April 10, 2019

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

Dakota Springs Engineering, Inc.
31 North Tejon Street, Suite 500
Colorado Springs, CO 80903

Attn: Charles K. Cothern

Re: Geologic Hazard Addendum
Springs at Waterview East
South Powers and Bradley Road
Colorado Springs, Colorado

Ref: Entech Engineering, Inc., Revised February 8, 2019. *Soils, Geology and Geologic Hazard, Springs at Waterview East, South Powers Boulevard and Bradley Road, El Paso County, Colorado.* Entech Job No. 170039

Dear Mr. Cothern:

A Soils, Geology and Geologic Hazard Study was prepared by Entech Engineering, Inc., Revised Date February 8, 2019, for the above referenced site. This addendum is in response to the Colorado Geological Survey (CGS) review letter dated March 20, 2019, CGS Unique No. EP-18-0011_4 and is included in Appendix A.

CGS recommended additional investigation on the site in areas where significant cuts are proposed. Entech has recently drilled additional borings at the site. The Summary of Laboratory Test Results, Test Boring Location Maps and Test Boring Logs are included in Appendices B and C. Soils encountered in these borings consisted of predominantly clay soils with underlying claystone and shale. The bedrock underlying the site is the Pierre Shale Formation of Cretaceous Age, which typically has a moderate to high expansion potential.

Based on the additional subsurface information, it is anticipated claystone or clay soils will be exposed in the majority of cuts proposed on the site. These soils have the potential for moderate to high expansion potential. Mitigation of the expansive soils will be required for the majority of the site. Specific recommendations for foundations and construction will be provided in the Subsurface Soil Investigations after additional investigation is performed for the different phases of the development prior to construction.

We trust 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.

Logan L. Langford, P.G.
Geologist

Reviewed by:

Joseph C. Goode, Jr., P.E.
President

COLORADO LICENSED
JOSEPH COLLIN GOODE
23725
4/11/19
PROFESSIONAL ENGINEER

LLL/kah
Encl.
Entech Job No. 170039
AA Projects/2017/170039 geohaz addendum

APPENDIX A: Colorado Geological Survey Review Letter, dated March 20, 2019, CGS Unique No. EP18-0011_4

COLORADO GEOLOGICAL SURVEY

1801 Moly Road
Golden, Colorado 80401

Karen Berry
State Geologist

March 20, 2019

Nina Ruiz
El Paso County
Planning and Community Development
2880 International Circle
Colorado Springs, CO 80910

Location:
W½ Section 9,
T15S, R65W of the 6th P.M.
38.7562, -104.6777

Subject: **Trails at Aspen Ridge PUDSP191 (previously reviewed as Springs East at Waterview SP-17-010)**
El Paso County, CO; CGS Unique No. EP-18-0011_4

Dear Ms. Ruiz:

Colorado Geological Survey has reviewed the Trails at Aspen Ridge combined PUD/preliminary plan referral. I understand the applicant currently proposes 516 SF residential lots on 118 acres located southeast of S. Powers Blvd. and Bradley Road, east of Security-Widefield.

The available referral documents include:

- Trails at Aspen Ridge Letter of Intent (February 13, 2019),
- Soil, Geology, and Geologic Hazard, Springs at Waterview East (Entech Engineering, Inc., revised February 8, 2019),
- Set of ten Trails at Aspen Ridge Grading and Erosion Control Plans (Matrix Design Group/Stantec, February 2019),
- and other documents.

CGS previously reviewed the Springs East at Waterview development, and two previous versions of Entech's Soil, Geology, and Geologic Hazard report (4/25/2017 and 2/21/2018). Entech's revised (2/8/2019) report contains an updated lot layout but is otherwise unchanged from the 2/21/2018 version.

Entech's ten borings were drilled to a depth of 20 feet. The Trails at Aspen Ridge Grading and Erosion Control Plans indicate that significant cuts and fills are planned. Cuts of approximately 15 feet are proposed in the area of Entech's borings TB-1 in the in the northeastern area of the site, and TB-5, in the southwestern area of the site, so Entech's borings extend only five feet below proposed grade in these areas, and do not extend to sufficient depths to provide meaningful information about soil and bedrock engineering properties and groundwater levels.

As noted in CGS's 11/28/2017 review letter, **additional investigation, sampling, testing and analysis are needed in proposed cut areas, based on the project grading plans,** to characterize subsurface conditions, determine depth and extent of overexcavation, if overexcavation is planned to reduce the use of drilled pier foundations, and to determine basement feasibility where Entech's borings did not extend to sufficient depth below planned basement floor and foundation bearing depths.

