



ENTECH
ENGINEERING, INC.

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

February 13, 2023

Quality Brands Group LLC
2001 West Main Street, Suite 250
Stamford, Connecticut 06902

Attn: Shane Clark

Re: Soils and Geology Study
8035 Meridian Park Drive
Lot 1A, Bent Grass East Commercial Fil. No. 2A
El Paso County, Colorado
Entech Job No. 230132

Dear Mr. Clark:

The project consists of the construction of a Dunkin' Donuts restaurant on the southern portion of a 1.46-acre lot. This report addresses potential geologic constraints and hazards effecting the proposed construction.

GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in a portion of the SE $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 1, Township 13 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located southwest of Bent Grass Meadows Drive and Meridian Road in El Paso County, Colorado. The location of the site is shown on the Vicinity Map, Figure 1.

The topography of the site is gradually sloping to the southeast. No drainages were observed on the site, however, a minor drainage is located along the eastern side of the property that flows in a southerly direction. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included undeveloped and agricultural grazing land. The site is currently vacant and vegetation consist of primarily field grasses and weeds. Site photographs, taken February 6, 2023, are included in Appendix A.

The site consists of a 1.46-acre lot. Proposed development will consist of Dunkin' Donuts Restaurant with parking and drive areas, and other associated site improvements. The buildings will be serviced by municipal water and sewer. The Development Plan is presented in Figure 3.

LAND USE AND ENGINEERING GEOLOGY

This site was found to be suitable for the proposed development, which will consist a new Dunkin' Donuts Restaurant, parking and drive areas, and other associated site improvements. Areas were encountered where the geologic conditions will impose minor constraints on development and land use. These include artificial fill. Based on the proposed development plan, it appears that these areas will have minor impacts on the development. These conditions will be discussed in greater detail in the report.

In general, it is our opinion that the development can be achieved if the observed geologic conditions on site are either avoided or properly mitigated. All recommendations are subject to the limitations discussed in the report.

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SCOPE OF THE REPORT

A general geologic analysis utilizing published geologic data. Detailed site-specific mapping will be conducted to obtain general information in respect to major geographic and geologic features, geologic descriptions and their effects on the development of the property.

PREVIOUS INVESTIGATIONS

The site was previously investigated by Entech Engineering, Inc., with the results presented in the *Subsurface Soil Investigation*, dated September 23, 2022 (Reference 1, Appendix B). Subsurface soils information from the report was used in preparing this Soil, Geology, and Geologic Hazard Evaluation. Four test borings were drilled across the site in the proposed building location. The locations of the test borings are indicated on the Development Plan, Figure 3. Laboratory testing was also performed on some of the soils to classify and determine the soils engineering characteristics. Laboratory tests included grain-size analysis, ASTM D-422, and Atterberg Limits, ASTM D-4318. Test Boring Logs and Summary of Laboratory Testing Results are included in Appendix B.

The site was also investigated as a part of a Geologic Hazard/Land Use Investigation for the entire 201-acre Bent Grass Development by Entech Engineering, Inc., revised September 28, 2006 (Reference 2). Information from these reports was used in evaluating the site.

FIELD INVESTIGATION

Our field investigation consisted of the preparation of a geologic map of bedrock features and significant surficial deposits. The Natural Resource Conservation Service (NRCS), previously the Soil Conservation Service (SCS) survey was also reviewed to evaluate the site. The position of mappable units within the subject site are shown on the Geologic Map. Our mapping procedures involved both field reconnaissance and measurements, and aerial photo reconnaissance and interpretation. The same mapping procedures have also been utilized to produce the Geology/Engineering Geology Map which identified pertinent geologic conditions affecting development. The field mapping was performed by personnel of Entech Engineering, Inc. on February 6, 2023.

SOIL AND GEOLOGIC CONDITIONS

Soil Survey

The Natural Resource Conservation Service (NRCS) (Reference 3, Figure 3), previously the Soil Conservation Service (Reference 4) has mapped one soil type on the site. Complete descriptions of the soils are presented in Appendix C. In general, the soils consist of gravelly sandy loam, and very gravelly loamy sand. The soils are described as follows:

<u>Type</u>	<u>Description</u>
19	Columbine Gravelly Sandy Loam, 0-3% Slopes

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The soils have been described to have rapid permeabilities. The soils are described as well suited for use as homesites. Possible hazards with soils erosion are present on the site. The erosion potential can be controlled with vegetation. The soils have been described to have moderate erosion hazards (Reference 3).

Soils

Two soil types and one bedrock type were encountered in the test borings drilled for the subsurface investigation: Type 1: silty sand fill (SM), Type 2: native silty to slightly silty sand (SM, SM-SW), Type 3: slightly silty sandstone (SM-SW). Bedrock was encountered in two of the test borings at 14 and 16 feet bgs in the main building, which were drilled to a depth of 20 feet. Each soil type was classified in accordance with the Unified Soil Classification System (USCS) using the laboratory testing results and the observations made during drilling.

