February 3, 2022
Revised March 4, 2022

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

Elite Properties of America, Inc.
2138 Flying Horse Club Drive
Colorado Springs, CO 80921

Attn: Jim Boulton

Re: Soil, Geology, and Geologic Hazard Study - Addendum
Midtown at Hannah Ridge, Filing No. 3
Akers Drive and Constitution Avenue
El Paso County, Colorado

Ref: Soil, Geology, and Geologic Hazard Study, April 20, 2020
Midtown at Hannah Ridge, Filing No. 3
Akers Drive and Constitution Avenue
El Paso County, Colorado

Dear Mr. Boulton:

This letter is written in response to the Colorado Geological Survey (CGS), January 10, 2022, review comments concerning the Soil, Geology, and Geologic Hazard Study for the above referenced site, dated April 20, 2020. This addendum letter should be used in conjunction with the original Soil, Geology, and Geologic Hazard Study.

CGS COMMENTS AND ENTECH ENGINEERING, INC. RESPONSES

CGS Comment: "*Basement feasibility*: *Since it appears that not all areas of high groundwater will be avoided by construction, CGS recommends that Entech be provided the opportunity to map areas of high groundwater, list the lots impacted by high groundwater, and provided recommendations for any needed underground drainage system. We recommend that Entech discuss the feasibility of basements due to the anticipated high groundwater.*"

Entech Response: The proposed development does not have basements or crawlspaces, and will utilize shallow spread footings with slab on grade construction. Entech has updated the Geology/Engineering Geology Map (Figure 1), with the lasted site plan with proposed grading. The areas mapped with the potential for seasonal shallow groundwater are located in the existing detention pond, and the drainage along the southern side of the site. Groundwater was encountered in four of the six test borings drilled on the site at depths of 5 to 18 feet. The proposed structures are not located in the areas of mapped as seasonally wet areas.

Test Boring No.	Depth of Fill (ft.)	Depth to Bedrock (ft.)	Depth to Groundwater (ft.)
TB – 1	6	14	18
TB – 2	4	9	11.5
TB – 3	N/A	>20	>20
TB – 4	N/A	19	>20
TB – 5	N/A	14	10.5
TB – 6	N/A	9	5

Entech will perform additional subsurface soil investigation for the proposed structures and roadways. Specific foundation recommendations will be provided upon the further investigation. Based on our initial investigations the site is suitable for the proposed construction with proper mitigation of constraints and engineering design.

ROADWAY AND EMBANKMENT CONSTRUCTION RECOMMENDATIONS

In general, the site soils are suitable for the proposed roadways and embankments. If excavations encroach on the groundwater level unstable soil conditions may be encountered. Excavation of saturated soils will be difficult with rubber-tired equipment. Stabilization using shot rock or geogrids may be necessary.

Any areas to receive fill should have all topsoil, organic material or debris removed. Prior to fill placement Entech should observe the subgrade. Fill must be properly benched and compacted to minimize potentially unstable conditions in slope areas. Fill slopes should be 3:1. The subgrade should be scarified and moisture conditioned to within 2% of optimum moisture content and compacted to a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557, prior to placing new fill. Areas receiving fill may require stabilization with rock or fabric if shallow groundwater conditions are encountered.

New fill should be placed in thin lifts not to exceed 6 inches after compaction while maintaining at least 95% of its maximum Modified Proctor Dry Density, ASTM D-1557. These materials should be placed at a moisture content conducive to compaction, usually 0 to ±2% of Proctor optimum moisture content. The placement and compaction of fill should be observed and tested by Entech during construction. Entech should approve any import materials prior to placing or hauling them to the site. Additional investigation will be required for pavement designs once roadway grading is completed and utilities are installed.

We trust this has provided you with the information you required. In summary, based on the analysis of this site, the proposed development meets stability requirements. 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

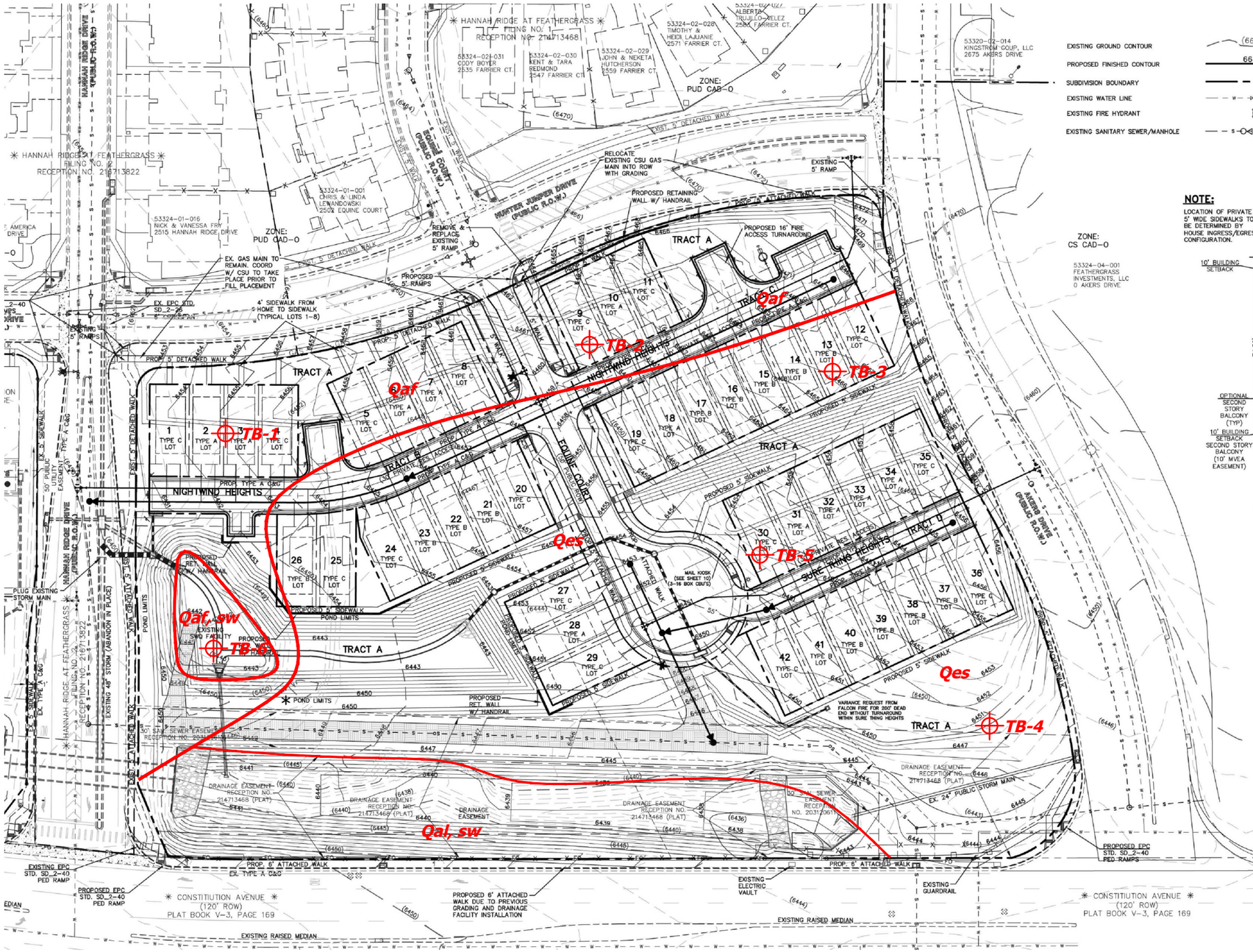
COLORADO REGISTERED
JOSEPH COLLIN GOODE JR.
23725
PROFESSIONAL ENGINEER
3-4-2022

Reviewed by:

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

LLL

Entech Job No. 200006
AAprojects/2020/200006 sgghs addendum

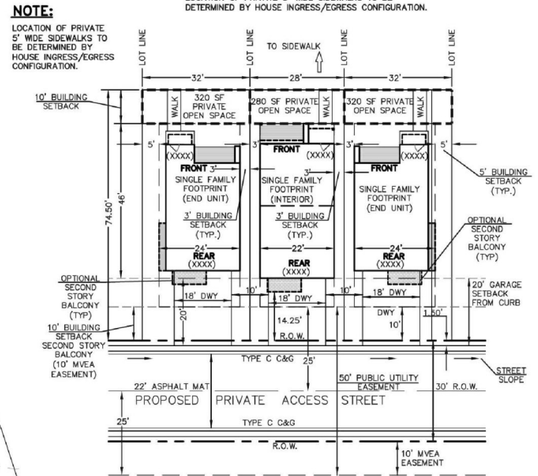


LEGEND:

- EXISTING GROUND CONTOUR (6640)
- PROPOSED FINISHED CONTOUR 6650
- SUBDIVISION BOUNDARY
- EXISTING WATER LINE
- EXISTING FIRE HYDRANT
- EXISTING SANITARY SEWER/MANHOLE
- PROPOSED WATER MAIN & GATE VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED SANITARY SEWER MAIN/MANHOLE
- PROPOSED STORM SEWER
- PROPOSED STORM INLET
- EXIST. STORM SEWER
- EXIST. STORM INLET

NOTE:

LOCATION OF PRIVATE 5' WIDE SIDEWALKS TO BE DETERMINED BY HOUSE INGRESS/EGRESS CONFIGURATION.