Entech states (page 7) "Overexcavation depths of 4 to 6 feet are anticipated for the site." This means 4 to 6 feet below foundation bearing elevations. For a development of the proposed density, overexcavation should

be performed over the entire area within a specific construction phase determined to require overexcavation, at the grading phase of development, before wet utilities are installed. In areas of expansive soils, significant cuts and/or shallow claystone bedrock, roads will require overexcavation as well.

Thank you for the opportunity to review and comment on this project. If you have questions or require additional review, please call me at (303) 384-2643, or e-mail carlson@mines.edu.

Sincerely,

Jill Carlson, C.E.G.
Engineering Geologist

APPENDIX B: Laboratory Test Results and Test Boring Logs, Entech Job No. 190161

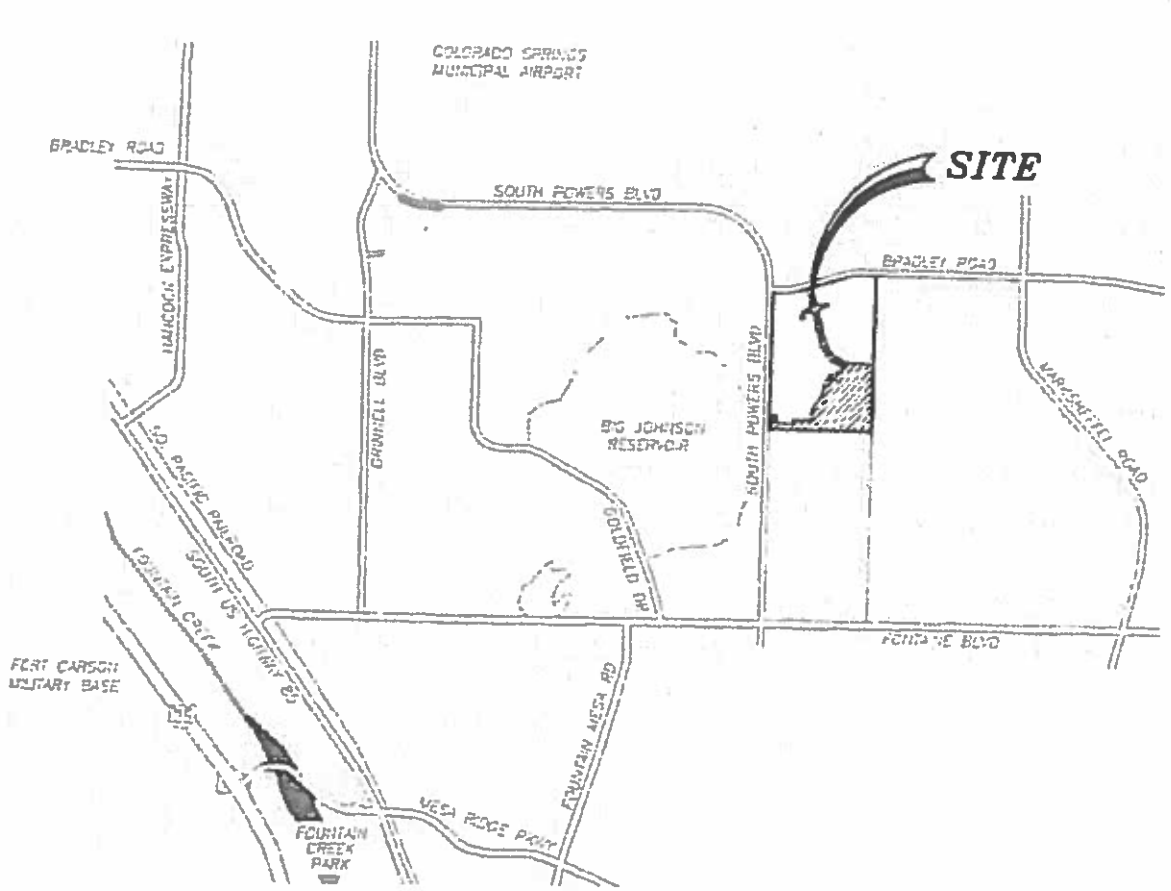
TABLE 1

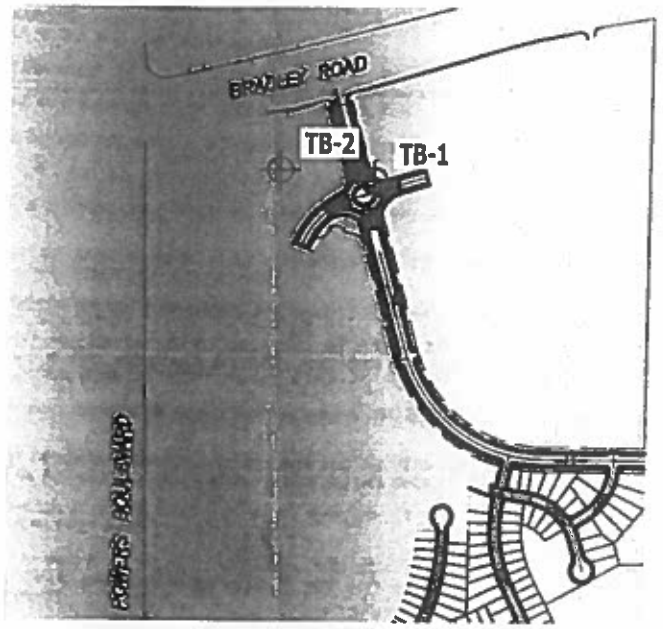
SUMMARY OF LABORATORY TEST RESULTS

CLIENT COLA, LLC
PROJECT TRAILS AT ASPEN RIDGE
JOB NO. 190161

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	2	5			34.4						SM	SAND, SILTY
2	1	2-3			67.3	27	13				CL	CLAY, SANDY
2	1	10	33.1	103.3	90.0	44	26			0.3	CL	CLAY, SANDY