Soil Type 1 classified as a silty sand fill (SM). The sand fill was encountered in all the test borings at the existing ground surface and extended to depths ranging from 8 to 9 feet bgs. Standard Penetration Testing resulted in N-values of 12 to 21 bpf indicating medium dense states. Water content and grain size testing resulted in water contents of 5 to 12 percent and approximately 22 to 27 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits testing on samples of the fill resulted in the soils being non plastic. The sand fill is likely non-expansive. Sulfate testing resulted in less than 0.01 percent sulfate by weight, indicating the sand fill exhibits negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 2 classified as native silty to slightly silty sand (SM, SM-SW). The native sand was encountered in all the test borings below the Type 1 sand fill at 8 to 9 feet and extended to 14 to 16 feet bgs or to termination of borings at 10 feet. Standard Penetration Testing resulted in N-values of 12 to 44 bpf indicating medium dense to dense states. Water content and grain size testing resulted in water contents of approximately 2 to 14 percent and approximately 5 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits testing on samples of the fill resulted in the soils being non-plastic. The expansion potential of the sand is anticipated to be low to negligible. Sulfate testing resulted in less than 0.01 percent sulfate by weight, indicating the sand fill exhibits negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 3 classified as slightly silty sandstone (SM). The sandstone was encountered in Test Boring Nos. 1 and 2 at depths of 14 to 16 feet bgs and extended to the termination of the borings (20 feet). Standard Penetration Testing resulted in N-values of greater than 50 bpf, indicating very dense states. Water content and grain size testing resulted in approximately 12 to 13 percent water content and approximately 11 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits testing on samples of the sandstone resulted in the soils being non-plastic. The expansion potential of the sandstone is anticipated to be low to negligible. Sulfate testing resulted in less than 0.01 percent sulfate by weight, indicating the sandstone exhibits negligible for below grade concrete degradation due to sulfate attack.

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Groundwater

Groundwater was not encountered in the test borings which were drilled to depths of 10 to 20 feet (Reference 1, Appendix B). It should be noted that fluctuation in groundwater levels could change due to seasonal variations, changes in land runoff characteristics and future development of nearby areas. Isolated sand layers within the soil profile can carry water in the subsurface. Contractors should be cognizant of the potential for the occurrence of subsurface water during construction.

Geology

Approximately 15 miles west of the site is a major structural feature known as the Rampart Range Fault. This fault marks the boundary between the Great Plains Physiographic Province and the Southern Rocky Mountain Province. The site exists within a large structural feature known as the Denver Basin. Bedrock in the area is typically gently dipping in a northerly direction. The bedrock underlying the site consists of the Dawson Formation of Cretaceous Age. The Dawson Formation typically consists of coarse-grained arkosic sandstone with interbedded layers of siltstone or claystone. Overlying the Dawson Formation are deposits of man-made fill soils and soils associated with water-deposited alluvial sands.

The geology of the site was evaluated using the *Geologic Map of the Falcon Quadrangle*, by Morgan and White in 2012, (Reference 5, Figure 5). The Geology for the site is presented in Figure 6. One mappable unit was identified on this site which, are described as follows:

Qaf Artificial Fill of Late Holocene Age: These are man-made fill deposits associated with controlled fill placed on the site, and minor fill piles observed on the site. Areas of fill other than those mapped may be encountered.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Falcon Quadrangle* distributed by the Colorado Geologic Survey in 2012 (Reference 5, Figure 5), and the *Geologic Map of the Pueblo 1° x 2° Quadrangle*, distributed by the US Geological Survey in 1978 (Reference 6). The test borings used in evaluating the site are included in Appendix B. The Geology Map prepared for the site is presented in Figure 6.

ENGINEERING GEOLOGIC HAZARDS

Mapping has been performed on this site to identify areas where various geologic conditions exist of which developers should be cognizant during the planning, design and construction stages should new construction be proposed. The engineering geologic constraints identified on this site include artificial fill. This hazard and recommended mitigation techniques are discussed as follows:

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Artificial Fill – Constraint

Fill associated with controlled fill placed on the site, and minor fill piles observed on the site. Areas of fill other than those mapped may be encountered. The fill at the site was periodically observed and tested by personnel of Entech Engineering Inc. Any uncontrolled fill encountered beneath foundations will require complete penetration and removal and recompaction under controlled conditions.

Mitigation: It is anticipated that the fill piles will be removed during site grading. Areas of fill other than those encountered may be encountered. The fill piles are considered uncontrolled. Any uncontrolled fill encountered beneath foundations should be removed and recompacted at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557.

Floodplain Areas

The site does not lie within a floodplain according to the FIRM Map, No. 08041CO553G (Reference 9, Figure 7). Any site grading considered should be modified to direct surface flows around the structures or roads, or carried off-site so as to not produce any areas of ponded water. Specific drainage studies and exact floodplain locations are beyond the scope of this report.

RELEVANCE OF GEOLOGIC CONDITIONS TO LAND USE PLANNING

The proposed development will consist of consist a new Dunkin' Donuts Restaurant, parking and drive areas, and other associated site improvements. The existing geologic and engineering geologic conditions will impose minor constraints on development and construction. The geologic conditions on the site include artificial fill, which can be satisfactorily mitigated through proper engineering design and construction practices.

The upper granular soils in the borings drilled on the site were encountered at medium dense states. Fill was encountered in all of the test borings on the site extending to depths of 8 to 9. The fill at the site was periodically observed and tested by personnel of Entech Engineering Inc. Any uncontrolled fill encountered beneath foundations will require complete penetration and removal and recompaction under controlled conditions. Areas of fill, other than those mapped, may be encountered. All fill piles and debris within building areas should be completely removed prior to construction. Any uncontrolled fill encountered beneath new foundations and floor slabs will require removal and recompaction at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557.

In summary, the recompacted granular soils will likely provide suitable support for shallow foundations. The geologic conditions encountered on site can be mitigated with proper engineering and construction practices. Specific recommendations have been made in the Subsurface Soil Investigation (Reference 1).