TYPICAL LOT

ADDRESS ABOVE GARAGE AND ON FRONT OF HOME

SCALE: 1" = 20'

NOTE: ENSURE DRIVEWAYS DO NOT CONFLICT WITH PED RAMP TRANSITIONS.

ADDRESSING NOTE:

REAR LOADED UNITS REQUIRE UNIQUE ADDRESSING PLACEMENT AT FINAL INSPECTION WITH REGIONAL BUILDING CONSTRUCTION DIVISION.

PROPOSED BUILDING

MAX. GROSS SF: 3,600 S.F. GROSS
TYPE CONSTRUCTION: V-B
REQ. GPM FIRE FLOW = 1,500 gpm
REQ. MIN. NUMBER HYDRANTS = 1
AVG. DIST. BETWEEN HYDRANTS = 500'
MAX. HOSE LENGTH = 250'
AREA SEPARATION WALLS ARE NOT USED
(FIRE SUPPRESSION SYSTEM NOT REQUIRED)

FIRE FLOW CHART	
NODE	FIRE FLOW (GPM)
A	1,500

40 20 0 40 80

SCALE: 1" = 40'

Legend:

Qaf– Artificial Fill Deposits of Holocene Age:
man–made fill deposits

Qes– Eolian Sand of Quaternary Age:
windblown sediments

sw – seasonally wet areas

REVISION	BY

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

GEOLOGY/ENGINEERING GEOLOGY MAP
MIDTOWN AT HANNAH RIDGE, FILING NO. 3
AKERS DRIVE AND CONSTITUTION AVENUE
EL PASO COUNTY, CO.
FOR: ELITE PROPERTIES OF AMERICA, INC.

DRAWN	LLL
CHECKED	
DATE	2/3/22
SCALE	AS SHOWN
JOB NO.	200006
FIGURE No.	1

February 3, 2022

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

Elite Properties of America, Inc.
2138 Flying Horse Club Drive
Colorado Springs, CO 80921

Attn: Jim Boulton

Re: Soil, Geology, and Geologic Hazard Study - Addendum
Midtown at Hannah Ridge, Filing No. 3
Akers Drive and Constitution Avenue
El Paso County, Colorado

Ref: Soil, Geology, and Geologic Hazard Study, April 20, 2020
Midtown at Hannah Ridge, Filing No. 3
Akers Drive and Constitution Avenue
El Paso County, Colorado

Dear Mr. Boulton:

This letter is written in response to the Colorado Geological Survey (CGS), January 10, 2022, review comments concerning the Soil, Geology, and Geologic Hazard Study for the above referenced site, dated April 20, 2020. This addendum letter should be used in conjunction with the original Soil, Geology, and Geologic Hazard Study.

CGS COMMENTS AND ENTECH ENGINEERING, INC. RESPONSES

CGS Comment: "*Basement feasibility*: *Since it appears that not all areas of high groundwater will be avoided by construction, CGS recommends that Entech be provided the opportunity to map areas of high groundwater, list the lots impacted by high groundwater, and provided recommendations for any needed underground drainage system. We recommend that Entech disucss the feasibility of basements due to the anticipated high groundwater.*"

Entech Response: The proposed development does not have basements or crawlspaces, and will utilize shallow spread footings with slab on grade construction. Entech has updated the Geology/Engineering Geology Map (Figure 1), with the lasted site plan with proposed grading. The areas mapped with the potential for seasonal shallow groundwater are located in the existing detention pond, and the drainage along the southern side of the site. Groundwater was encountered in four of the six test borings drilled on the site at depths of 5 to 18 feet. The proposed structures are not located in the areas of mapped as seasonally wet areas.

Test Boring No.	Depth of Fill (ft.)	Depth to Bedrock (ft.)	Depth to Groundwater (ft.)
TB – 1	6	14	18
TB – 2	4	9	11.5
TB – 3	N/A	>20	>20
TB – 4	N/A	19	>20
TB – 5	N/A	14	10.5
TB – 6	N/A	9	5

Entech will perform additional subsurface soil investigation for the proposed structures and roadways. Specific foundation recommendations will be provided upon the further investigation. Based on our initial investigations the site is suitable for the proposed construction with proper mitigation of constraints and engineering design.

Elite Properties of America, Inc.
Soil, Geology, and Geologic Hazard Study - Addendum
Midtown at Hannah Ridge, Filing No. 3
Akers Drive and Constitution Avenue
Colorado Springs, Colorado

We trust this has provided you with the information you required. In summary, based on the analysis of this site, the proposed development meets stability requirements. 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

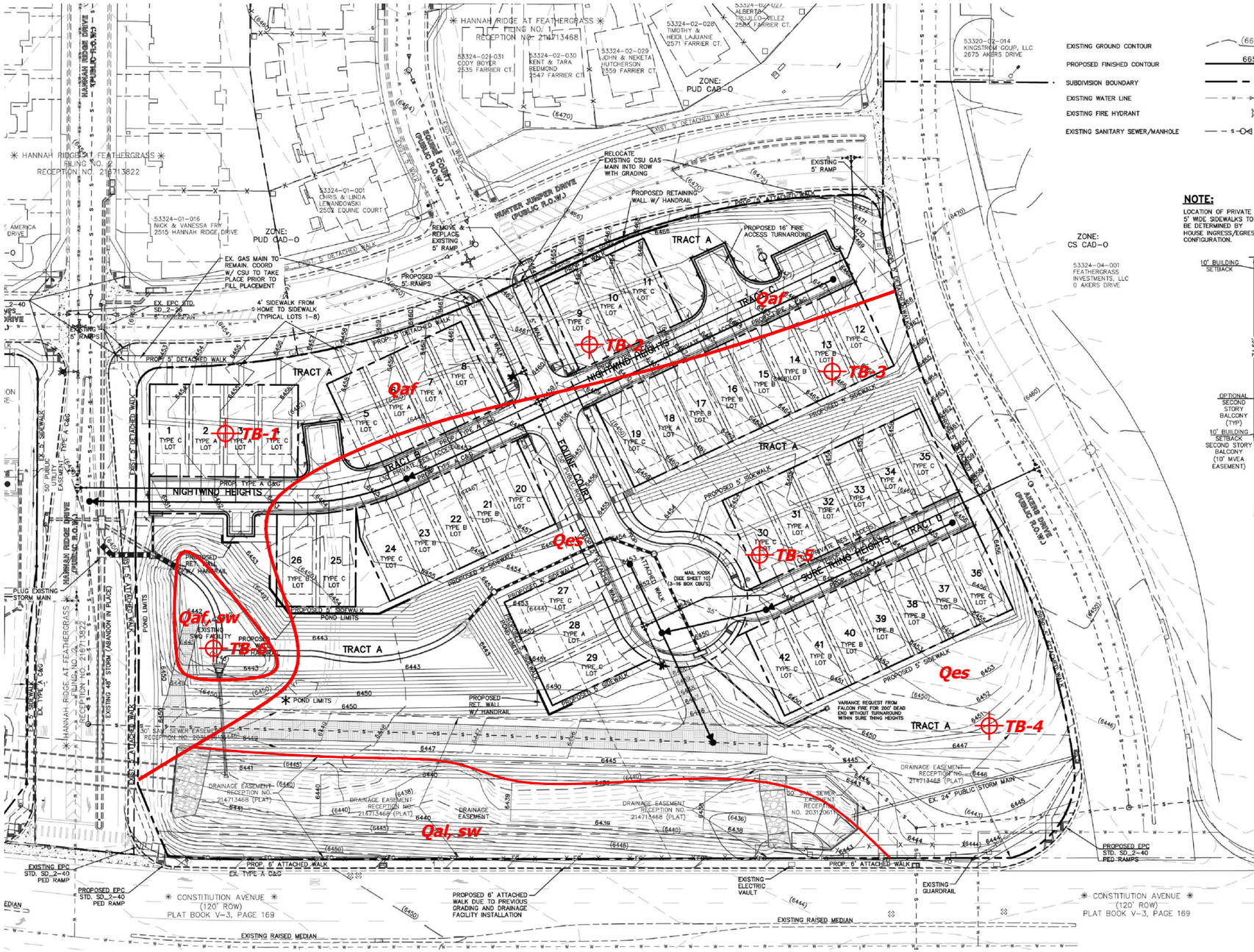
COLORADO REGISTERED
JOSEPH COLLIN GOODE JR.
23725
PROFESSIONAL ENGINEER
2-3-2022

Reviewed by:

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

LLL

Entech Job No. 200006
AAprojects/2020/200006 sgghs addendum

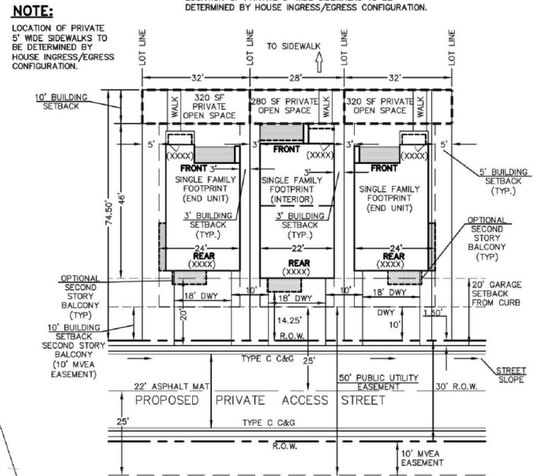


LEGEND:

EXISTING GROUND CONTOUR	(6640)
PROPOSED FINISHED CONTOUR	6650
SUBDIVISION BOUNDARY	
EXISTING WATER LINE	— W —
EXISTING FIRE HYDRANT	
EXISTING SANITARY SEWER/MANHOLE	— S —
PROPOSED WATER MAIN & GATE VALVE	
PROPOSED FIRE HYDRANT	
PROPOSED SANITARY SEWER MAIN/MANHOLE	
PROPOSED STORM SEWER	
PROPOSED STORM INLET	
EXIST. STORM SEWER	
EXIST. STORM INLET	

NOTE:

LOCATION OF PRIVATE 5' WIDE SIDEWALKS TO BE DETERMINED BY HOUSE INGRESS/EGRESS CONFIGURATION.



