ENTECH
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SOILS AND GEOLOGY STUDY
PREAMBLE 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

December 23, 2024

Respectfully Submitted,

ENTECH ENGINEERING, INC.

Logan L. Langford, P.G.
Sr. Geologist

Reviewed by:

COLORADO LICENSED JOSEPH COLLIN GOODE 23725 PROFESSIONAL ENGINEER

Digitally signed by Joseph C. Goode Jr.
Date: 12/23/24

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

LLL:JCG/ed

PCD No.

Entech Job No. 242070

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1 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 thirty-eight single-family residential lots and associated site improvements. The development will utilize municipal sewer and water. The detention ponds have been constructed prior to completion of this report.

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 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 just east of the Colorado Springs city limits, at the northwest corner of Akers Drive and Constitution Avenue. The approximate location of the project site is shown on the Vicinity Map (Figure 1).

The general topography of the site gradually slopes 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. An existing storm water detention pond located in the western portion of the site. 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 drainages along Constitution Avenue. Site photographs, taken December 18, 2024, are included in Appendix A.

The total acreage involved in the proposed development is 7.44 acres. Thirty-eight single-family residential lots and associated site improvements are proposed. The structures will have slabs on grade and shallow foundations, no below grade levels are proposed. The development will utilize municipal sewer and water. The Site and Exploration Plan is presented in Figure 3. Site grading was completed in 2020 – 2021. Entech periodically observing and performed density testing as the fill was placed.

3 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 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), Web Soil Survey was also reviewed to evaluate the site. The position of mappable units within the subject property is 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 (Figure 6) which identified pertinent geologic conditions affecting development. The field mapping was originally performed by Entech personnel on April 6, 2020. The site was revisited and previous mapping verified/modified completed on December 18, 2024.

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 Site and Exploration Plan (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 select soil samples to classify and determine the engineering characteristics of the soil. Laboratory tests included Grain-Size Analysis (ASTM D422) and Atterberg Limits testing (ASTM D4318). Sulfate testing was performed on select samples to evaluate the 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 C-1.

A Soil and Geology Study was previously completed for Midtown at Hannah Ridge Filing No. 3 (Reference 2). The previously completed Soil, Geology, and Geologic Hazard Study – Addendum for Midtown at Hannah Ridge Filing No. 3 is included in Appendix D (Reference 2). The addendum was written in response to the previous Colorado Geological Survey review comments regarding shallow groundwater conditions and potential for basement feasibility. The previously completed Soils and Geology Study and Addendum letter were used in preparing this report.

5 SOIL, GEOLOGY, AND ENGINEERING GEOLOGY

5.1 General Geology

Physiographically, the site lies in the western portion of the Great Plains Physiographic Province. A major structural feature known as the Rampart Range Fault lies approximately 11 miles to the west. 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 five of the test borings at depths ranging from 9 to 14 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 and alluvial and eolian sediments of the 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 4), previously the Soil Conservation Service (Reference 5), 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
8	Blakeland loamy sand, 1 to 9% slopes

Complete descriptions of each soil type are presented in Appendix E. 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 Geologic Map of the Elsmere Quadrangle showing the site is presented in Figure 5 (Reference 6). The Geology Map prepared for the site is presented in Figure 6. One mappable units was identified on this site which is described as follows:

Qaf **Artificial Fill of Holocene Age:** These are recent deposits of man-made fill associated with the previously completed overlot grading completed for the filing. The fill is controlled, and personnel of Entech observed fill placement and performed density testing.

5.4 Soil Conditions

Three soil types and two bedrock types were encountered in the test borings drilled for the subsurface investigation. Each soil and bedrock 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 silty sand fill and clayey sand fill (SM, SC). The sand fill was encountered in two test borings (TB-1 and TB-2) at the existing ground surface and extended to depths of 4 to 6 feet below the 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% with approximately 18% to 34% 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 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 TB-3 at 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 resulted in 5% to 20% water content with approximately 21% to 49% 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% 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 TB-3 and TB-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 and grain-size testing resulted in water contents of approximately 8% to 24% with 62% to 95% 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%, 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 TB-2, TB-4, TB-5, and TB-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% water content with 24% to 45% 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%, 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% 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 TB-1, TB-5, and TB-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% water content with 57% to 93% 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%, indicating a low consolidation potential. Sulfate testing resulted in 0.00% 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 of 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 onsite, 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 monitor potential occurrences of such subsurface water features during construction on site and address individual problems as necessary at the time of construction.

6 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 the developers should monitor 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:

Artificial Fill – Constraint

These are recent man-made fill deposits associated with overlot grading and an existing detention pond on the site. Filing 3 overlot grading was completed in 2020 – 2021. Entech periodically observed and tested the fill. The overlot fill is considered controlled for construction purposes.

Mitigation: The overlot fill is suitable to support the proposed structures. Any uncontrolled fill or loose soil encountered beneath foundations will require removal and recompaction at a minimum of 95% of the Modified Procter (ASTM D1557) maximum dry density.

Collapsible Soils – Constraint

The majority of the soils encountered onsite 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 the Modified Procter (ASTM D1557) maximum dry density 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 – Constraint

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 the Modified Procter (ASTM D1557) maximum dry density is a suitable mitigation that 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. Final recommendations should be determined after additional investigation of each building site.

Groundwater and Floodplain Areas – Constraint

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 9). A drainage is located along the southern side of the site, and a storm water 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 previous field mapping. Areas of erosion were observed along the drainage that was mitigated with the site grading. In these areas, rip-rap, erosion control blankets, and/or other erosion protection methods should be utilized.

Seasonal Shallow Groundwater – Constraint

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. Shallow water is not expected in the building areas.

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. The site grading completed for the development mitigate the majority of the drainage issues.

Radon – Hazard

Radon is a colorless, tasteless radioactive gas with a United States Environmental Protection Agency (EPA) specified action level of 4.0 picocuries per liter (pCi/L) of air. Radon gas has a very short half-life of 3.8 days. Radon levels for the area have been reported by the Colorado Geologic Survey in the open file, Report No. 91-4 (Reference 10). Average Radon levels for the 80922-zip code is 5.9 pCi/l. The following is a table of radon levels in this area:

Average Radon Levels for the 80922 Zip Code	
0 < 4 pCi/L	0.00%
4 < 10 pCi/L	100.00%
10 < 20 pCi/L	0.00%
> 20 pCi/L	0.00%

Mitigation:

The potential for high radon levels is present for the site. Build-up of radon gas can usually be mitigated by providing increased ventilation of basement and crawlspace and sealing joints. **Specific requirements for mitigation should be based on site specific testing.**

6.1 Relevance of Geologic Conditions to Land Use Planning

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

The medium dense granular soils and controlled overlot fill will provide good support for foundations. Loose soils or uncontrolled fill, if encountered at or near foundation depth, will require mitigation. Standard spread footing foundations in conjunction with possible overexcavation in areas of expansive soils or loose soils are anticipated for this site. 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 associated with the drainage and existing detention pond were observed in the southern and southwestern portions of the site. Since the proposed structures will be slab-on-grade without basements these areas are not anticipated to affect the proposed structures. Areas of erosion that should be mitigated during site grading and development were observed along the drainage. 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 avoidance. Investigation of each lot is recommended prior to construction.

Trench backfill placement should be performed in accordance with El Paso County specifications. All excavation and excavation shoring/bracing should be performed in accordance with OSHA guidelines.