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ECONOMIC MINERAL RESOURCES

Some of the sandy materials on-site could be considered a low-grade sand resource. According to the *El Paso County Aggregate Resource Evaluation Map* (Reference 10), the area is mapped as upland deposits. According to the *Atlas of Sand, Gravel and Quarry Aggregate Resources, Colorado Front Range Counties* distributed by the Colorado Geological Survey (Reference 11), areas of the site are mapped as A3 – Alluvial fan: sand resource. According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 12), the area of the site has been mapped as “Little or no potential” for industrial minerals. Generally, the Dawson formation does not contain significant industrial mineral resources. The sands associated with the eolian and alluvial deposits may be considered a sand resource. Considering the silty to clayey nature of much of these materials and abundance of similar materials through the region, they would be considered to have little significance as an economic resource.

According to the *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands* (Reference 12), the site is mapped within the Denver Basin Coal Region. However, the area of the site has been mapped as “Poor” for coal resources. No active or inactive mines have been mapped in the area of the site. The *El Paso County Aggregate Resource Map* (Reference 11) has mapped coal resources in the Falcon area approximately ½ mile south of the site; however, the coal resources are estimated at 1,500 feet below the surface (Reference 9). At this depth, mining the coal would not be economical at this time. No metallic mineral resources have been mapped on the site (Reference 12).

The site has been mapped as “Fair” for oil and gas resources (Reference 12). No oil or gas fields have been discovered in the area of the site. A well was drilled nearly 3 miles southeast of the site to 8,263 feet deep in 1955. No oil or gas was reported and it was plugged. The sedimentary rocks in the area may lack the geologic structure for trapping oil or gas; therefore, it would not be considered a significant resource.

CLOSURE

It should be pointed out that because of the nature of data obtained by random sampling of such variable nonhomogeneous materials as soil and rock, it is important that we be informed of any differences observed between surface and subsurface conditions encountered in construction and those assumed in the body of this report. Any new construction considered on this site will require additional investigation. Construction and design personnel should be made familiar with the contents of this report. Specific construction and foundation recommendations will be provided when investigations are completed at each building site prior to new construction.

This report has been prepared for Quality Brands Group LLC. for application to the proposed development in accordance with generally accepted geologic, soil and engineering practices. No other warranty expresses or implied is made.

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

Respectfully Submitted,

ENTECH ENGINEERING, INC.




Logan L. Langford, P.G.
Geologist

LLL


Encl.

Entech Job No. 230132
AAprojects/2023/230132 sgs

Reviewed by:



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

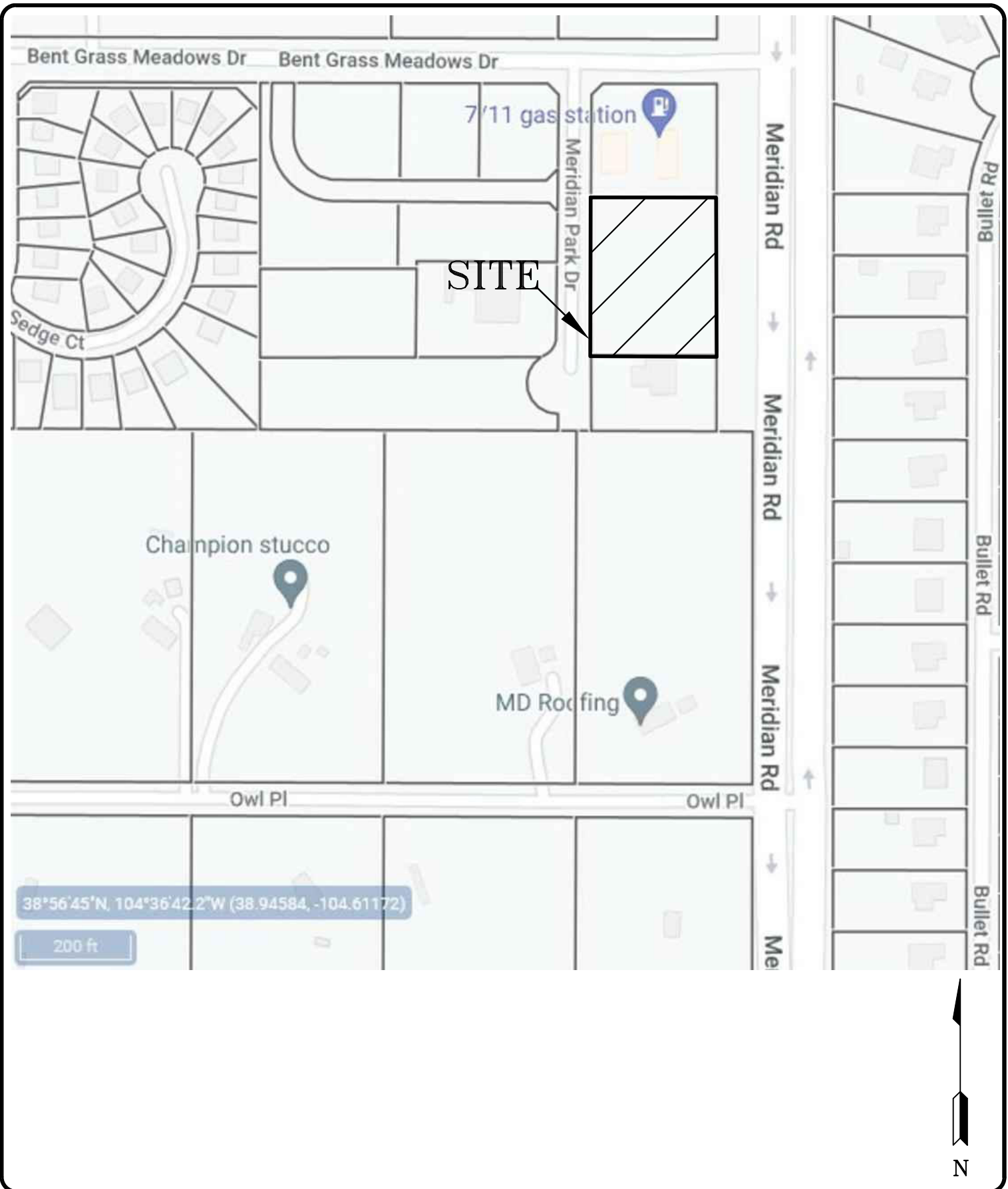


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El Paso County, Colorado
Entech Job No. 230132