TYPICAL LOT

ADDRESS ABOVE GARAGE AND ON FRONT OF HOME

SCALE: 1" = 20'

NOTE: ENSURE DRIVEWAYS DO NOT CONFLICT WITH PED RAMP TRANSITIONS.

ADDRESSING NOTE:

REAR LOADED UNITS REQUIRE UNIQUE ADDRESSING PLACEMENT AT FINAL INSPECTION WITH REGIONAL BUILDING CONSTRUCTION DIVISION.

PROPOSED BUILDING

MAX. GROSS SF: 3,600 S.F. GROSS
TYPE CONSTRUCTION: V-B
REQ. GPM FIRE FLOW = 1,500 gpm
REQ. MIN. NUMBER HYDRANTS = 1
AVG. DIST. BETWEEN HYDRANTS = 500'
MAX. HOSE LENGTH = 250'
AREA SEPARATION WALLS ARE NOT USED
(FIRE SUPPRESSION SYSTEM NOT REQUIRED)

FIRE FLOW CHART	
NODE	FIRE FLOW (GPM)
A	1,500

N

40 20 0 40 80

SCALE: 1" = 40'

Legend:

Qaf– Artificial Fill Deposits of Holocene Age:
man–made fill deposits

Qes– Eolian Sand of Quaternary Age:
windblown sediments

sw – seasonally wet areas

REVISION	BY

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

GEOLOGY/ENGINEERING GEOLOGY MAP
MIDTOWN AT HANNAH RIDGE, FILING NO. 3
AKERS DRIVE AND CONSTITUTION AVENUE
EL PASO COUNTY, CO.
FOR: ELITE PROPERTIES OF AMERICA, INC.

DRAWN	LLL
CHECKED	
DATE	2/3/22
SCALE	AS SHOWN
JOB NO.	200006
FIGURE No.	1

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

SOIL, GEOLOGY, AND GEOLOGIC HAZARD STUDY
MIDTOWN AT HANNAH RIDGE, FILING NO. 3
AKERS DRIVE AND CONSTITUTION AVENUE
EL PASO COUNTY, COLORADO

Prepared for

Elite Properties of America, Inc.
2138 Flying Horse Club Drive
Colorado Springs, Colorado 80921

Attn: Jim Boulton

April 20, 2020

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 JR
23725
PROFESSIONAL ENGINEER

LLL/nc

Encl.

Entech Job No. 200006
AAprojects/2020/200006 countysoil/geo

TABLE OF CONTENTS

1.0 SUMMARY

Project Location

The project lies in a portion of the SE¼ of Section 32, Township 13 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located in El Paso County just east of the Colorado Springs city limits.

Project Description

Total acreage involved in the project is 7.44 acres. The proposed site development consists of forty-two single family residential lots and associated site improvements. The development will utilize municipal sewer and water.

Scope of Report

This report presents the results of our geologic evaluation of engineering geologic hazard study.

Land Use and Engineering Geology

This site was found to be suitable for the proposed development. Areas were encountered where the geologic conditions will impose some minor constraints on development and land use. These include areas of artificial fill, loose collapsible soils, expansive soils, and areas of erosion. 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.

2.0 GENERAL SITE CONDITIONS AND PROJECT DESCRIPTION

The site is located in a portion of the SE¼ of Section 32, Township 15 South, Range 65 West of the 6th Principal Meridian in El Paso County, Colorado. The site is located in El Paso County just east of the Colorado Springs city limits, at the northwest corner of Akers Drive and Constitution Avenue. The location of the site is as shown on the Vicinity Map, Figure 1.

The topography of the site is generally gradually sloping to the south southwest with moderate slopes along the northern and eastern sides of the site. A drainage is located along the southern side of the site, and water was observed flowing at the time of our field mapping. A stormwater detention pond is located in the western portion of the site which will remain. The site boundaries are indicated on the USGS Map, Figure 2. Previous land uses have included grazing and pasture land. The site contains primarily field grasses and weeds, with scattered trees near drainage along Constitution Avenue. Site photographs, taken April 6, 2020, are included in Appendix A.

Total acreage involved in the proposed development is 7.44 acres. Forty-two single family lots are proposed. The area will be serviced municipal sewer and water. The Development Plan is presented in Figure 3.

3.0 SCOPE OF THE REPORT

The scope of the report will include the following:

- 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.

4.0 FIELD INVESTIGATION

Our field investigation consisted of the preparation of a geologic map of any 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 property are shown on the Geologic Map. Our mapping procedures involved both field reconnaissance and measurements and air 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 April 6, 2020.

Six Test Borings were drilled on the site as part of the Preliminary Subsurface Soil Investigation to determine general soil and bedrock characteristics. The locations of the test borings are indicated on the Development Plan/Test Boring Location Map, Figure 3. The Test Boring Logs are presented in Appendix B. Results of this testing will be discussed later in this report.

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, Atterberg Limits ASTM D-4318. Sulfate testing was performed on select samples to evaluate potential for below grade concrete degradation due to sulfate attack. Results of the laboratory testing are included in Appendix C. A Summary of Laboratory Test Results is presented in Table 1.

5.0 SOIL, GEOLOGY AND ENGINEERING GEOLOGY

5.1 General Geology

Physiographically, the site lies in the western portion of the Great Plains Physiographic Province. Approximately eleven miles to the west 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 the southeastern edge of a large structural feature known as the Denver Basin. Bedrock was encountered in the test borings at depths ranging from one to four feet below ground surface (bgs), which were drilled to depths of 20 feet. Bedrock in the area tends to be very gently dipping in a northerly direction (Reference 1). The rocks in the area of the site are sedimentary in nature and typically Tertiary to Upper Cretaceous in age. The bedrock underlying the site consists of the Dawson Formation. Overlying this formation are unconsolidated deposits of recent man-made fill deposits, alluvial and eolian sediments of Quaternary Age. Overlot fill is located along the northern, eastern and western portions of the site. The site's stratigraphy will be discussed in more detail in Section 5.3.

5.2 Soil Conservation Survey

The Natural Resource Conservation Service (Reference 2), previously the Soil Conservation Service (Reference 3) has mapped one soil type on the site (Figure 4). In general, the soils classified as loamy sand. The soils are described as follows:

Type	Description
97	Truckton sandy loam, 3 to 9% slopes

Complete descriptions of each soil type are presented in Appendix D. The soils have generally been described to have moderate to moderately rapid permeabilities. Possible hazards with soil erosion are present on the site. The erosion potential can be controlled with vegetation. The majority of the soils have been described to have moderate to high erosion hazards.

5.3 Site Stratigraphy

The Elsmere Quadrangle Geology Map showing the site is presented in Figure 5 (Reference 4). The Geology Map prepared for the site is presented in Figure 6. Three mappable units were identified on this site which are described as follows:

Qaf **Artificial Fill of Holocene Age:** These are recent deposits of man-made fill. The fill piles were observed along the eastern and central portions of the site.

Qes **Eolian Sand of Quaternary Age:** These are deposits are fine to medium grained soil deposited by the action of the prevailing winds from the northwest. They typically occur as large dune deposits or narrow ridges. Additionally, low areas associated with blow-outs were observed. The eolian soil types are typically tan to brown in color and tend to have a very uniform or well-sorted gradation. These materials tend to have a relatively high permeability and low density.

Tkd **Dawson Formation of Tertiary to Cretaceous Age:** The Dawson Formation typically consists of arkosic sandstone with interbedded fine-grained sandstone, siltstone and claystone. Overlying this formation is a variable layer of residual soil. The residual soils were derived from the in-situ weathering of the bedrock materials on-site. These soils consisted of silty to very silty sands.

The soils listed above were mapped from site-specific mapping, the *Geologic Map of the Elsmere Quadrangle* distributed by the Colorado Geological Survey in 2003 (Reference 4), the *Geologic Map of the Colorado Springs-Castle Rock Area*, distributed by the US Geological Survey in 1979 (Reference 5), and the *Geologic Map of the Denver 1^0 x 2^0 Quadrangle*, distributed by the US Geological Survey in 1981 (Reference 6). The Test Borings were also used in evaluating the site and are included in Appendix B. The Geology Map prepared for the site is presented in Figure 6.