7 ECONOMIC MINERAL RESOURCES

Some of the sandy materials onsite could be considered a low-grade sand resource. According to the *El Paso County Aggregate Resource Evaluation Map* (Reference 11), 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 12), areas of the site are not mapped with any resources. According to the *Evaluation of Mineral and Mineral Fuel Potential* (Reference 13), the area of the site has been mapped as “Fair” for industrial minerals. However, considering the predominately silty nature of these materials, the abundance of similar materials throughout 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 13), the site is mapped within the Denver Basin Coal Region. However, the site area mapped has been designated as “Poor” for coal resources. No active mines have been mapped in the area of the site, but several inactive mines are located approximately 4 to 5 miles south and southeast of the site. No metallic mineral resources have been mapped onsite (Reference 13).

The site has been mapped as “Fair” for oil and gas resources (Reference 13). No oil or gas fields have been discovered the site area. 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 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 onsite, 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 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 revegetation 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 ROADWAY, EMBANKMENT, and STORM WATER FACILITY CONSTRUCTION RECOMMENDATIONS

In general, the site soils are suitable for the proposed roadways. The storm water detention facility was constructed during the previously completed overlot grading. Groundwater is not anticipated to affect roadway construction. If road or utility excavations encroach on the groundwater level unstable soil conditions may be encountered. Unstable soils are not anticipated in areas of shallow bedrock. 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.

10 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 noted that due to the nature of data obtained by random sampling of variable and non-homogeneous materials such as soil and rock, it is important that Entech 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 soils and geology has been prepared for Elite Properties of America, Inc. with application to the 38 single-family residential lots and associated site improvements on 7.44 acres within the Preamble at Hannah Ridge Subdivision Filing No. 3 in El Paso County, Colorado. In conducting the soils and geology investigation, laboratory testing, engineering evaluation, and reporting, Entech Engineering, Inc. endeavored to work in accordance with generally accepted professional geotechnical and geologic practices and principles consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession currently practicing in the same locality and under similar conditions. No other warranty, expressed or implied, is made. During final design and/or construction, if conditions are encountered that appear different from those described in this report, Entech Engineering, Inc. requests to be notified so that the evaluation and recommendations presented herein can be reviewed and modified as appropriate.

If there are any questions regarding the information provided herein, or if Entech Engineering, Inc. can be of further assistance, please do not hesitate to contact us.

REFERENCES

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. Entech Engineering, Inc. dated April 20, 2020. *Soil, Geology, and Geologic Hazard Study, Midtown at Hannah Ridge Filing No. 3, Akers Drive and Constitution Avenue, El Paso County, Colorado.* Entech Job No. 200006.

3. Entech Engineering, Inc. revised date March 4, 2022. *Soil, Geology, and Geologic Hazard Study – Addendum, Midtown at Hannah Ridge Filing No. 3, Akers Drive and Constitution Avenue, El Paso County, Colorado.* Entech Job No. 200006.

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

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

6. 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.

7. 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.

8. 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.

9. Federal Emergency Management Agency. December 7, 2018. *Flood Insurance Rate Maps for El Paso County, Colorado and Incorporated Areas.* Map Numbers 08041C0752G & 08041C0756G.

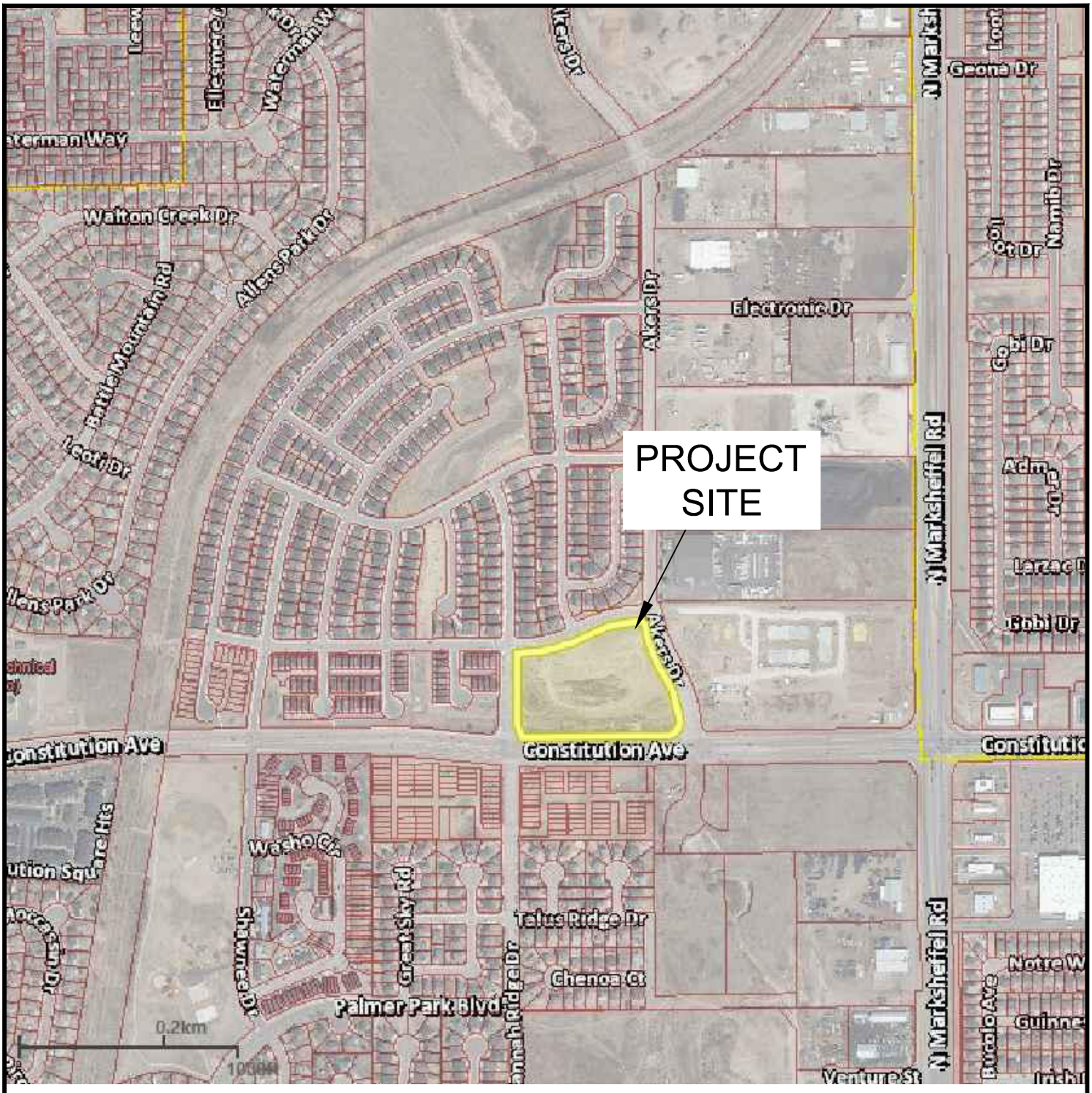
10. Colorado Geological Survey. 1991. *Results of the 1987-88 EPA Supported Radon Study in Colorado*. Open-file Report 91-4.

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

12. 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.