2	2	30			61.6						CL	CLAY, VERY SANDY
3	1	20	23.2	102.6	95.5	32	13			0.9	CL	CLAYSTONE, SANDY

FIGURE





⊕ TB-2- APPROXIMATE TEST BORING LOCATION AND NUMBER

ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO 80907 (719) 531-5599

VICINITY MAP/TEST BORING LOCATION PLAN
LEGACY DRIVE – BORROW SITE
EL PASO COUNTY, CO
FOR: COLA, LLC

DRAWN BY:	DATE DRAWN:	DESIGNED BY:	CHECKED:
SCC	02/21/19	SCC	SCC

JOB NO.: 190161
FIG. NO.: 1

APPENDIX A: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 2/8/2019
Job # 190161

REMARKS

WATER @ 15', 2/8/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			14	7.3	2	CLAY, SANDY, TAN TO RED BROWN, FIRM, MOIST
5			8	14.0	2	
10			12	21.3	2	
15			11	11.1	2	
20			34	19.6	3	HIGHLY WEATHERED CLAYSTONE, GRAY BROWN, VERY STIFF, MOIST

TEST BORING NO. 2
DATE DRILLED 2/8/2019
CLIENT COLA, LLC
LOCATION TRAILS AT ASPEN RIDGE

REMARKS

DRY TO 30', 2/8/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			15	7.2	1	SAND, SILTY, FINE GRAINED, LIGHT BROWN, LOOSE TO MEDIUM DENSE, MOIST
5			10	6.1	1	
10			9	3.1	1	
15			17	3.0	1	
20			13	4.5	1	
25			29	10.9	1	CLAYEY LENSES
30			16	15.5	2	CLAY, SANDY, RED BROWN, STIFF, MOIST

ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			2/21/19

JOB NO.: 190161
FIG NO.: A- 1

APPENDIX C: Laboratory Test Results and Test Boring Logs, Entech Job No. 190162

TABLE 1

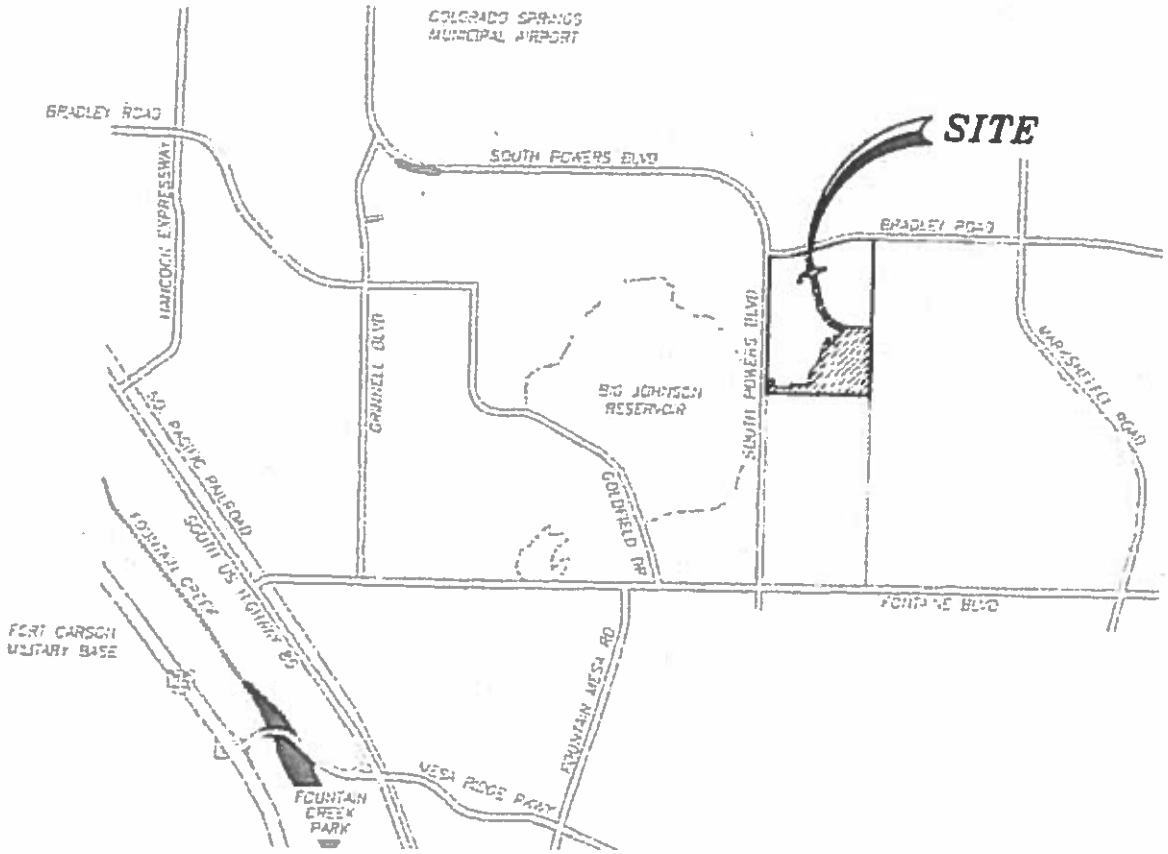
SUMMARY OF LABORATORY TEST RESULTS

CLIENT COLA, LLC
PROJECT TRAILS AT ASPEN RIDGE
JOB NO. 190162

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	1	2-3	13.3	103.0	91.8	39	19	<0.01		1.5	CL	CLAY, SANDY
1	2	2-3			95.6				1420		CL	CLAY, SANDY
2	1	10	15.8	107.2	97.3			0.24		1.2	CL	CLAYSTONE, SANDY
2	2	15	15.8	113.9	97.9	56	36			3.1	CH	CLAYSTONE, SANDY
3	1	20			93.5			0.15			CL	SHALE