5.4 Soil Conditions

Three soil types and two bedrock types were encountered in the test borings drilled for the subsurface investigation, Type 1: silty sand fill and clayey sand fill (SM, SC), Type 2: native silty very clayey sand and very clayey sand (SC-SM, SC), Type 3: native very sandy clay and clayey

silt (CL, MH), Type 4: silty sandstone and clayey to very clayey sandstone (SM, SC), and Type 5: sandy to very sandy claystone, clayey very sandy siltstone and siltstone (CL, ML). Each soil and bedrock type were 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 silty sand fill and clayey sand fill (SM, SC). The sand fill was encountered in Test Boring Nos. 1 and 2 at the existing ground surface, extending to depths of 4 to 6 feet below ground surface (bgs). Standard Penetration testing conducted on the sand fill resulted in N-values ranging from 14 to 23 bpf, indicating medium dense states. Water content and grain size testing resulted in water contents ranging from 7 to 8 percent with approximately 18 to 34 percent of the soil size particles passing the No. 200 Sieve. Atterberg Limits testing resulted in a liquid limit of 29 and plastic index of 10. FHA Swell testing resulted in a swell pressure of 880 psf, indicating a low expansion potential.

Soil Type 2 classified as native silty very clayey sand and very clayey sand (SC-SM, SC). The native sand was encountered in all of the test borings at depths ranging from the existing ground surface and underlying Soil Types 1 and 3 at 4 to 6 feet bgs and extending to depths of 9 to 14.5 feet bgs and to the termination of Test Boring No. 3, 20 feet bgs. Standard Penetration Testing conducted on the sand resulted in N-values of 6 to 38 bpf, indicating loose to dense states. Water content and grain size testing result in 5 to 20 percent water content with approximately 21 to 49 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits testing on a sample of very clayey sand resulted in a liquid limit of 27 and a plastic index of 7. Sulfate testing resulted in 0.00 percent soluble sulfate by weight, indicating the sand exhibits negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 3 classified as native very sandy clay and clayey silt (CL, MH). The native clay and silt were encountered in Test Boring Nos. 3 and 4 at the existing ground surface and underlying Soil Type 2 at a depth of 14.5 feet bgs, extending to depths of 6 and 19 feet bgs. Standard Penetration Testing on the clay and silt resulted in N-values of 13 to 28 bpf, indicating firm to stiff consistencies. Water content grain size testing resulted in water contents of approximately 8 to 24 percent with 62 to 95 percent of the soil size particles passing the No. 200 sieve. Atterberg Limits testing on a clay and silt sample resulted in liquid limits of 31 and 56 with corresponding

plastic indexes of 9 and 17, respectively. Swell/Consolidation Testing on a sample of the clayey silt resulted in a volume change of 0.4 percent, indicating a low expansion potential.

Soil Type 4 classified as silty sandstone and clayey to very clayey sandstone (SM, SC). The sandstone was encountered in Test Boring Nos. 2, 4, 5, and 6 underlying Soil Types 2, 3, and 5 at depths ranging from 9 to 19 feet bgs, extending to 14 feet in one test boring and to the termination of the other test borings (20 feet bgs). Standard Penetration Testing conducted on the sandstone resulted in N-values of greater than 50 bpf, which indicates very dense states. Water content and grain size testing resulted in 10 to 15 percent water content with 24 to 45 percent of the soil size particles passing the No. 200 Sieve. Atterberg Limits Testing on the silty sandstone resulted in non-plastic results. Swell/Consolidation Testing resulted in volume changes of -2.3 and 0.3 percent, indicating a low to moderate consolidation potential and low expansion potential. Notably, the consolidation was likely due to a disturbed sandstone sample. Sulfate testing resulted in less than 0.01 percent soluble sulfate by weight, indicating the sandstone exhibits negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 5 classified as sandy to very sandy claystone, clayey very sandy siltstone and siltstone (CL, ML). The claystone and siltstone were encountered in Test Boring Nos.1, 5, and 6 underlying Soil Types 2 and 4 at depths of 14 feet bgs, extending to depths of 19 and 20 feet bgs. Standard Penetration Testing conducted on the claystone and siltstone resulted in N-values of greater than 50 bpf, which indicates hard consistencies. Water content and grain size testing resulted in 13 to 21 percent water content with 57 to 93 percent of the soil size particles passing the No. 200 Sieve. Atterberg Limits testing resulted in liquid limits of 40 and 49 with corresponding plastic indexes of 13 and 16. Swell/Consolidation Testing resulted in a volume change of -0.3 percent, indicating a low consolidation potential. Sulfate testing resulted in 0.00 percent soluble sulfate by weight, indicating the sandstone exhibits negligible potential for below grade concrete degradation due to sulfate attack.

A Summary of Laboratory Test Results, and the Test Boring Logs are presented in Appendix B.

5.5 Groundwater

Groundwater was encountered in four of the test borings at depths of 5 to 18 feet. Water was not encountered in the remaining borings which were drilled to 20 feet. Fluctuation in groundwater conditions may occur due to variations in rainfall and other factors not readily apparent at this time. Areas or seasonal shallow groundwater associated with a detention pond and drainage in the western and southern portions of the site are discussed further in the following sections.

It should be noted that in the sandy materials on-site, some groundwater conditions might be encountered due to the variability in the soil profile. Isolated sand and gravel layers within the soils, sometimes only a few feet in thickness and width, can carry water in the subsurface. Groundwater may also flow on top of the underlying bedrock. Builders and planners should be cognizant of the potential for the occurrence of such subsurface water features during construction on-site and deal with each individual problem as necessary at the time of construction.

6.0 ENGINEERING GEOLOGY – IDENTIFICATION AND MITIGATION OF GEOLOGIC HAZARDS

As mentioned previously, detailed mapping has been performed on this site to produce an Engineering Geology Map Figure 7. This map shows the location of various geologic conditions of which the developers should be cognizant during the planning, design and construction stages of the project. Hazards include areas of artificial fill, loose collapsible soils, expansive soils, seasonally shallow groundwater areas, and areas of erosion. These hazards and the recommended mitigation techniques are as follows:

<u>Artificial Fill</u>

These are recent man-made fill deposits associated with overlot grading and an existing detention pond on the site. The fill along Hunter Jumper Drive was previously tested by Entech. This fill will primarily be avoided by the proposed construction.

Mitigation: Any uncontrolled fill encountered beneath foundations will require removal and recompaction at a minimum of 95% of its maximum Modified Procter Dry Density, ASTM D-1557.

Collapsible Soils

The majority of the soils encountered on-site do not exhibit collapsible characteristics, however, areas of collapsible and loose soils were encountered in the test borings drilled on site. Walls of trenches may collapse if not supported.

Mitigation: Should loose or collapsible soils be encountered beneath foundations, recompaction and moisture conditioning of the upper 2 to 3 feet of soil at 95% of its maximum Modified Proctor Dry Density ASTM D-1557 will be required. Exterior flatwork and parking areas may also experience movement. Proof rolling and recompaction of soft areas should be performed during site work.

Expansive Soils

Expansive soils were encountered in the test borings drilled on site, and the potential for isolated claystone lenses in the sandstone exist across the site. These occurrences are typically sporadic; therefore, none have been indicated on the maps. Expansive clays, if encountered at foundation grade, can cause differential movement in structures. These occurrences should be identified and mitigated on an individual basis.

Mitigation Should expansive soils be encountered beneath foundations; mitigation will be necessary. Mitigation of expansive soils will require special foundation design. Overexcavation and replacement with non-expansive soils at a minimum of 95% of its maximum Modified Proctor Dry Density, ASTM D-1557 is a suitable mitigation, which is common in the area. Floor slabs on expansive soils should be expected to experience movement. Overexcavation and replacement has been successful in minimizing slab movements. The use of structural floors should be considered for basement construction on highly expansive clays. Final recommendations should be determined after additional investigation of each building site.

Groundwater and Floodplain Areas

Groundwater was encountered in four of the test borings at depths of 5 to 18 feet. Water was not encountered in the remaining borings which were drilled to 20 feet. Groundwater is not anticipated to affect the construction of shallow foundations. The site is not mapped within floodplain zones according to the FEMA Map Nos. 08041CO752G and 08041CO756G, Figure 7 (Reference 7). A drainage is located along the southern side of the site and a stormwater detention pond is located in the western portion of the site. Water was observed in portions of the drainage, and the detention pond was dry during our field mapping. Areas of erosion were observed along the drainage, that should be mitigated during site grading and development. In these areas rip-rap, erosion control blankets and/or other erosion protection methods should be utilized.

Seasonal Shallow Groundwater

In these areas, we would anticipate the potential for periodically high subsurface moisture conditions and possible frost heave potential, depending on the soil conditions. Water was observed in portions of the drainage along the southern side of the site at the time of our field mapping. The areas mapped with this hazard are located in the drainage easement and will be avoided by the proposed residential structures.

Mitigation In these locations, foundations in areas subject to severe frost heave potential should penetrate sufficient depth so as to discourage the formation of ice lenses beneath foundations. At this location and elevation, a foundation depth for frost protection of 2.5 feet is recommended. In areas where high subsurface moisture conditions are anticipated periodically, a subsurface perimeter drain will be necessary to help prevent the intrusion of water into areas located below grade. Additionally, swales should be created to intercept surface runoff and carry it safely around and away from structures. It is anticipated that the site grading will likely mitigate the drainages on site.