13. 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



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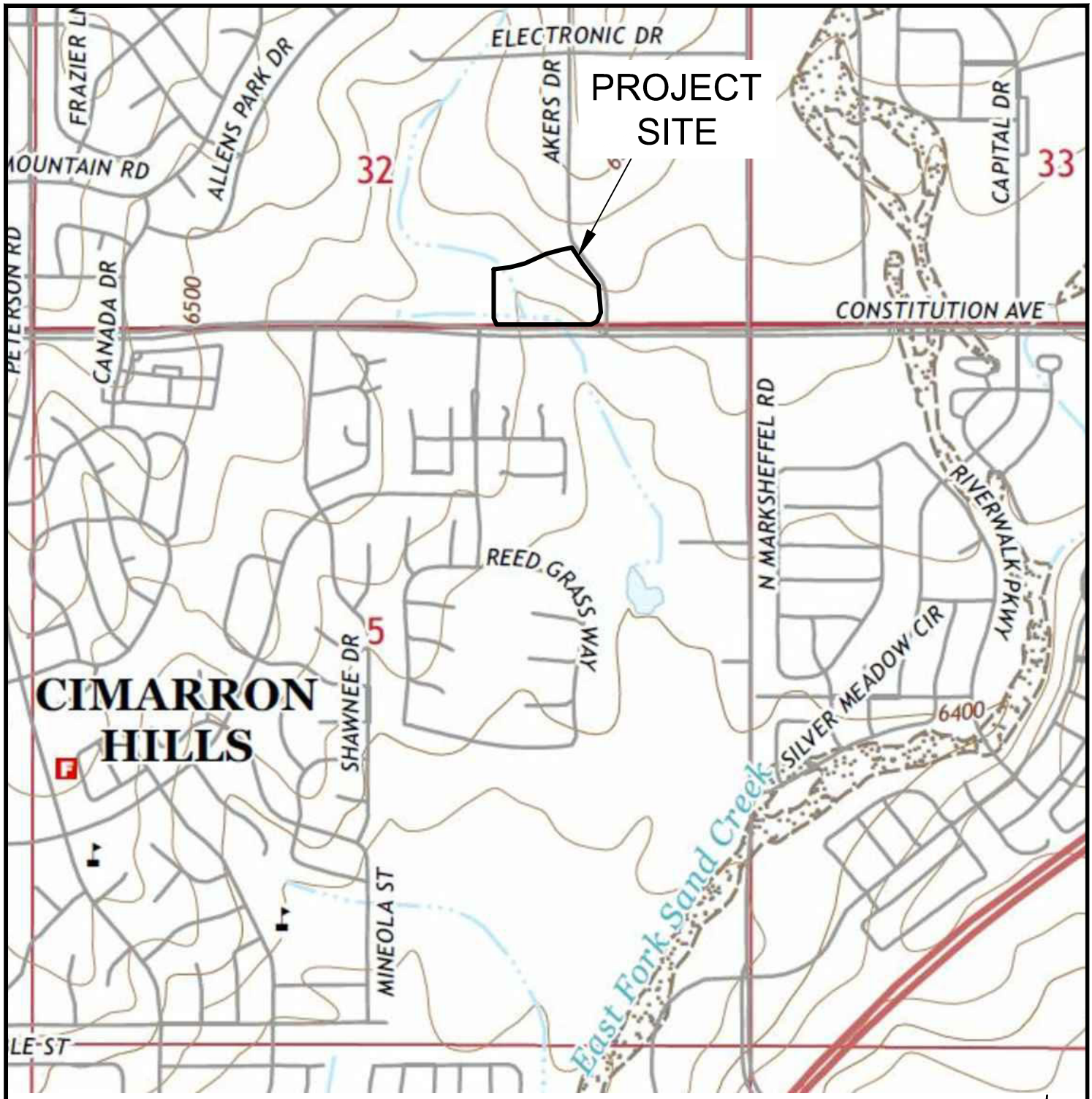
ENTECH ENGINEERING, INC.

VICINITY MAP

PREAMBLE AT HANNAH RIDGE FIL. NO. 3
ELITE PROPERTIES OF AMERICA, INC.

JOB NO. 242070

FIG. 1



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USGS TOPOGRAPHY MAP

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JOB NO. 242070

FIG. 2

TB- APPROXIMATE TEST BORING LOCATION AND NUMBER

(P2) - APPROXIMATE PHOTOGRAPH LOCATION AND NUMBER

ENTECH ENGINEERING, INC.

SITE AND EXPLORATION PLAN

PREAMBLE AT HANNAH RIDGE FIL. NO. 3
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JOB NO.
242070

FIG. 3

ENTECH ENGINEERING, INC.

USDA SOIL MAP

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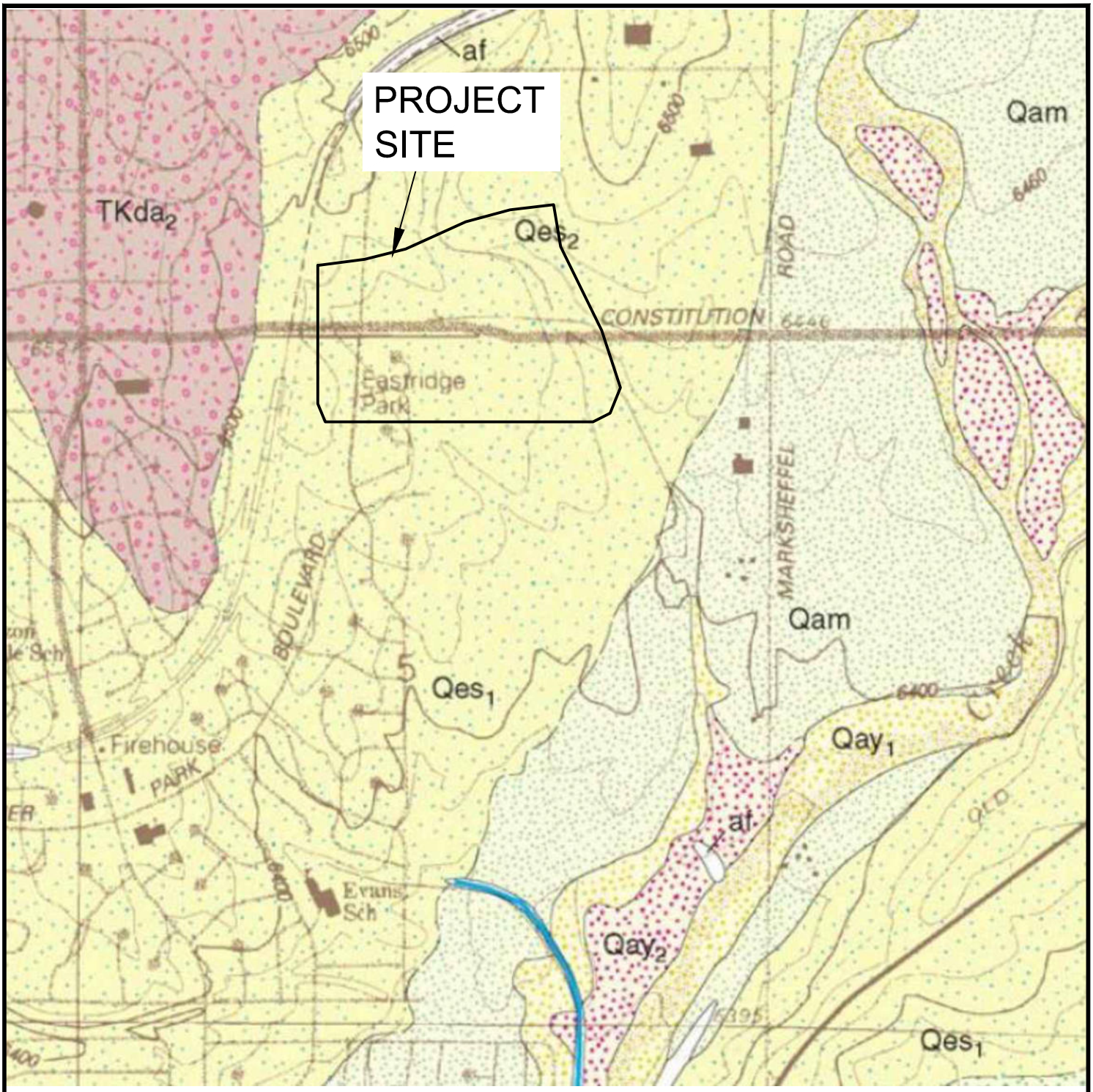
JOB NO. 242070

FIG. 4



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GEOLOGIC MAP OF THE ELSMERE QUADRANGLE