FIGURES

N

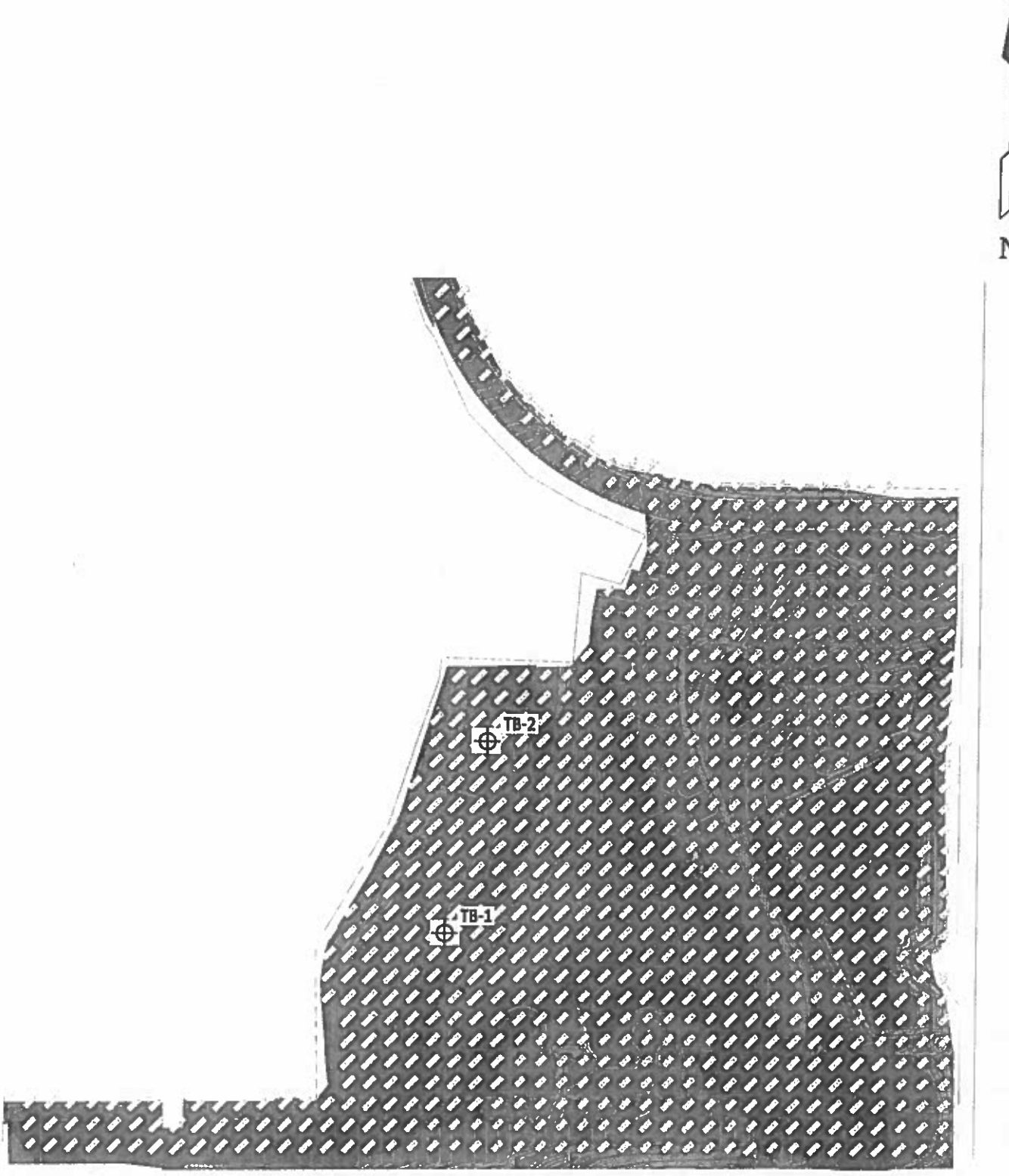


ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

VICINITY MAP
TRAILS AT ASPEN RIDGE–BORROW SITE
EL PASO COUNTY, CO
FOR: COLA, LLC

DRAWN BY:	DATE DRAWN:	DESIGNED BY:	CHECKED:
SCC	02/25/19	SCC	SCC

JOB NO.: 190162
FIG. NO.: 1



⊕ TB-2- APPROXIMATE TEST BORING LOCATION AND NUMBER

ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

TEST BORING LOCATION MAP
TRAILS AT ASPEN RIDGE-BORROW SITE
EL PASO COUNTY, CO
FOR: COLA, LLC

DRAWN BY:	DATE DRAWN:	DESIGNED BY:	CHECKED:
SCC	02/25/19	SCC	SCC

JOB NO.: 190162
FIG. NO.: 2

APPENDIX A: Test Boring Logs

TEST BORING NO. 1
DATE DRILLED 2/11/2019
Job # 190162

REMARKS

DRY TO 20', 2/11/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			24	10.1	1
5			45	11.3	2
10			50 9"	15.0	2
15			50 9"	13.1	2
20			50 2"	9.5	3

0.5' TOPSOIL, CLAY, SANDY, TAN, STIFF, MOIST

WEATHERED TO FORMATIONAL CLAYSTONE, SANDY, TAN, VERY STIFF TO HARD, MOIST

SHALE, GRAY BROWN, HARD, MOIST

TEST BORING NO. 2
DATE DRILLED 2/11/2019
CLIENT COLA, LLC
LOCATION TRAILS AT ASPEN RIDGE

REMARKS

DRY TO 30', 2/11/19

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			20	13.5	1
5			28	15.2	1
10			47	16.3	2
15			40	17.6	2
20			47	17.0	2
25			50 7"	13.6	2
30			50 2"	9.6	3

0.5' TOPSOIL, CLAY, SANDY, TAN, STIFF, MOIST

WEATHERED TO FORMATIONAL CLAYSTONE, SANDY, GRAY BROWN, VERY STIFF TO HARD, MOIST

SHALE, GRAY BROWN, HARD, MOIST

ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN:	DATE:	CHECKED: AL	DATE: 2/22/19

JOB NO.: 190162
FIG NO.: A- 1