6.1 Relevance of Geologic Conditions to Land Use Planning

The development will be single-family residential. It is our opinion that the existing geologic and engineering geologic conditions will impose some minor constraints on the proposed development and construction. The most significant problems affecting development will be those associated with the expansive soils, loose or collapsible soils, fill, seasonally shallow groundwater and areas of erosion encountered across the site. Other hazards on site can be satisfactorily mitigated through proper engineering design and construction practices.

The medium dense granular soils and very dense sandstone encountered in the upper soil profiles of the test borings should provide good support for foundations. Loose soils or uncontrolled fill, if encountered at or near foundation depth, will require mitigation. Foundations anticipated for the site are standard spread footings or crawlspaces possibly in conjunction with overexcavation in areas of expansive soils or loose soils. Overexcavation may also be necessary in areas of shallow bedrock to provide for similar bearing capacity. Excavation is anticipated to be moderate with rubber-tired equipment for the site sand materials, and difficult for the dense sandstone. Expansive layers may also be encountered in the soil and bedrock on this site. Areas of expansive soils encountered on site are sporadic; therefore, none have been indicated on the maps. Expansive soils, if encountered, will require special foundation design and/or overexcavation. These soils will not prohibit development.

Areas of seasonally shallow groundwater were observed in the in the southern and western portions of the site associated with the drainage and existing detention pond. These areas will likely be avoided by the structures. Areas of erosion were observed along the drainage, that should be mitigated during site grading and development. In these areas rip-rap, erosion control blankets and/or other erosion protection methods should be utilized.

In summary, development of the site can be achieved if the items mentioned above are mitigated. These items can be mitigated through proper design and construction or through avoidance. Investigation on each lot is recommended prior to construction.

7.0 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 8), the area is not mapped with any aggregate deposits. According to the *Atlas of Sand, Gravel and Quarry Aggregate Resources, Colorado Front Range Counties* distributed by the Colorado Geological Survey (Reference 9), areas of the site are not mapped with any resources. According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 10), the area of the site has been mapped as "Fair" for industrial minerals. However, considering the silty nature of much of these materials and abundance of similar materials through the region and the close proximity to developed land, 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 10), 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 mines have been mapped in the area of the site, several inactive mines are located approximately 4 to 5 miles south and southeast of the site. No metallic mineral resources have been mapped on-site (Reference 10).

The site has been mapped as "Fair" for oil and gas resources (Reference 10). No oil or gas fields have been discovered in the area of the site. The sedimentary rocks in the area may lack the geologic structure for trapping oil or gas; therefore, it may not be considered a significant resource. Hydraulic fracturing is a new method that is being used to extract oil and gas from rocks. It utilizes pressurized fluid to extract oil and gas from rocks that would not normally be productive. The area of the site has not been explored to determine if the rocks underlying the site would be commercially viable utilizing hydraulic fracturing. The practice of hydraulic fracturing has come under review due to concerns about environmental impacts, health and safety.

8.0 EROSION CONTROL

The soil types observed on the site are moderately to highly susceptible to wind erosion, and moderately to highly susceptible to water erosion. A minor wind erosion and dust problem may be created for a short time during and immediately after construction. Should the problem be considered severe enough during this time, watering of the cut areas or the use of chemical palliative may be required to control dust. However, once construction has been completed and vegetation re-established, the potential for wind erosion should be considerably reduced.

With regard to water erosion, loosely compacted soils will be the most susceptible to water erosion, residually weathered soils become increasingly less susceptible to water erosion. For the typical soils observed on-site, allowable velocities or unvegetated and unlined earth channels would be on the order of 3 to 4 feet/second, depending upon the sediment load carried by the water. Permissible velocities may be increased through the use of vegetation to something on the order of 4 to 7 feet/second, depending upon the type of vegetation established. Should the anticipated velocities exceed these values, some form of channel lining material may be required to reduce erosion potential. These might consist of some of the synthetic channel lining materials on the market or conventional riprap. In cases where ditch-lining materials are still insufficient to control erosion, small check dams or sediment traps may be required. The check dams will serve to reduce flow velocities, as well as provide small traps for containing sediment. The determination of the amount, location and placement of ditch linings, check dams and of the special erosion control features should be performed by or in conjunction with the drainage engineer who is more familiar with the flow quantities and velocities.

Cut and fill slope areas will be subjected primarily to sheetwash and rill erosion. Unchecked rill erosion can eventually lead to concentrated flows of water and gully erosion. The best means to combat this type of erosion is, where possible, the adequate re-vegetation of cut and fill slopes. Cut and fill slopes having gradients more than three (3) horizontal to one (1) vertical become increasingly more difficult to revegetate successfully. Therefore, recommendations pertaining to the vegetation of the cut and fill slopes may require input from a qualified landscape architect and/or the Soil Conservation Service.

9.0 CLOSURE

It is our opinion that the existing geologic engineering and geologic conditions will impose some constraints on development and construction of the site. The majority of these conditions can be mitigated through proper engineering design and construction practices. The proposed development and use are consistent with anticipated geologic and engineering geologic conditions.

It should be pointed out that because of the nature of data obtained by random sampling of such variable and non-homogeneous 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. Individual investigations for building sites will be required prior to construction. Construction and design personnel should be made familiar with the contents of this report.

This report has been prepared for Elite Properties of America, Inc. for application to the proposed project in accordance with generally accepted geologic soil and engineering practices. No other warranty expressed or implied is made.

We trust that this report has provided you with all the information that you required. Should you require additional information, please do not hesitate to contact Entech Engineering, Inc.

BIBLIOGRAPHY

1. Bryant, Bruce; McGrew, Laura W, and Wobus, Reinhard A. 1981. *Geologic Structure Map of the Denver 1° x 2° Quadrangle, North-Central Colorado.* Sheet 2. U.S. Geologic Survey. Map I-1163.

2. Natural Resource Conservation *Service,* September 23, 2016. *Web Soil Survey.* United States Department Agriculture, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

3. United States Department of Agriculture Soil Conservation Service. June 1981. *Soil Survey of El Paso County Area, Colorado.*

4. Madole, Richard F. and Thorson, Jon P., 2003. *Geologic Map of the Elsmere Quadrangle, El Paso County, Colorado.* Colorado Geological Survey. Open-File Report 02-2.

5. Trimble, Donald E. and Machette, Michael N. 1979. *Geologic Map of the Colorado Springs-Castle Rock Area, Front Range Urban Corridor, Colorado.* USGS, Map I-857-F.

6. Bryant, Bruce; McGrew, Laura W. and Wobus, Reinhard A. 1981. *Geologic Map of the Denver 1° x 2° Quadrangle, North-Central Colorado.* U.S. Geologic Survey. Map 1-1163.

7. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for El Paso County, Colorado and Incorporated Areas.* Map Numbers 08041CO752G & 08041CO756G

8. El Paso County Planning Development. December 1995. *El Paso County Aggregate Resource Evaluation Maps.*

9. Schwochow, S.D.; Shroba, R.R. and Wicklein, P.C. 1974. *Atlas of Sand, Gravel, and Quarry Aggregate Resources, Colorado Front Range Counties.* Colorado Geological Survey. Special Publication 5-B.

10. Keller, John W.; TerBest, Harry and Garrison, Rachel E. 2003. *Evaluation of Mineral and Mineral Fuel Potential of El Paso County State Mineral Lands Administered by the Colorado State Land Board.* Colorado Geological Survey. Open-File Report 03-07.