BIBLIOGRAPHY

1. Entech Engineering, Inc. dated September 23, 2022. *Subsurface Soil Investigation, Dunkin Donuts, Meridian Road and Bent Grass Meadows Drive, El Paso County, Colorado*. Entech Job No. 221761.
2. Entech Engineering, Inc. Revised September 28, 2006. *Geologic Hazard/Land Use Study and Preliminary Subsurface Soil Investigation, Bent Grass 201-Acre Site, El Paso County, Colorado*. Entech Job No. 40515.
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FIGURES



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

VICINITY MAP
8035 MERIDIAN PARK DRIVE
LOT 1A, BENT GRASS E. COMMERCIAL FIL. 2A
EL PASO COUNTY, CO.
FOR: QUALITY BRAND GROUP LLC

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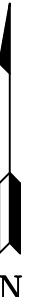
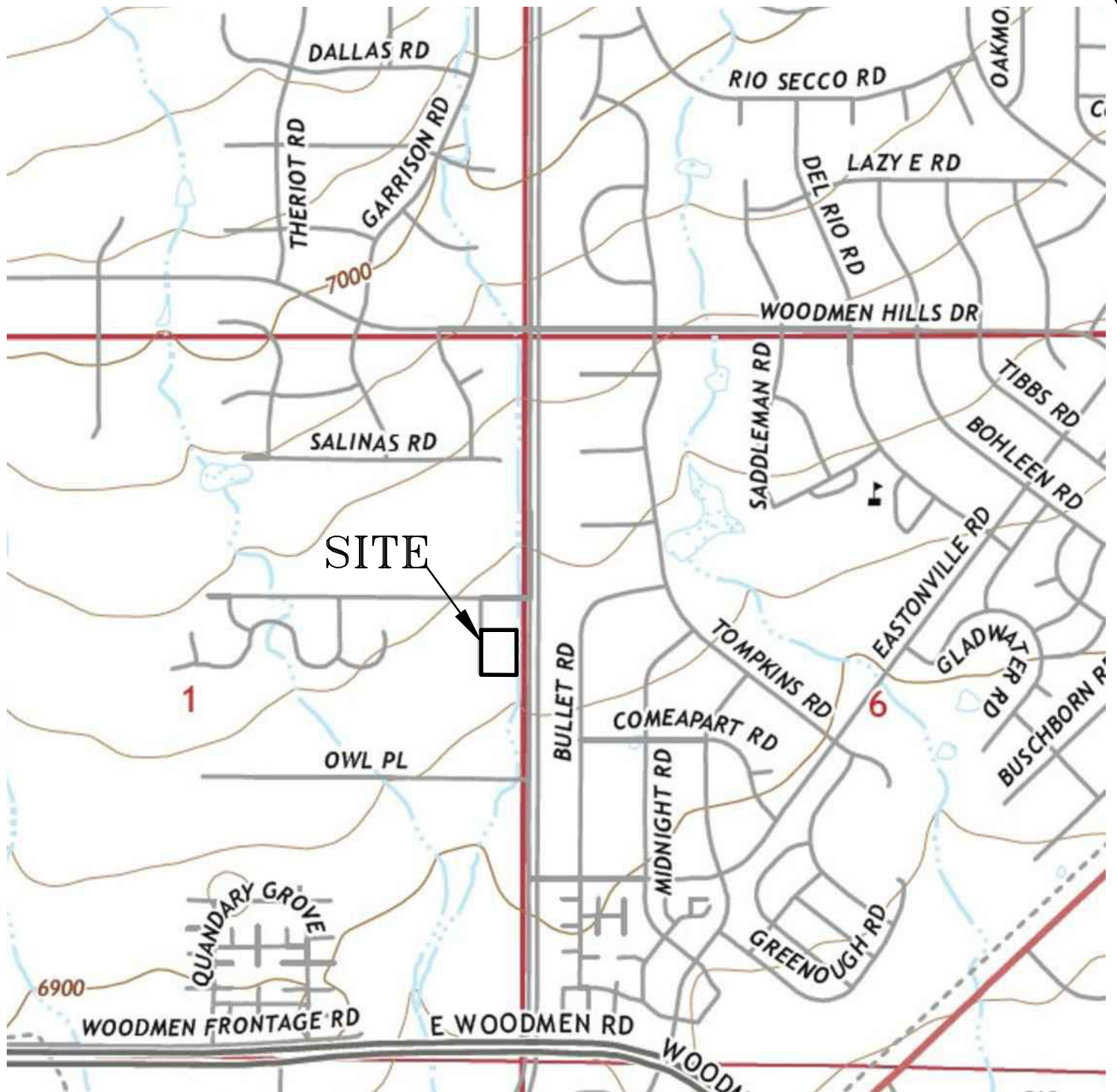
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FIG NO.:
1



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505 ELKTON DRIVE
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USGS TOPOGRAPHY MAP
8035 MERIDIAN PARK DRIVE
LOT 1A, BENT GRASS E. COMMERCIAL FIL. 2A
EL PASO COUNTY, CO.
FOR: QUALITY BRAND GROUP LLC

