM-SW	COMPACTION TEST #	1, SAMPLE #1
TEST DESIGNATION / METHOD	ASTM D-1557-C	TEST BY	BL
MAXIMUM DRY DENSITY (PCF)	132.5	OPTIMUM MOISTURE	6.4%



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MOISTURE DENSITY RELATION

DRAWN:	DATE:	CHECKED:	DATE:
		<i>DL</i>	<i>07/29/19</i>

JOB NO.:
190854
 FIG NO.:
2

CBR TEST LOAD DATA

JOB NO: 190854
 CLIENT: MULE CREEK
 PROJECT: HIGHWAY 67
 SAMPLE # 1, CBR #1

PISTON DIAMETER (cm) 4.958	10 BLOWS		25 BLOWS		56 BLOWS	
	PISTON AREA (in ²) 2.99250919	MOLD # 12	MOLD # 2	MOLD # 14	MOLD # 12	MOLD # 14
PENETRATION DEPTH (INCHES)	LOAD(LBS) (LBS)	STRESS (PSI)	LOAD(LBS) (LBS)	STRESS (PSI)	LOAD(LBS) (LBS)	STRESS (PSI)
0.000	0	0.00	0	0.00	0	0.00
0.025	184	61.49	349	116.62	614	205.18
0.050	318	106.27	695	232.25	795	265.66
0.075	524	175.10	1032	344.86	1199	400.67
0.100	721	240.93	1229	410.69	1996	667.00
0.125	876	292.73	1439	480.87	2785	930.66
0.150	976	326.15	1688	564.08	3429	1145.86
0.175	1093	365.25	1932	645.61	4291	1433.91
0.200	1235	412.70	2214	739.85	4931	1647.78
0.300	1563	522.30	2499	835.09	5455	1822.88
0.400	1769	591.14	2765	923.97	6000	2005.01
0.500	1988	664.33	2965	990.81		

FINAL MOISTURE CONTENT

	MOLD # 12	MOLD # 2	MOLD # 14
CAN #	G-3	G-6	G-18
WT. CAN	145.18	215.9	214.91
WT. CAN+WET	369.53	384.93	399.86
WT. CAN+DRY	347.99	369.39	385.92
WT. H2O	21.54	15.54	13.94
WT. DRY SOIL	202.81	153.49	171.01
MOISTURE CONTENT	10.62%	10.12%	8.15%

WET DENSITY (PCF)	126.8	131.0	139.4
DRY DENSITY (PCF)	119.2	123.1	131.0

BEARING RATIO	24.09	41.07	66.70
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90% OF DRY DENSITY	119.3
95% OF DRY DENSITY	125.9

BEARING RATIO AT 90% OF MAX	24.51 ~ R VALUE	71
BEARING RATIO AT 95% OF MAX	50.15 ~ R VALUE	81



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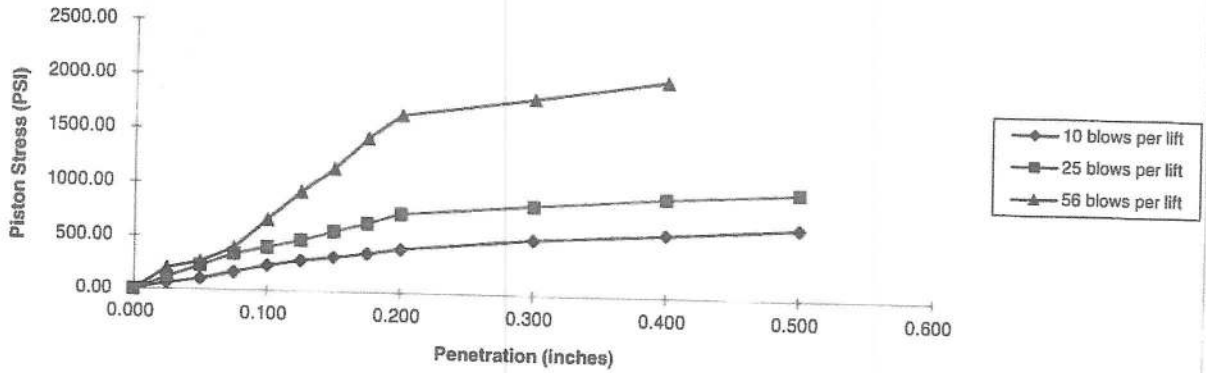
CBR TEST DATA

DRAWN:	DATE:	CHECKED:	DATE:
		DJ	8/21/11

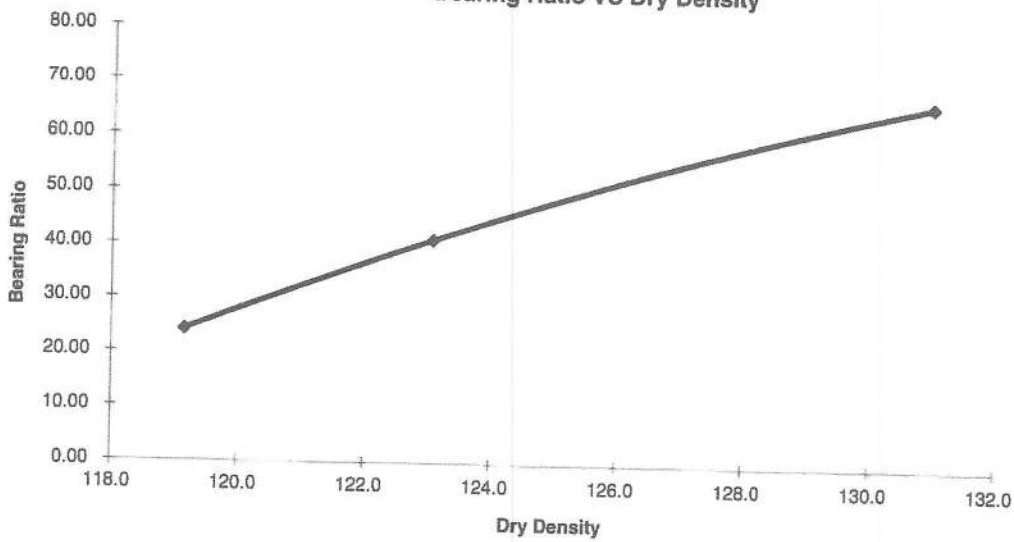
JOB NO:
 190854

FIG NO:
 3

Stress VS Penetration



Bearing Ratio VS Dry Density



BEARING RATIO AT 90% OF MAX	24.51 ~ R VALUE	71.00
BEARING RATIO AT 95% OF MAX	50.15 ~ R VALUE	81.00

JOB NO: 190854
 SAMPLE # 1, CBR #1



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CALIFORNIA BEARING RATIO

DRAWN

DATE:

CHECKED:

DATE: 8/21/11

JOB NO.:

190854

FIG NO.:

4