FIGURES

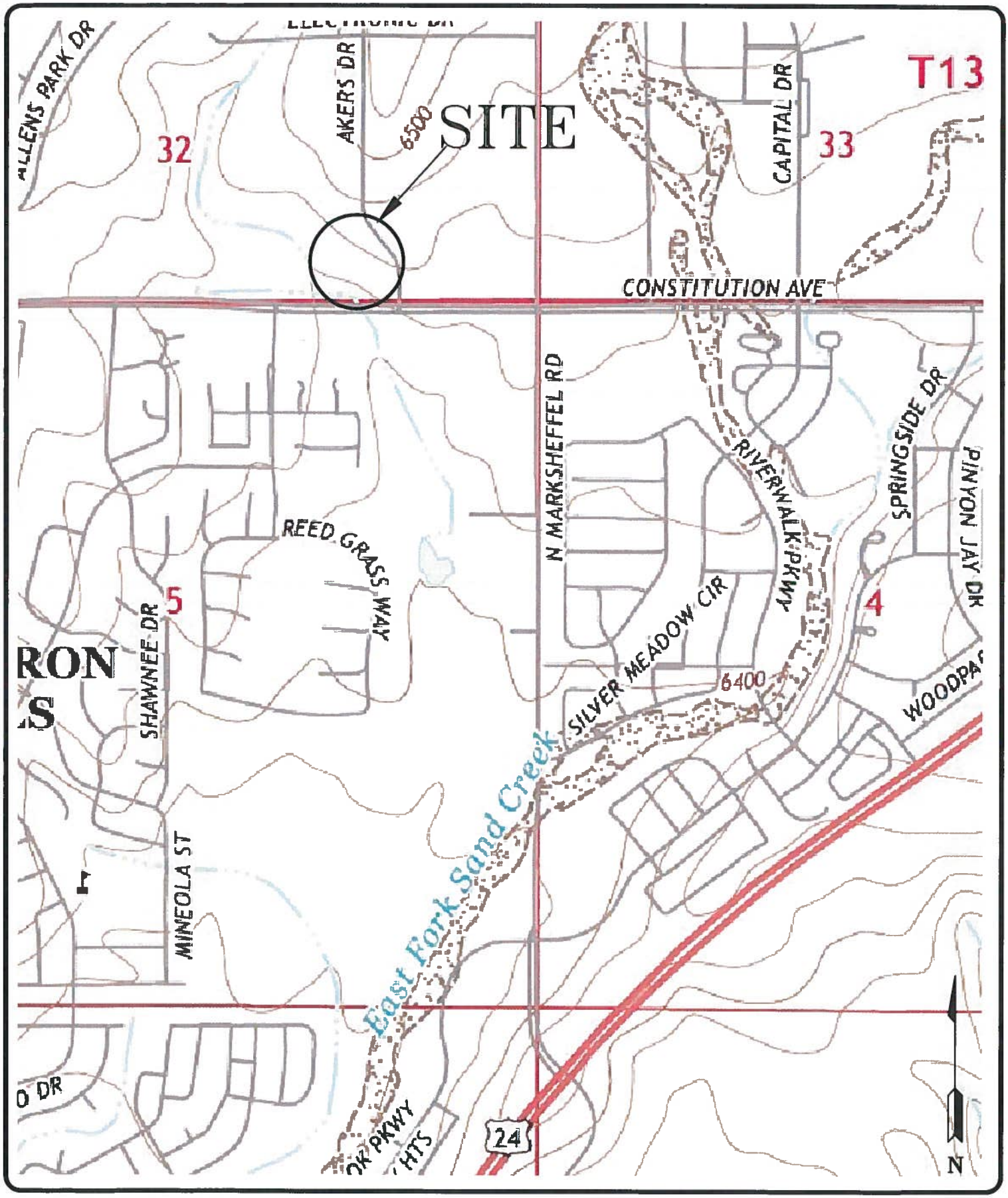
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

VICINITY MAP
MIDTOWN AT HANNAH RIDGE, FILING NO. 3
AKERS DRIVE AND CONSTITUTION AVENUE
EL PASO COUNTY, CO.
FOR: ELITE PROPERTIES OF AMERICA, INC.

DRAWN:	DATE:	CHECKED:	DATE:
LLL	4/16/20		

JOB NO.: 200006

FIG NO.: 1



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

USGS MAP
MIDTOWN AT HANNAH RIDGE, FILING NO. 3
AKERS DRIVE AND CONSTITUTION AVENUE
EL PASO COUNTY, CO.
FOR: ELITE PROPERTIES OF AMERICA, INC.

DRAWN:	DATE:	CHECKED:	DATE:
LLL	4/16/20		

JOB NO.: 200006

FIG NO.: 2

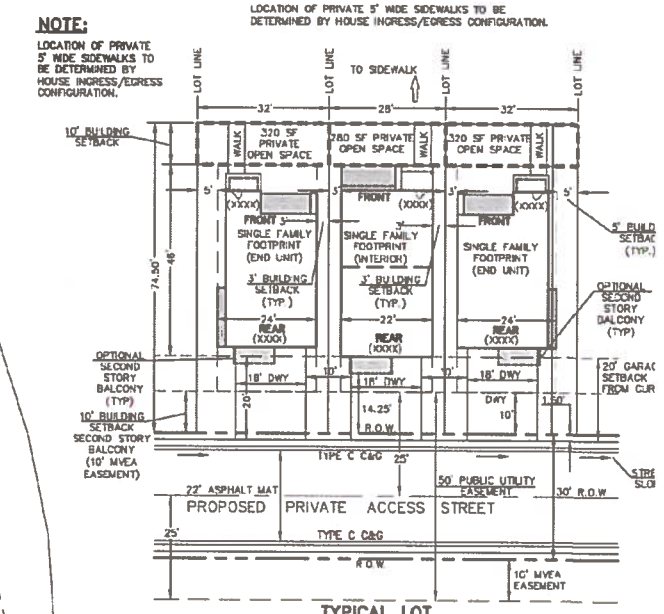
ADDITIONAL SERVICE PROVIDERS GENERAL NOTES FROM TITLE SHEET:

A. WATER PROVIDER	CHEROKEE METROPOLITAN DISTRICT
B. WASTEWATER PROVIDER	CHEROKEE METROPOLITAN DISTRICT
C. ELECTRIC PROVIDER	MOUNT VIEW ELECTRIC ASSOCIATION
D. GAS PROVIDER	COLORADO SPRINGS UTILITIES
E. FIRE PROTECTION DISTRICT	FALCON FIRE
F. EMERGENCY SERVICES (AMBULANCE)	EL PASO COUNTY
G. EMERGENCY SERVICES (POLICE)	EL PASO COUNTY SHERIFF

FILING NO. 3 SUMMARY TABLE:

PARCELS	SQUARE FEET	PERCENTAGE	OWNER	MAINTENANCE
TRACT A (PARKS, MAILBOXES, FENCES, WALLS, OPEN SPACE, PRIVATE PEDESTRIAN ACCESS, PUBLIC UTILITIES, DRAINAGE)	178,465	54.82%	HOA	HOA
TRACT B, C, D, E (PRIVATE R.O.W. – ACCESS)	27,312	8.39%	HOA	HOA
LOTS (42 TOTAL)	93,567	28.74%	INDIVIDUAL LOT OWNERS	
PUBLIC R.O.W.	26,223	8.05%	COUNTY	COUNTY
TOTAL	325,567	100%		

NOTE:
LOCATION OF PRIVATE 5' WIDE SIDEWALKS TO BE DETERMINED BY HOUSE INGRESS/EGRESS CONFIGURATION.



NOTE: ENSURE DRIVEWAYS DO NOT CONFLICT WITH PED RAMP TRANSITIONS.

TB– APPROXIMATE TEST BORING LOCATION AND NUMBER

P2 – APPROXIMATE PHOTOGRAPH LOCATION AND NUMBER

REVISION	BY

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

SITE PLAN/TEST BORING LOCATION MAP
MIDTOWN AT HANNAH RIDGE, FILING NO. 3
AKERS DRIVE AND CONSTITUTION AVENUE
EL PASO COUNTY, CO.
FOR: ELITE PROPERTIES OF AMERICA, INC.

DRAWN	LJL
CHECKED	
DATE	4/16/20
SCALE	AS SHOWN
JOB NO.	200006
FIGURE No.	3

N

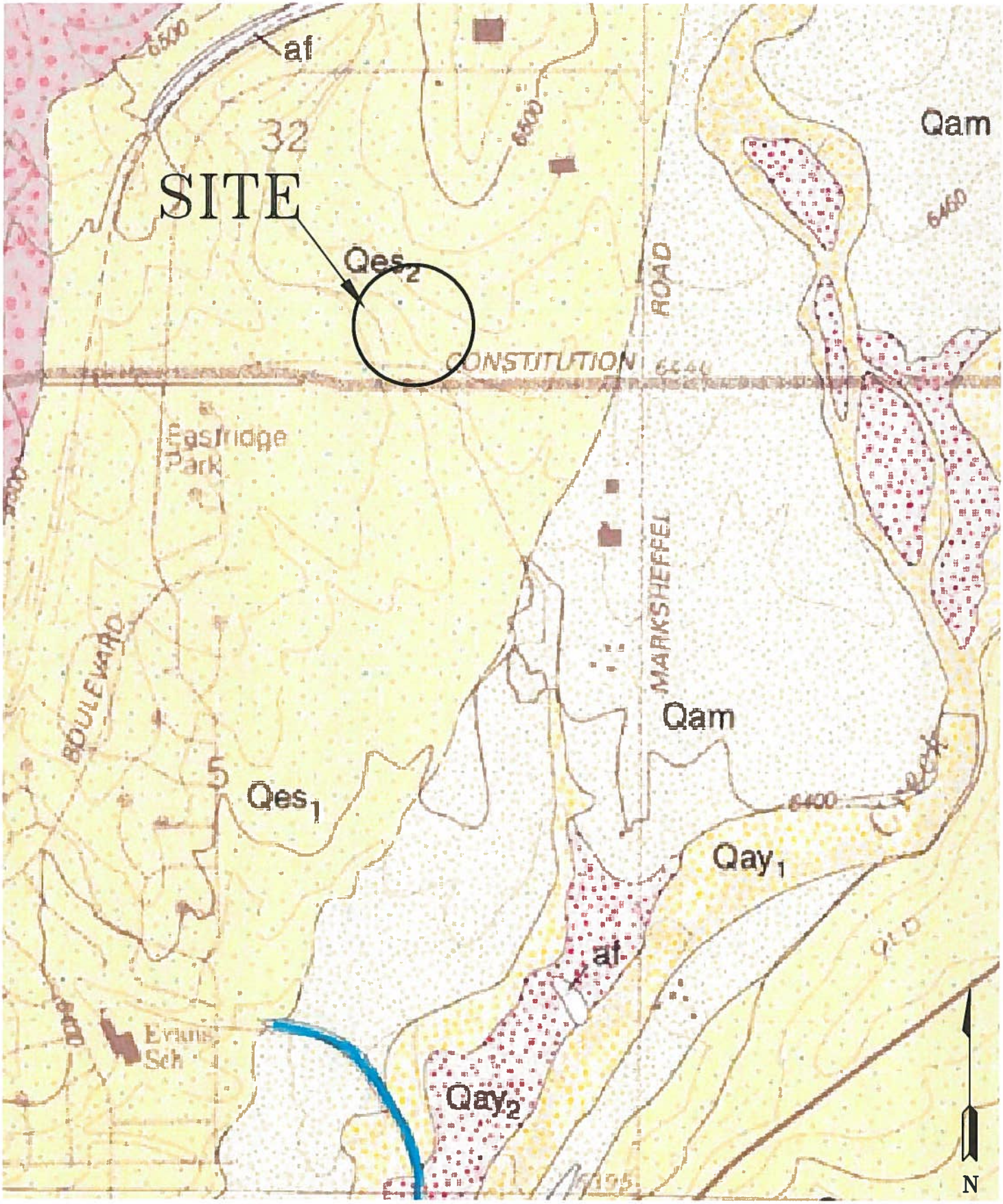
ENTECH
ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