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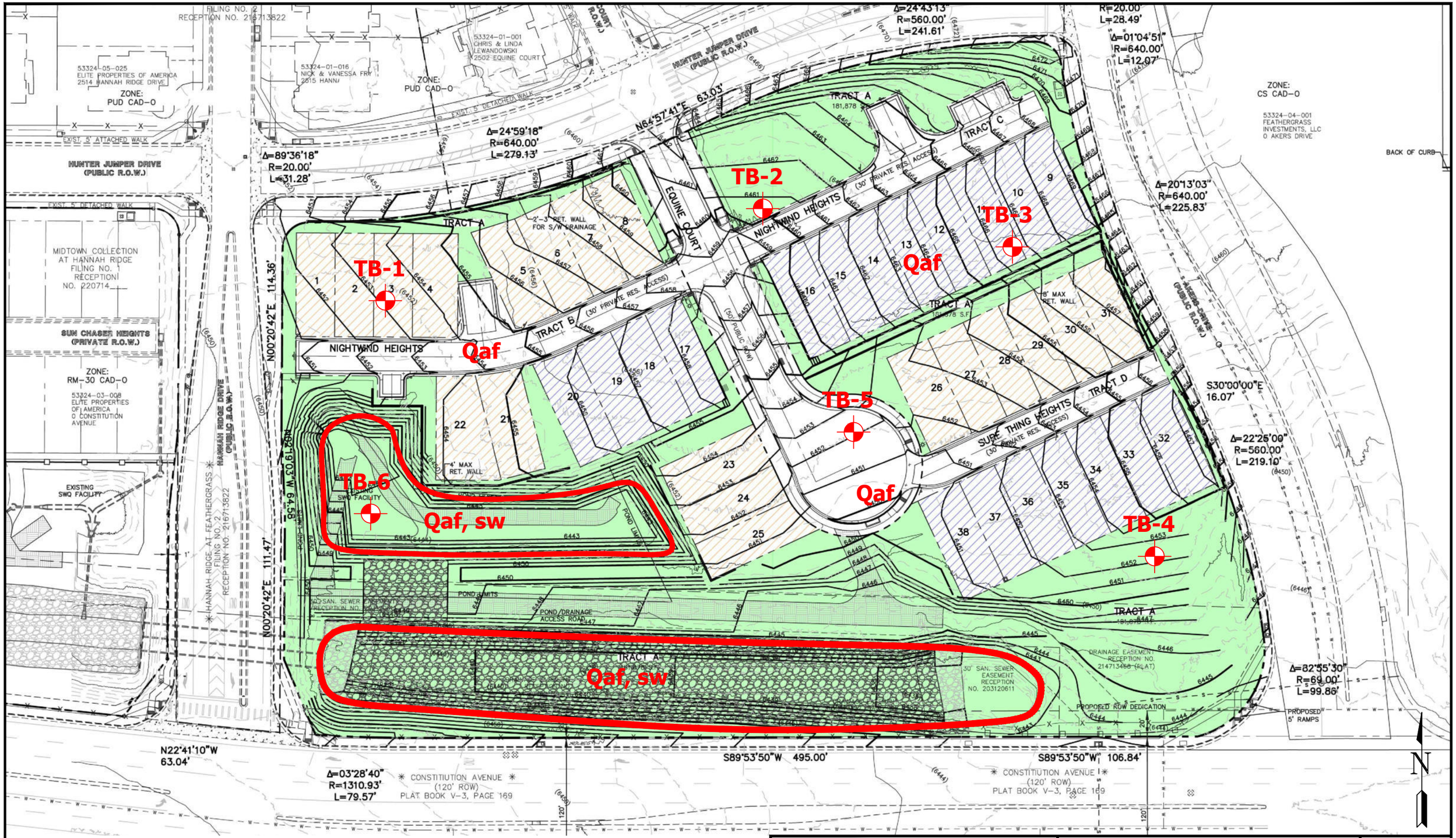
FIG. 5



Legend:

Qaf - Artificial Fill of Holocene Age:
man placed fill deposits associated with previously completed grading operations

sw - seasonally shallow groundwater area

ENTECH ENGINEERING, INC.

GEOLOGY / ENGINEERING GEOLOGY MAP

PREAMBLE AT HANNAH RIDGE FIL. NO. 3
ELITE PROPERTIES OF AMERICA, INC.

JOB NO. 242070

FIG. 6

N

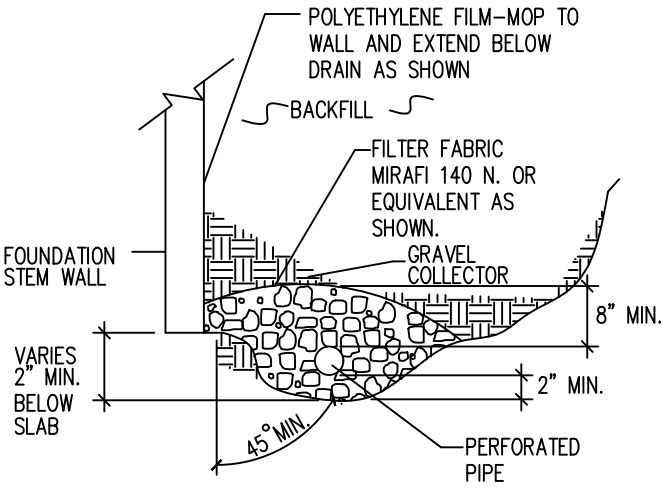
ENTECH ENGINEERING, INC.

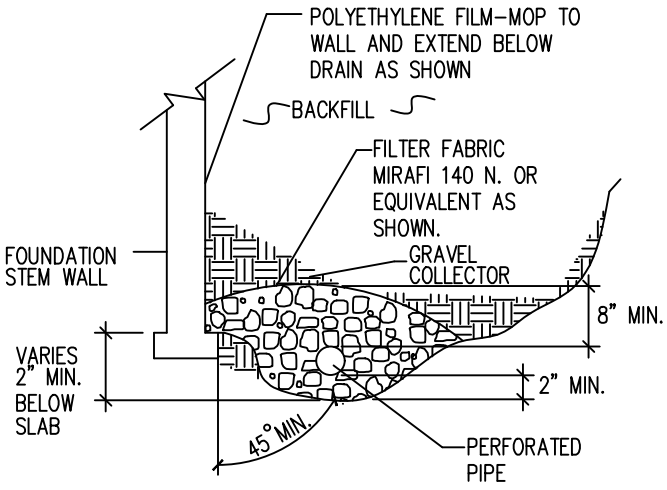
FEMA FLOODPLAIN MAP

HANNAH RIDGE FIL. NO. 3
ELITE PROPERTIES OF AMERICA, INC.

JOB NO. 242070

FIG. 7





NOTES:

–GRAVEL SIZE IS RELATED TO DIAMETER OF PIPE PERFORATIONS–85% GRAVEL GREATER THAN 2x PERFORATION DIAMETER.

–PIPE DIAMETER DEPENDS UPON EXPECTED SEEPAGE. 4–INCH DIAMETER IS MOST OFTEN USED.

–ALL PIPE SHALL BE PERFORATED PLASTIC. THE DISCHARGE PORTION OF THE PIPE SHOULD BE NON–PERFORATED PIPE.

–FLEXIBLE PIPE MAY BE USED UP TO 8 FEET IN DEPTH, IF SUCH PIPE IS DESIGNED TO WITHSTAND THE PRESSURES. RIGID PLASTIC PIPE WOULD OTHERWISE BE REQUIRED.

–MINIMUM GRADE FOR DRAIN PIPE TO BE 1% OR 3 INCHES OF FALL IN 25 FEET.