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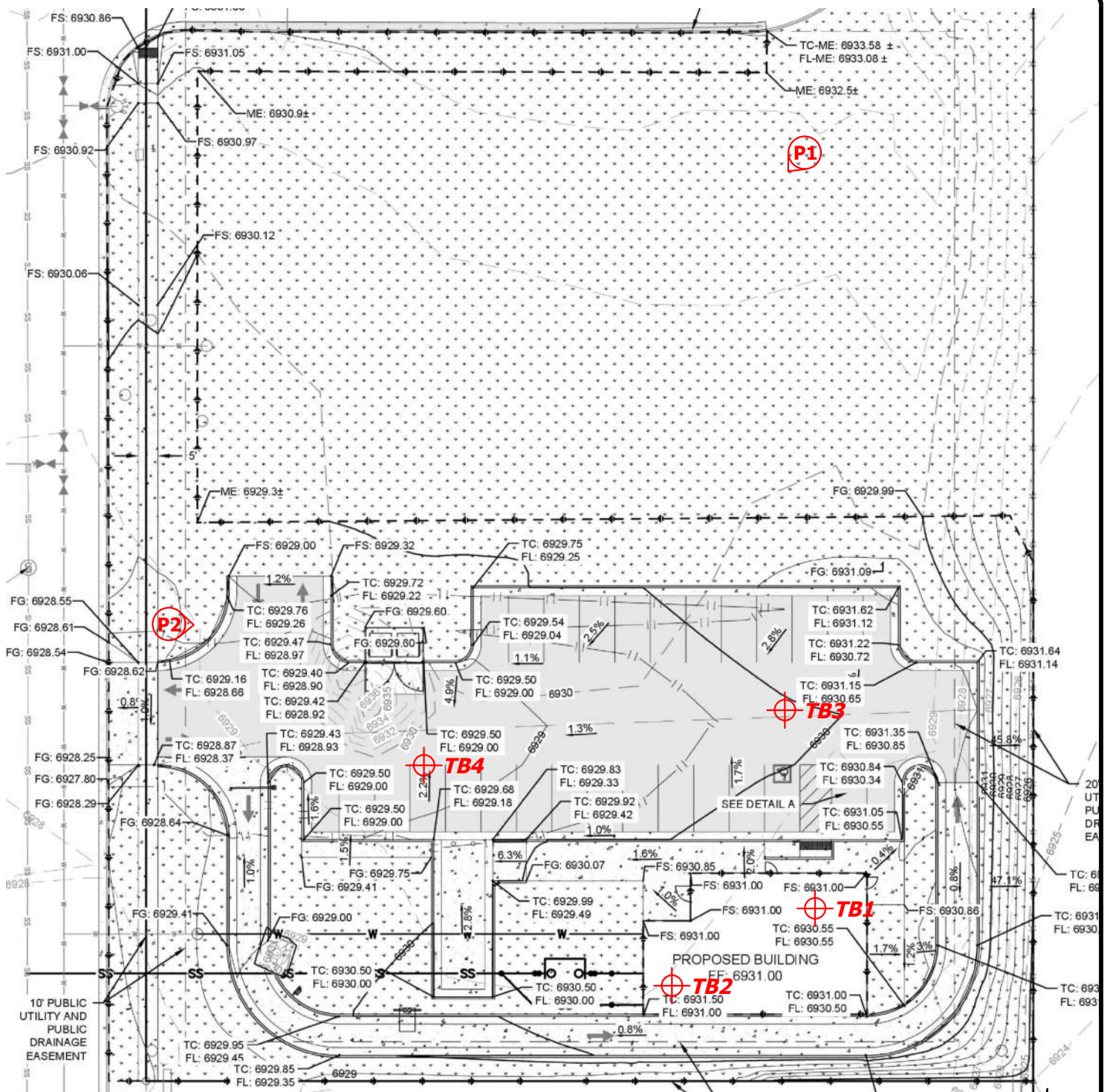
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FIG NO.:
2



⊕ TB- approximate test boring location and number

Ⓟ - approximate location and number of photograph

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505 ELKTON DRIVE
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SITE PLAN
8035 MERIDIAN PARK DRIVE
LOT 1A, BENT GRASS E. COMMERCIAL FIL. 2A
EL PASO COUNTY, CO.
FOR: QUALITY BRAND GROUP LLC

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FIG NO.:
3



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SOIL SURVEY MAP
8035 MERIDIAN PARK DRIVE
LOT 1A, BENT GRASS E. COMMERCIAL FIL. 2A
EL PASO COUNTY, CO.
FOR: QUALITY BRAND GROUP LLC