SOIL SURVEY MAP
MIDTOWN AT HANNAH RIDGE, FILING NO. 3
AKERS DRIVE AND CONSTITUTION AVENUE
EL PASO COUNTY, CO.
FOR: ELITE PROPERTIES OF AMERICA, INC.

DRAWN:	DATE:	CHECKED:	DATE:
LLL	4/16/20		

JOB NO.: 200006

FIG NO.: 4



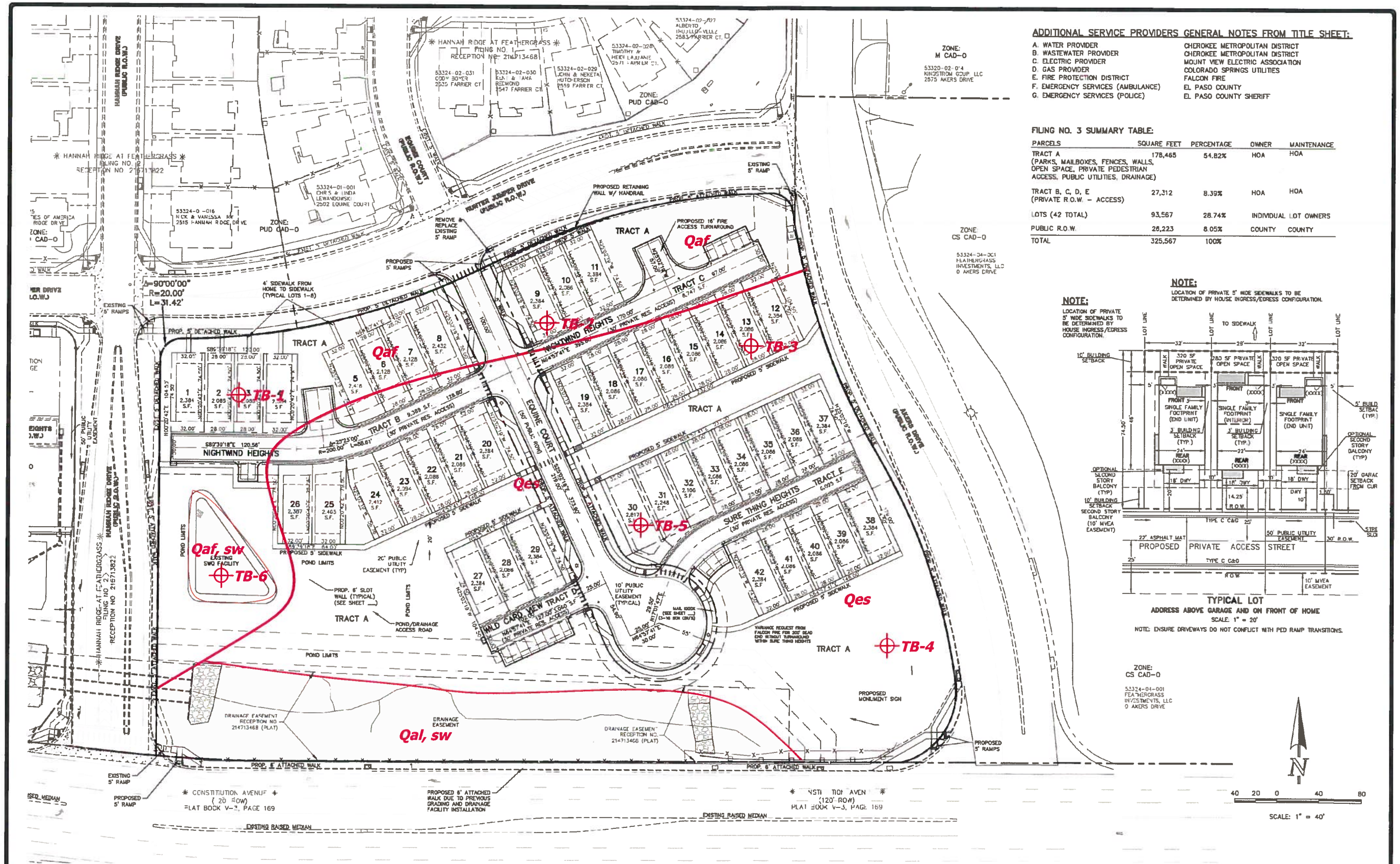
ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, CO. 80907 (719) 531-5599

ELSMERE QUADRANGLE GEOLOGY MAP
MIDTOWN AT HANNAH RIDGE, FILING NO. 3
AKERS DRIVE AND CONSTITUTION AVENUE
EL PASO COUNTY, CO.
FOR: ELITE PROPERTIES OF AMERICA, INC.

DRAWN:	DATE:	CHECKED:	DATE:
LLL	4/16/20		

JOB NO.: 200006

FIG NO.: 5



ADDITIONAL SERVICE PROVIDERS GENERAL NOTES FROM TITLE SHEET:

A. WATER PROVIDER	CHEROKEE METROPOLITAN DISTRICT
B. WASTEWATER PROVIDER	CHEROKEE METROPOLITAN DISTRICT
C. ELECTRIC PROVIDER	MOUNT VIEW ELECTRIC ASSOCIATION
D. GAS PROVIDER	COLORADO SPRINGS UTILITIES
E. FIRE PROTECTION DISTRICT	FALCON FIRE
F. EMERGENCY SERVICES (AMBULANCE)	EL PASO COUNTY
G. EMERGENCY SERVICES (POLICE)	EL PASO COUNTY SHERIFF

FILING NO. 3 SUMMARY TABLE:

PARCELS	SQUARE FEET	PERCENTAGE	OWNER	MAINTENANCE
TRACT A (PARKS, MAILBOXES, FENCES, WALLS, OPEN SPACE, PRIVATE PEDESTRIAN ACCESS, PUBLIC UTILITIES, DRAINAGE)	178,465	54.82%	HOA	HOA
TRACT B, C, D, E (PRIVATE R.O.W. – ACCESS)	27,312	8.39%	HOA	HOA
LOTS (42 TOTAL)	93,567	28.74%	INDIVIDUAL LOT OWNERS	
PUBLIC R.O.W.	26,223	8.05%	COUNTY	COUNTY
TOTAL	325,567	100%		

NOTE:

LOCATION OF PRIVATE 5' WIDE SIDEWALKS TO BE DETERMINED BY HOUSE INGRESS/EGRESS CONFIGURATION.

NOTE:

LOCATION OF PRIVATE 5' WIDE SIDEWALKS TO BE DETERMINED BY HOUSE INGRESS/EGRESS CONFIGURATION.

Legend:

Qaf– Artificial Fill Deposits of Holocene Age:
man–made fill deposits

Qes– Eolian Sand of Quaternary Age:
windblown sediments

sw – seasonally wet areas

REVISION	BY

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

GEOLOGY/ENGINEERING GEOLOGY MAP
MIDTOWN AT HANNAH RIDGE, FILING NO. 3
AKERS DRIVE AND CONSTITUTION AVENUE
EL PASO COUNTY, CO.
FOR: ELITE PROPERTIES OF AMERICA, INC.