–DRAIN TO BE PROVIDED WITH A FREE GRAVITY OUTFALL, IF POSSIBLE. A SUMP AND PUMP MAY BE USED IF GRAVITY OUT FALL IS NOT AVAILABLE.

ENTECH ENGINEERING, INC.

PERIMETER DRAIN DETAIL

PREAMBLE AT HANNAH RIDGE FIL. NO. 3
ELITE PROPERTIES OF AMERICA, INC.

JOB NO. 242070

FIG. 8

APPENDIX A: Site Photographs

1

Looking west from the northwestern side of the site.

December 18, 2024

2

Looking east from the northwestern side of the site.

December 18, 2024

Job No. 242070

3

Looking west from the northeastern side of the site.

December 18, 2024

4

Looking west from the eastern side of the site.

December 18, 2024

Job No. 242070

5

Looking west along drainage from the southeastern side of the site.

December 18, 2024

6

Looking northeast from the southwestern side of the site.

December 18, 2024

Job No. 242070

APPENDIX B: Test Boring Logs

TABLE B-1

DEPTH TO GROUNDWATER & BEDROCK

TEST BORING	DEPTH TO GROUNDWATER (ft.)	DEPTH TO BEDROCK (ft.)
1	18	14
2	11.5	9
3	>20	>20
4	>20	19
5	10.5	14
6	5	9

TEST BORING 1
DATE DRILLED 1/9/2020

REMARKS

WATER @ 18', 1/14/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			14	7.3	1
5			23	7.2	1
10			15	8.2	2
15			50/10"	19.5	5
20			50/8"	21.4	5

FILL 0-6', SAND, CLAYEY to SILTY, DARK BROWN to BROWN, MEDIUM DENSE, MOIST

SAND, SILTY, BROWN, MEDIUM DENSE, MOIST

SILTSTONE, WEAK, BROWN, WEATHERED (SILT, SANDY, HARD, MOIST)

TEST BORING 2
DATE DRILLED 1/9/2020

REMARKS

WATER @ 11.5', 1/14/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			22	8.0	1
5			29	5.1	2
10			50/5"	11.9	4
15			50/3"	10.0	4
20			50/1"	10.4	4

FILL 0-4', SAND, SILTY, BROWN, MEDIUM DENSE, MOIST

SAND, SILTY, BROWN, MEDIUM DENSE, MOIST

SANDSTONE, WEAK, BROWN, WEATHERED (SAND, SILTY, VERY DENSE, MOIST)

SANDSTONE, WEAK, BLUE-GRAY, WEATHERED (SAND, SILTY, VERY DENSE, MOIST)

ENTECH ENGINEERING, INC.

TEST BORING LOGS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. B-1

TEST BORING 3
DATE DRILLED 1/9/2020

REMARKS

DRY TO 18.5', 1/14/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type	
			13	7.6	3	CLAY, SANDY, BROWN, STIFF, MOIST
5			14	10.7	3	
						SAND, SILTY, TAN, LOOSE, MOIST
10			9	9.3	2	
						SAND, CLAYEY-SILTY, BROWN, MEDIUM DENSE, MOIST
15			14	8.2	2	
20			19	19.7	2	

TEST BORING 4
DATE DRILLED 1/9/2020

REMARKS

DRY TO 18.5', 1/14/20

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

ENTECH ENGINEERING, INC.

TEST BORING LOGS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. B-2

TEST BORING 5
DATE DRILLED 1/9/2020

REMARKS

WATER @ 10.5', 1/14/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, WITH ORGANICS, BROWN, DENSE to LOOSE, MOIST			38	6.6	2
5			13	6.1	2
10			6	17.1	2
CLAYSTONE, WEAK, GRAY, WEATHERED (CLAY, SANDY, HARD, MOIST)			50/9"	13.3	5
20			50/7"	15.4	4
SANDSTONE, WEAK, GRAY, WEATHERED (SAND, CLAYEY, VERY DENSE, MOIST)					

TEST BORING 6
DATE DRILLED 1/9/2020

REMARKS

WATER @ 5', 1/14/20

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
SAND, SILTY, BROWN, LOOSE, MOIST			7	9.2	2
5			23	15.5	2
SAND, CLAYEY, BROWN, MEDIUM DENSE, MOIST					
10			50/5"	11.2	4
SANDSTONE, WEAK, BROWN, WEATHERED (SAND, CLAYEY, VERY DENSE, MOIST)					
15			50/6"	13.5	5
CLAYSTONE, WEAK, GRAY, WEATHERED (CLAY, SANDY, HARD, MOIST)					
20			50/8"	13.6	5

ENTECH ENGINEERING, INC.

TEST BORING LOGS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

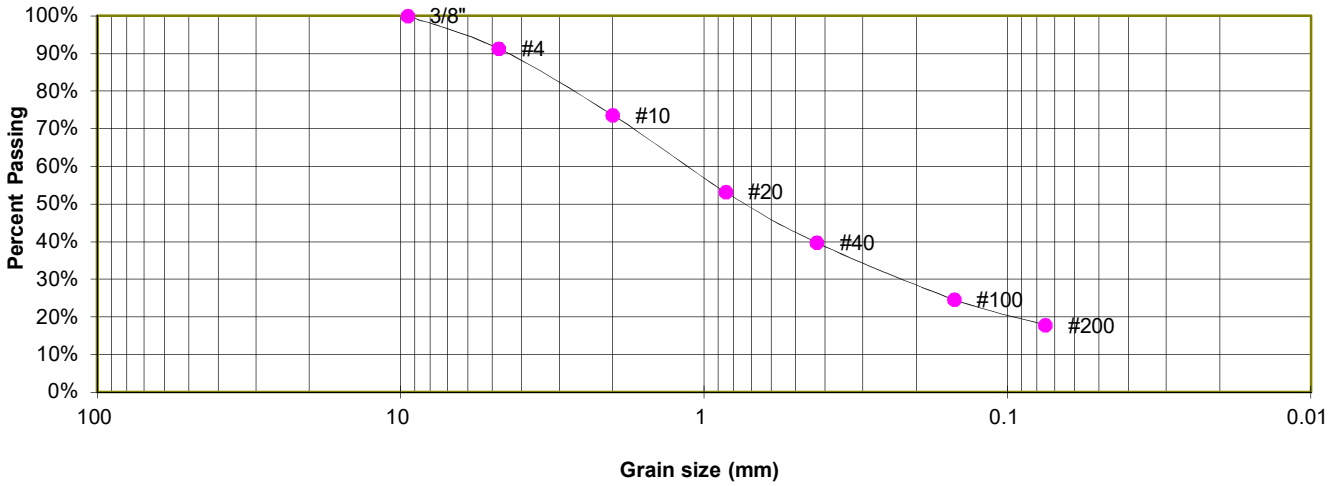
FIG. B-3

APPENDIX C: Laboratory Testing Results

TABLE C-1
SUMMARY OF LABORATORY TEST RESULTS

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/ CONSOL (%)	USCS	SOIL DESCRIPTION
1	1	2-3			17.8	29	19	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	20	7	0.00			SC-SM	SAND, CLAYEY-SILTY
2	4	5			43.4				0.00			SC	SAND, CLAYEY
3	3	2-3			61.6	31	22	9				CL	CLAY, SANDY
3	4	15	34.2	73.4	94.8	56	39	17			0.4	MH	SILT, SLIGHTLY SANDY
4	2	10			23.5	NV	NP	NP	<0.01			SM	SANDSTONE (SAND, SILTY)
4	5	20	19.3	99.9	45.4						0.3	SC	SANDSTONE (SAND, CLAYEY)
4	6	10	17.1	85.7	25.6						-2.3	SM	SANDSTONE (SAND, SILTY)
5	1	15	23.2	83.1	59.8	40	27	13	0.00		-0.3	ML	SILTSTONE (SILT, SANDY)
5	5	15			56.7							CL	CLAYSTONE (CLAY, SANDY)
5	6	20			93.0	49	33	16				ML	SILTSTONE (SILT, SLIGHTLY SANDY)

TEST BORING	1	SOIL DESCRIPTION	FILL, SAND, CLAYEY
DEPTH (FT)	2-3	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	91.3%
10	73.7%
20	53.2%
40	39.7%
100	24.7%
200	17.8%

ATTERBERG LIMITS

Plastic Limit	19
Liquid Limit	29
Plastic Index	10

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC

ENTECH ENGINEERING, INC.