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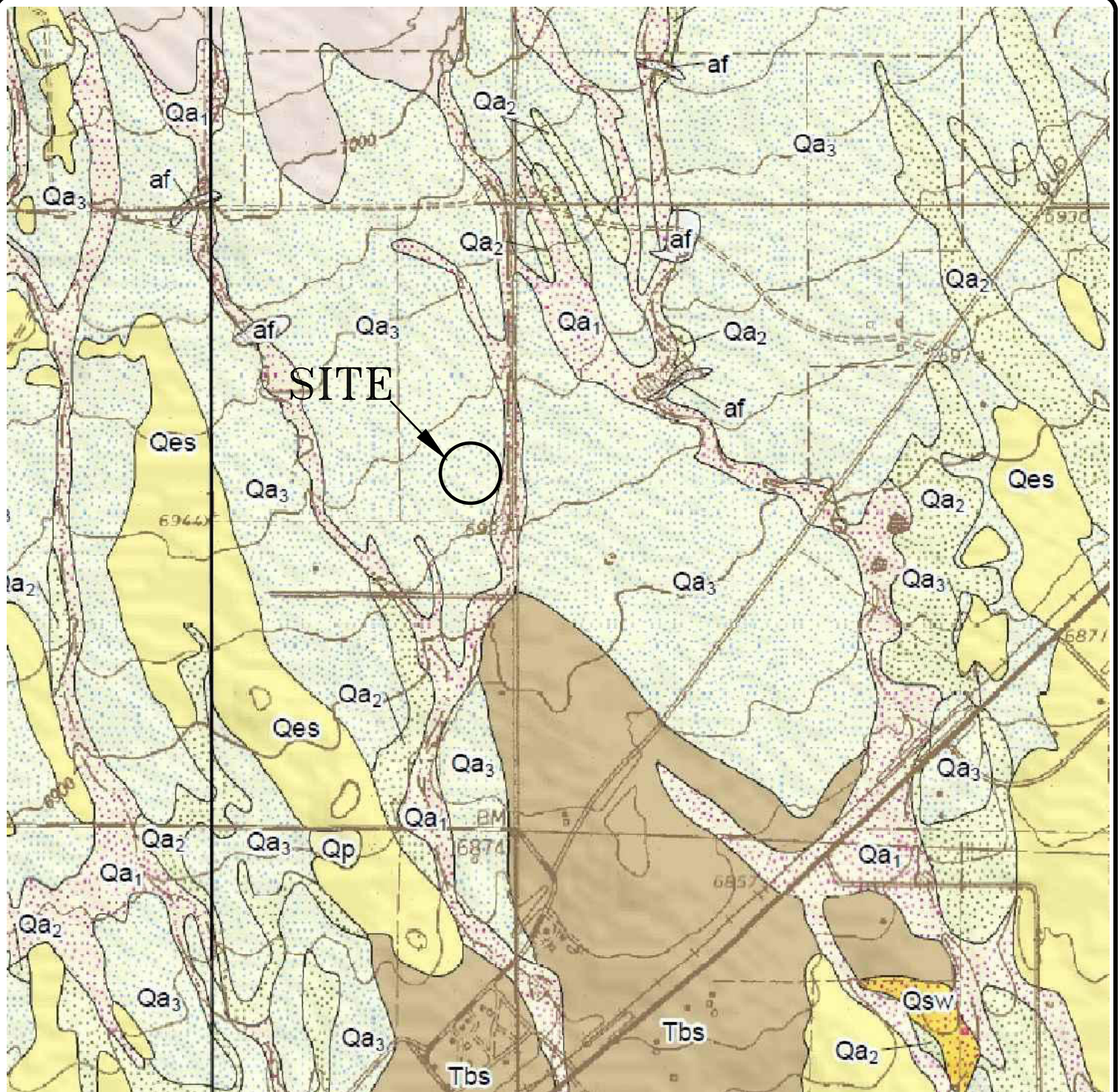
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FIG NO.:
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FALCON QUADRANGLE GEOLOGY MAP
8035 MERIDIAN PARK DRIVE
LOT 1A, BENT GRASS E. COMMERCIAL FIL. 2A
EL PASO COUNTY, CO.
FOR: QUALITY BRAND GROUP LLC

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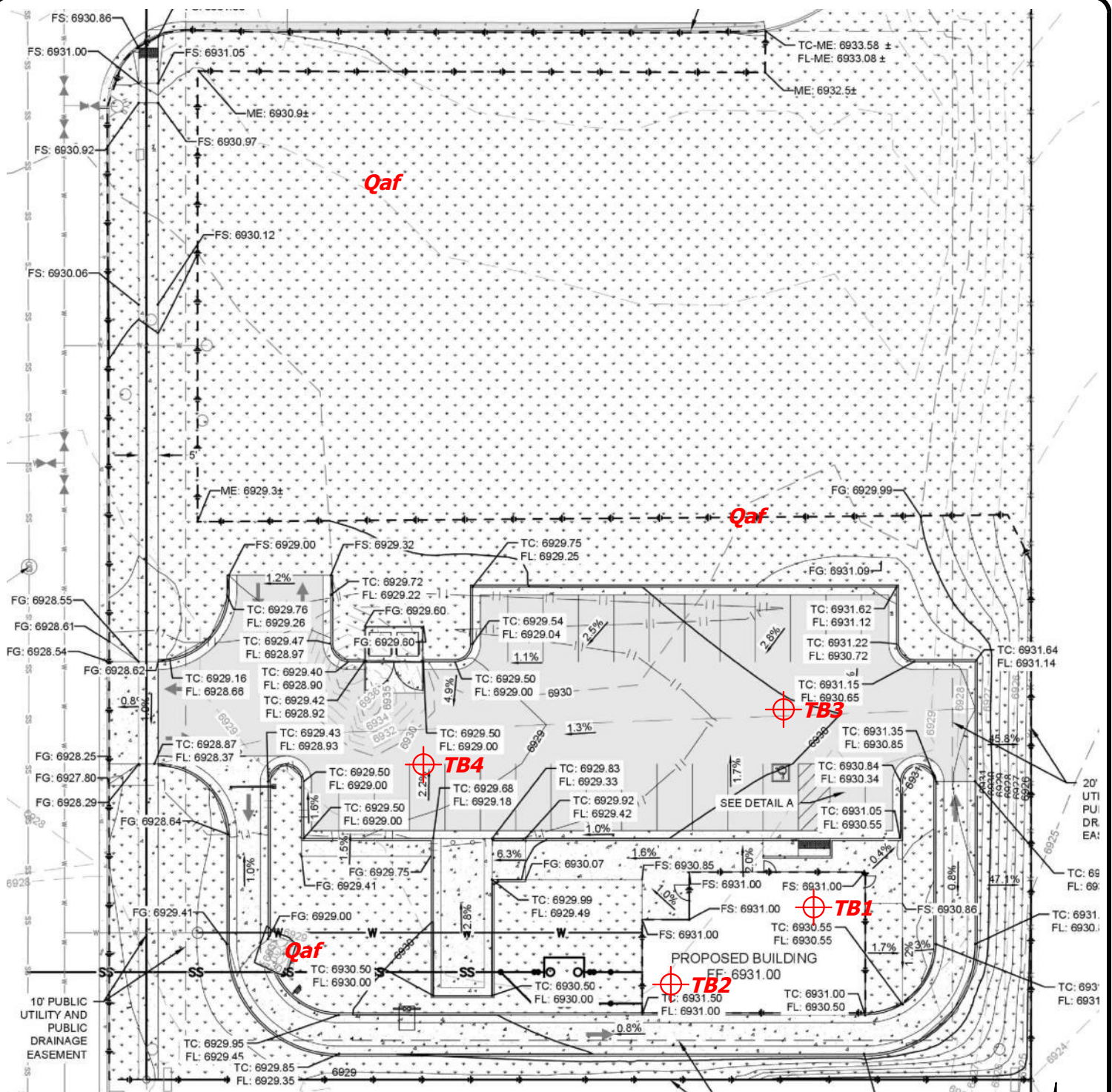
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FIG NO.:
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Legend:

Qaf - Artificial Fill Deposits of Holocene Age:
man-made fill deposits associated with controlled fill and minor fill piles on the site



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GEOLOGY/ENGINEERING GEOLOGY MAP
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LOT 1A, BENT GRASS E. COMMERCIAL FIL. 2A
EL PASO COUNTY, CO.
FOR: QUALITY BRAND GROUP LLC

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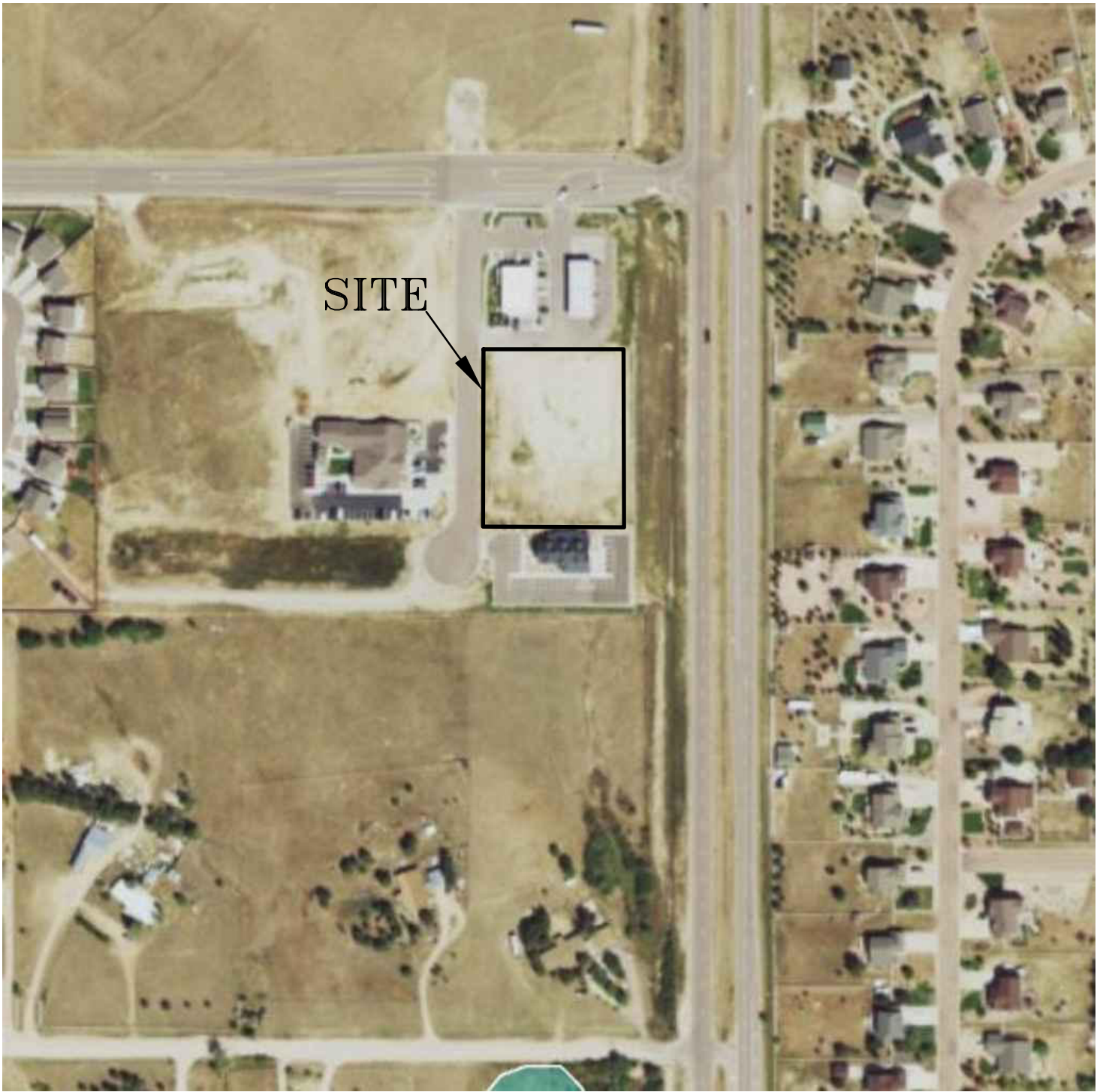
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FIG NO.:
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SITE