DRAWN	LLL
CHECKED	
DATE	4/16/20
SCALE	AS SHOWN
JOB NO.	200006
FIGURE No.	6

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

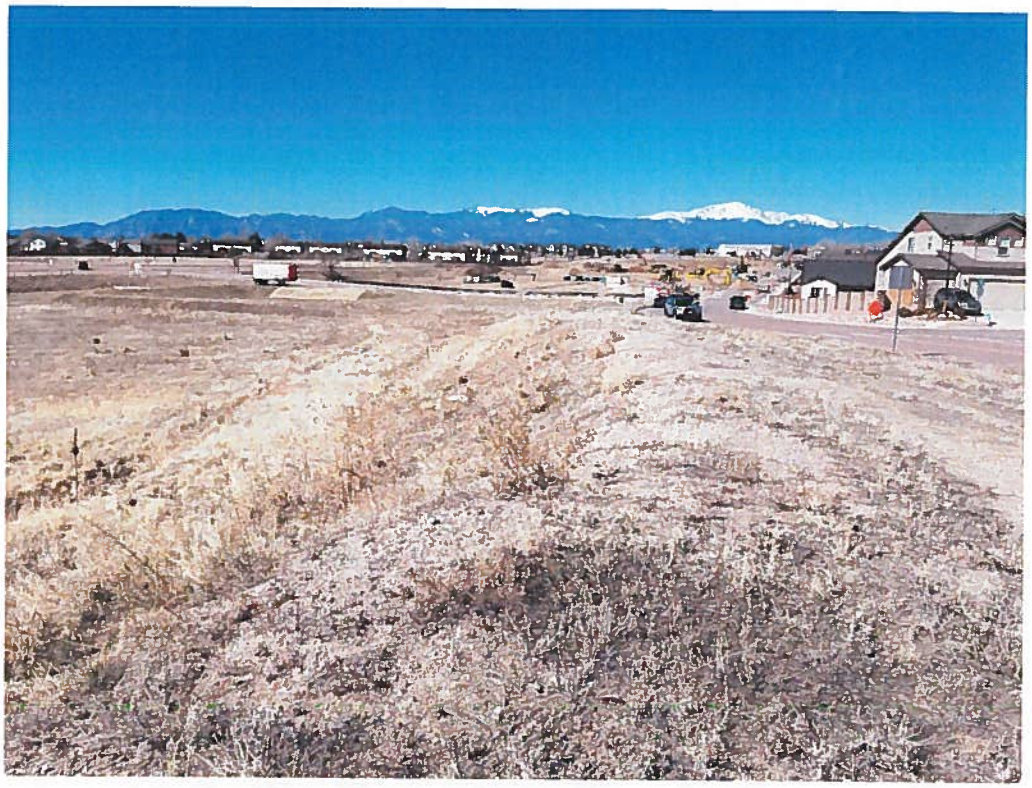
ELSMERE QUADRANGLE GEOLOGY MAP
MIDTOWN AT HANNAH RIDGE, FILING NO. 3
AKERS DRIVE AND CONSTITUTION AVENUE
EL PASO COUNTY, CO.
FOR: ELITE PROPERTIES OF AMERICA, INC.

DRAWN:	DATE:	CHECKED:	DATE:
LLL	4/16/20		

JOB NO.: 200006

FIG NO.: 7

APPENDIX A: Site Photographs



1

Looking west from the northeastern side of the site.

April 6, 2020

2

Looking southwest from the northeastern side of the site.

April 6, 2020

Job No. 200006

3

Looking west from southeast side of the site.

April 6, 2020

4

Looking northwest from the southeast side of the site.

April 6, 2020

Job No. 200006

5

Looking east at drainage along the southern side of the site.

April 6, 2020

6

Looking east from the western portion of the site.

April 6, 2020

Job No. 200006

APPENDIX B: Summary of Laboratory Testing Results and Test Boring Logs, Entech Job No. 200006

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

CLIENT ELITE PROPERTIES
PROJECT HANNAH RIDGE, FILING 3
JOB NO. 200006

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			17.8	29	10				SC	FILL, SAND, CLAYEY
1	6	5			34.1				880		SC	FILL, SAND, CLAYEY
2	2	5			21.3			0.00			SM	SAND, SILTY
2	3	15			49.4	27	7	0.00			SC-SM	SAND, VERY CLAYEY, SILTY
2	4	5			43.4			0.00			SC	SAND, VERY CLAYEY
3	4	15	34.2	73.4	94.8	56	17			0.4	MH	SILT, CLAYEY
3	3	2-3			61.6	31	9				CL	CLAY, VERY SANDY
4	2	10			23.5	NV	NP	<0.01			SM	SANDSTONE, SILTY
4	5	20	19.3	99.9	45.4					0.3	SC	SANDSTONE, VERY CLAYEY
4	6	10	17.1	85.7	25.6					-2.3	SM	SANDSTONE, SILTY
5	1	15	23.2	83.1	59.8	40	13	0.00		-0.3	ML	SILTSTONE, VERY SANDY, CLAYEY
5	6	20			93.0	49	16				ML	SILTSTONE
5	5	15			56.7						CL	CLAYSTONE, VERY SANDY

TEST BORING NO. 1
DATE DRILLED 1/9/2020
Job # 200006

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 18', 1/14/20						
POSS. FILL 0-6', SAND, CLAYEY TO SILTY, FINE TO COARSE GRAINED, DARK BROW TO BROWN, MEDIUM DENSE, MOIST				14	7.3	1
	5			23	7.2	1
SAND, SILTY, FINE TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST						
	10			15	8.2	2
SILTSTONE, CLAYEY, VERY SANDY, BROWN, HARD, MOIST	15			50 / 10"	19.5	5
	20			50 / 8"	21.4	5

TEST BORING NO. 2
DATE DRILLED 1/9/2020
CLIENT ELITE PROPERTIES
LOCATION HANNAH RIDGE, FILING 3

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 11.5', 1/14/20						
FILL 0-4', SAND, SILTY, FINE TO MEDIUM GRAINED, BROWN, MEDIUM DENSE, MOIST				22	8.0	1
	5			29	5.1	2
SAND, SILTY, FINE TO MEDIUM GRAINED, BROWN, MEDIUM DENSE, MOIST						
	10			50 / 5"	11.9	4
SANDSTONE, SILTY, FINE TO MEDIUM GRAINED, BROWN, VERY DENSE, MOIST						
COARSE GRAINED LENSES	15			50 / 3"	10.0	4
	20			50 / 1"	10.4	4
SANDSTONE, SILTY, FINE GRAINED, BLUE GRAY, VERY DENSE, MOIST						

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

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
			1/21/20

JOB NO.: 200006
FIG NO.: A- 1

TEST BORING NO. 3
DATE DRILLED 1/9/2020
Job # 200006

REMARKS

DRY TO 18.5', 1/14/20

Depth (ft)	Samples	Blows per foot	Watercontent %	Soil Type	Description
		13	7.6	3	CLAY, VERY SANDY, FIRM, BROWN, DRY TO MOIST
5		14	10.7	3	
					SAND, SILTY, FINE TO MEDIUM GRAINED, TAN, LOOSE, MOIST
10		9	9.3	2	
					SAND, VERY CLAYEY, VERY SILTY, FINE TO MEDIUM GRAINED, BROWN, MEDIUM DENSE, MOIST
15		14	8.2	2	
20		19	19.7	2	

TEST BORING NO. 4
DATE DRILLED 1/9/2020
CLIENT ELITE PROPERTIES
LOCATION HANNAH RIDGE, FILING 3

REMARKS

DRY TO 18.5', 1/14/20

Depth (ft)	Samples	Blows per foot	Watercontent %	Soil Type	Description
		13	7.0	2	SAND, VERY CLAYEY WITH ORGANICS, FINE TO MEIDUM GRAINED, BROWN, MEDIUM DENSE, MOIST
5		10	9.1	2	
					SAND, SILTY, FINE TO MEDIUM GRAINED, BROWN, LOOSE TO MEDIUM DENSE, MOIST
10		9	4.7	2	
15		28	24.4	2 3	SILT, CLAYEY, GRAY BROWN, STIFF, MOIST
20		50/4"	13.6	4	SANDSTONE, SILTY, FINE GRAINED, BROWN, VERY DENSE, MOIST

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

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE:
		h	1/21/20

JOB NO.: 200006
FIG NO.: A- 2

TEST BORING NO. 5
DATE DRILLED 1/9/2020
Job # 200006

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 10.5', 1/14/20						
SAND, SILTY WITH ORGANICS, FINE TO COARSE GRAINED, BROWN, DENSE TO LOOSE, MOIST				38	6.6	2
MEDIUM GRAINED LENSES	5			13	6.1	2
	10			6	17.1	2
CLAYSTONE, VERY SANDY, GRAY BROWN, HARD, MOIST	15			50 / 9"	13.3	5
SANDSTONE, VERY CLAYEY, FINE GRAINED, GRAY BROWN, VERY DENSE, MOIST	20			50 / 7"	15.4	4

TEST BORING NO. 6
DATE DRILLED 1/9/2020
CLIENT ELITE PROPERTIES
LOCATION HANNAH RIDGE, FILING 3

REMARKS	Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
WATER @ 5', 1/14/20						
SAND, SILTY, FINE TO MEDIUM GRAINED, BROWN, LOOSE, MOIST				7	9.2	2
SAND, CLAYEY, FINE GRAINED, BROWN, MEDIUM DENSE, MOIST	5			23	15.5	2
SANDSTONE, CLAYEY, FINE GRAINED, BROWN, VERY DENSE, MOIST	10			50 / 5"	11.2	4
CLAYSTONE, SANDY, GRAY BROWN, HARD, MOIST	15			50 / 6"	13.5	5
	20			50 / 8"	13.6	5

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

TEST BORING LOG

DRAWN:	DATE:	CHECKED:	DATE: 11/21/20

JOB NO.: 200006
FIG NO.: A- 3

APPENDIX C: Soil Survey Descriptions

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v
Elevation: 4,600 to 5,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: 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
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Minor Components

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 17, Sep 13, 2019