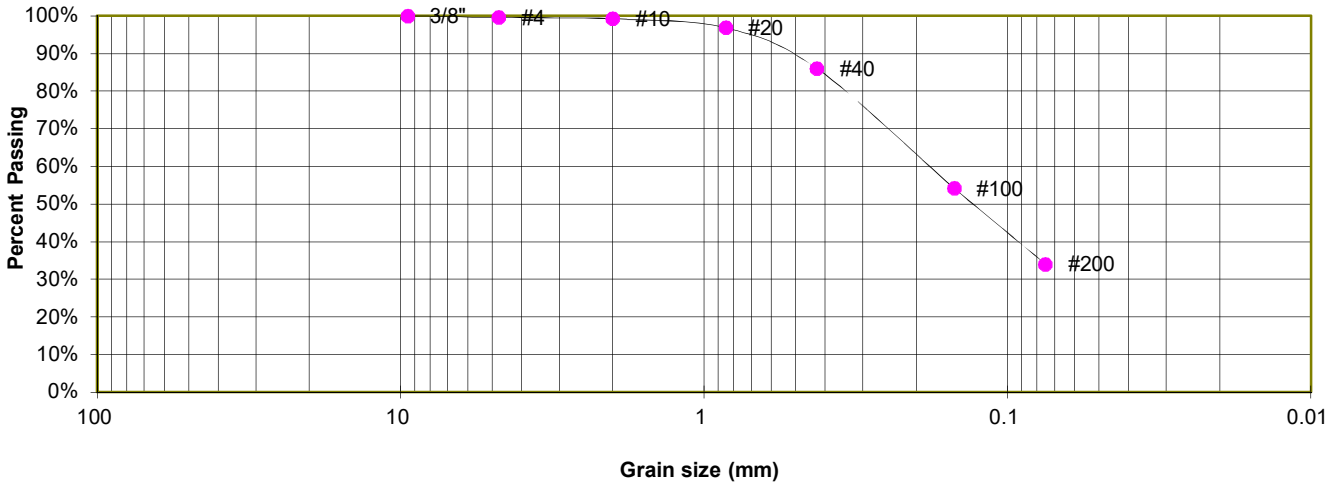
LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-1

TEST BORING	6	SOIL DESCRIPTION	FILL, SAND, CLAYEY
DEPTH (FT)	5	SOIL TYPE	1



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.6%
10	99.2%
20	96.8%
40	86.0%
100	54.3%
200	34.1%

FHA SWELL

Moisture at start	18.3%
Moisture at finish	29.5%
Moisture increase	11.2%
Initial dry density (pcf)	89
Swell (psf)	880

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC

ENTECH ENGINEERING, INC.

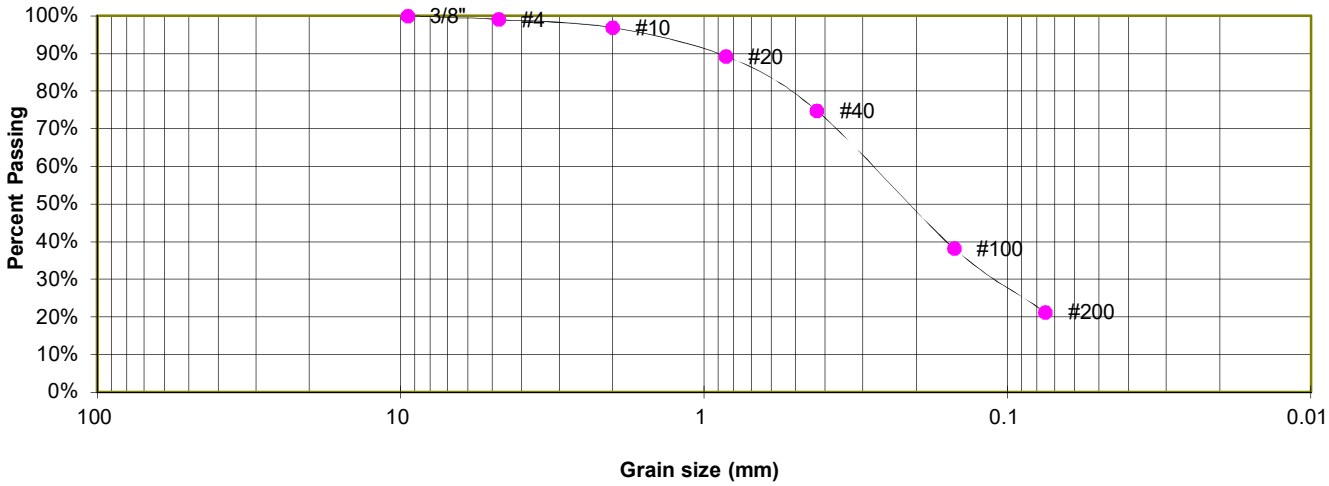
LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-2

TEST BORING	2	SOIL DESCRIPTION	SAND, SILTY
DEPTH (FT)	5	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	99.0%
10	96.9%
20	89.3%
40	74.8%
100	38.2%
200	21.3%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

ENTECH ENGINEERING, INC.

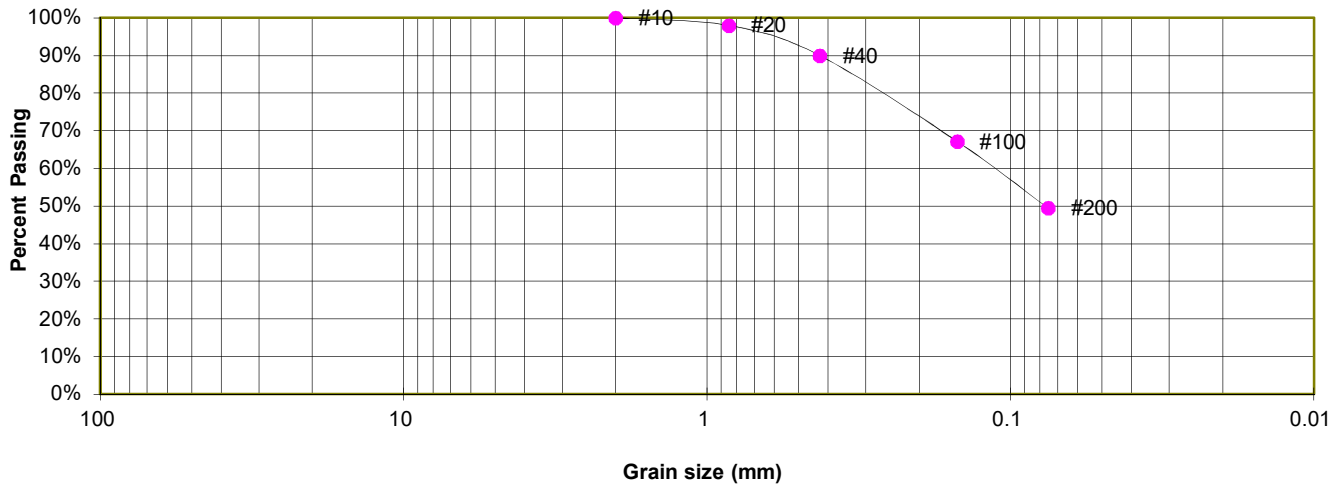
LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-3

TEST BORING	3	SOIL DESCRIPTION	SAND, CLAYEY-SILTY
DEPTH (FT)	15	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	98.0%
40	90.0%
100	67.2%
200	49.4%

ATTERBERG LIMITS

Plastic Limit	20
Liquid Limit	27
Plastic Index	7

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC-SM

ENTECH ENGINEERING, INC.