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FEMA FLOODPLAIN MAP
8035 MERIDIAN PARK DRIVE
LOT 1A, BENT GRASS E. COMMERCIAL FIL. 2A
EL PASO COUNTY, CO.
FOR: QUALITY BRAND GROUP LLC

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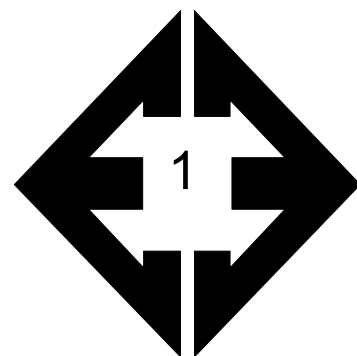
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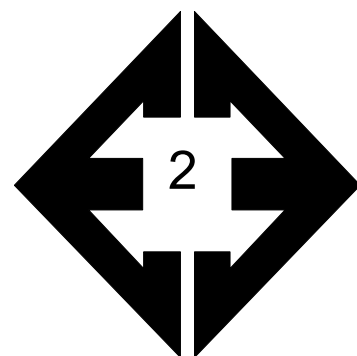
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APPENDIX A: Site Photographs



**Looking southwest
from the northeastern
side of the site.**

February 6, 2023



**Looking east from the
western side of the
site.**

February 6, 2023

**APPENDIX B: Entech Engineering, Inc. Subsurface Soil
Investigation, Entech Job No. 221761**

TABLE 1
SUMMARY OF LABORATORY TEST RESULTS

CLIENT: FIRST CUP, LLC
 PROJECT: DUNKIN DONUTS, BENT GRASS
 JOB NO.: 221761

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	3	0-3			27.1	NV	NP				SM	FILL, SAND, SILTY
1	1	2-3			21.5						SM	FILL, SAND, SILTY
1	3	1-2			24.0	NV	NP	<0.01			SM	FILL, SAND, SILTY
1	4	1-2			20.4	NV	NP				SM	FILL, SAND, SILTY
2	2	10			5.4	NV	NP	<0.01			SM-SW	SAND, SLIGHTLY SILTY
3	1	20			11.2	NV	NP	<0.01			SM-SW	SANDSTONE, SLIGHTLY SILTY

TEST BORING NO. 1
 DATE DRILLED 8/10/2022
 Job # 221761

TEST BORING NO. 2
 DATE DRILLED 8/10/2022
 CLIENT FIRST CUP, LLC
 LOCATION DUNKIN DONUTS, BENT GRASS

REMARKS

DRY TO 19.5', 8/11/22

FILL 0-9', SAND, SILTY, FINE TO
 COARSE GRAINED, DARK BROWN,
 MEDIUM DENSE, MOIST

SAND, SLIGHTLY SILTY, FINE TO
 COARSE GRAINED, TAN, MEDIUM
 DENSE TO DENSE, MOIST

SANDSTONE, SLIGHTLY SILTY,
 FINE TO COARSE GRAINED, TAN,
 VERY DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			21	9.0	1
5			12	7.6	1
10			17	2.3	2
15			44	13.6	2
20			50 9"	13.3	3

REMARKS

DRY TO 17.5', 8/11/22

FILL 0-9', SAND, SILTY, FINE TO
 COARSE GRAINED, DARK BROWN,
 MEDIUM DENSE, MOIST

SAND, SLIGHTLY SILTY, FINE TO
 COARSE GRAINED, TAN, MEDIUM
 DENSE TO DENSE, MOIST

SANDSTONE, SLIGHTLY SILTY,
 FINE TO COARSE GRAINED, TAN,
 VERY DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			12	5.7	1
5			14	4.8	1
10			15	4.2	2
15			50 10"	9.9	3
20			50 7"	12.0	3



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TEST BORING LOG

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8/29/22

JOB NO.:
 221761

FIG NO.:
 A- 1

TEST BORING NO. 3
 DATE DRILLED 8/10/2022
 Job # 221761

TEST BORING NO. 4
 DATE DRILLED 8/10/2022
 CLIENT FIRST CUP, LLC
 LOCATION DUNKIN DONUTS, BENT GRASS

REMARKS

DRY TO 10', 8/11/22

FILL 0-8', SAND, SILTY, FINE TO
 COARSE GRAINED, DARK BROWN,
 MEDIUM DENSE, MOIST

SAND, SILTY, FINE TO COARSE
 GRAINED, TAN, MEDIUM DENSE,
 MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			19	7.5	1
5			18	8.6	1
10			12	5.0	2
15					
20					

REMARKS

DRY TO 10', 8/10/22

FILL 0-9', SAND, SILTY, FINE TO
 COARSE GRAINED, DARK BROWN,
 MEDIUM DENSE, MOIST

SAND, SILTY, FINE TO COARSE
 GRAINED, TAN, MEDIUM DENSE,
 MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			16	11.6	1
5			18	8.6	1
10			28	10.3	2
15					
20					



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TEST BORING LOG

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FIG NO.:
 A- 2

APPENDIX C: Soil Survey Descriptions

El Paso County Area, Colorado

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p

Elevation: 6,500 to 7,300 feet

Mean annual precipitation: 14 to 16 inches

Mean annual air temperature: 46 to 50 degrees F

Frost-free period: 125 to 145 days

Farmland classification: Not prime farmland

Map Unit Composition

Columbine and similar soils: 97 percent

Minor components: 3 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Columbine

Setting

Landform: Fans, fan terraces, flood plains

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam

C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

Ecological site: R049XY214CO - Gravelly Foothill

Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit: 1 percent

Landform: Swales
Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 20, Sep 2, 2022