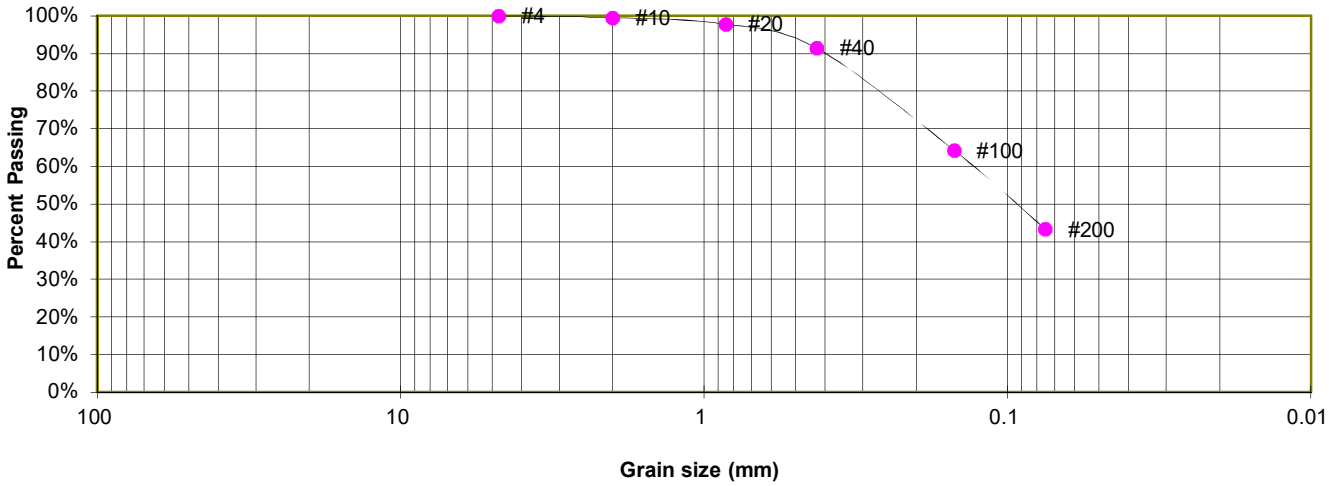
LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-4

TEST BORING	4	SOIL DESCRIPTION	SAND, CLAYEY
DEPTH (FT)	5	SOIL TYPE	2



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.5%
20	97.8%
40	91.4%
100	64.3%
200	43.4%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC

ENTECH ENGINEERING, INC.

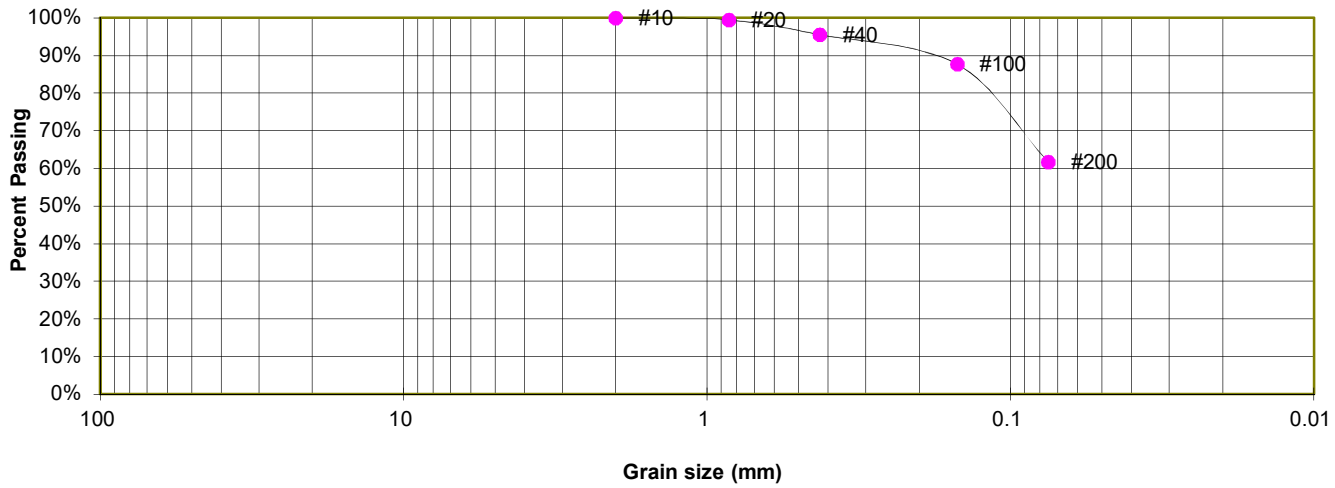
LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-5

TEST BORING	3	SOIL DESCRIPTION	CLAY, SANDY
DEPTH (FT)	2-3	SOIL TYPE	3



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	99.5%
40	95.6%
100	87.7%
200	61.6%

ATTERBERG LIMITS

Plastic Limit	22
Liquid Limit	31
Plastic Index	9

SOIL CLASSIFICATION

USCS CLASSIFICATION: CL

ENTECH ENGINEERING, INC.

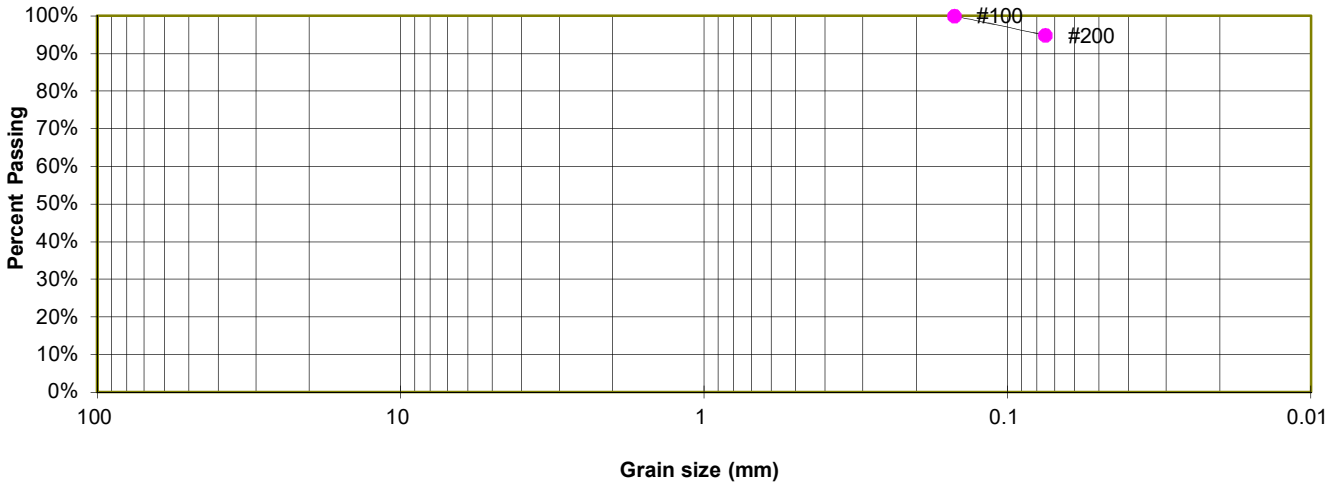
LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-6

TEST BORING	4	SOIL DESCRIPTION	SILT, SLIGHTLY SANDY
DEPTH (FT)	15	SOIL TYPE	3



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	
40	
100	100.0%
200	94.8%

ATTERBERG LIMITS

Plastic Limit	39
Liquid Limit	56
Plastic Index	17

SOIL CLASSIFICATION

USCS CLASSIFICATION: MH

ENTECH ENGINEERING, INC.

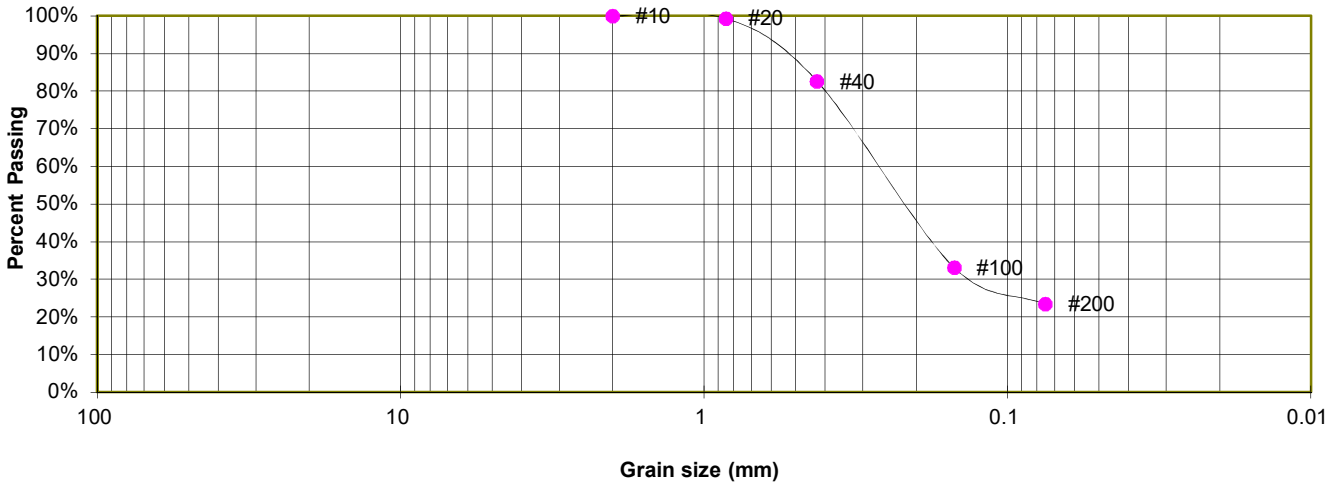
LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-7

TEST BORING	2	SOIL DESCRIPTION	SANDSTONE (SAND, SILTY)
DEPTH (FT)	10	SOIL TYPE	4



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	99.4%
40	82.7%
100	33.1%
200	23.5%

ATTERBERG LIMITS

Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

ENTECH ENGINEERING, INC.

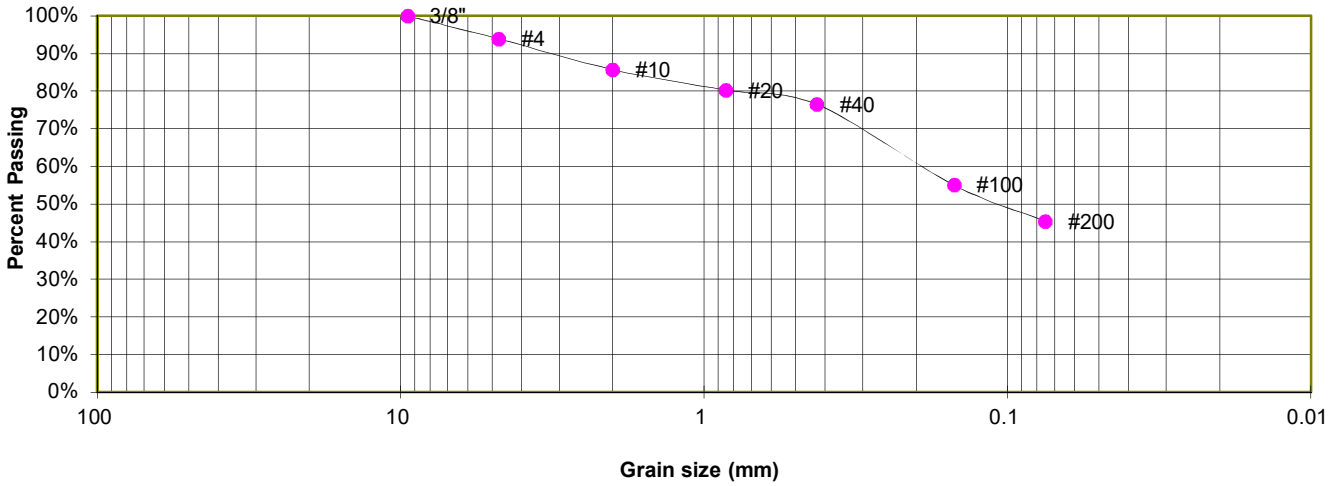
LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-8

TEST BORING	5	SOIL DESCRIPTION	SANDSTONE (SAND, CLAYEY)
DEPTH (FT)	20	SOIL TYPE	4



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	93.9%
10	85.7%
20	80.3%
40	76.5%
100	55.0%
200	45.4%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SC

ENTECH ENGINEERING, INC.

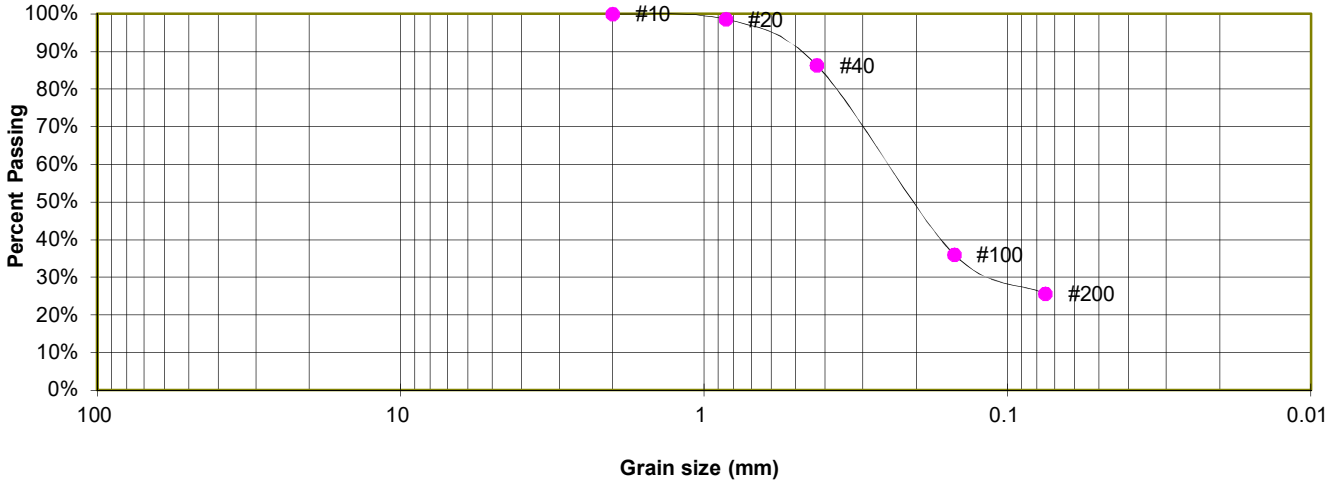
LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-9

TEST BORING	6	SOIL DESCRIPTION	SANDSTONE (SAND, SILTY)
DEPTH (FT)	10	SOIL TYPE	4



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	98.6%
40	86.3%
100	36.1%
200	25.6%

SOIL CLASSIFICATION

USCS CLASSIFICATION: SM

ENTECH ENGINEERING, INC.

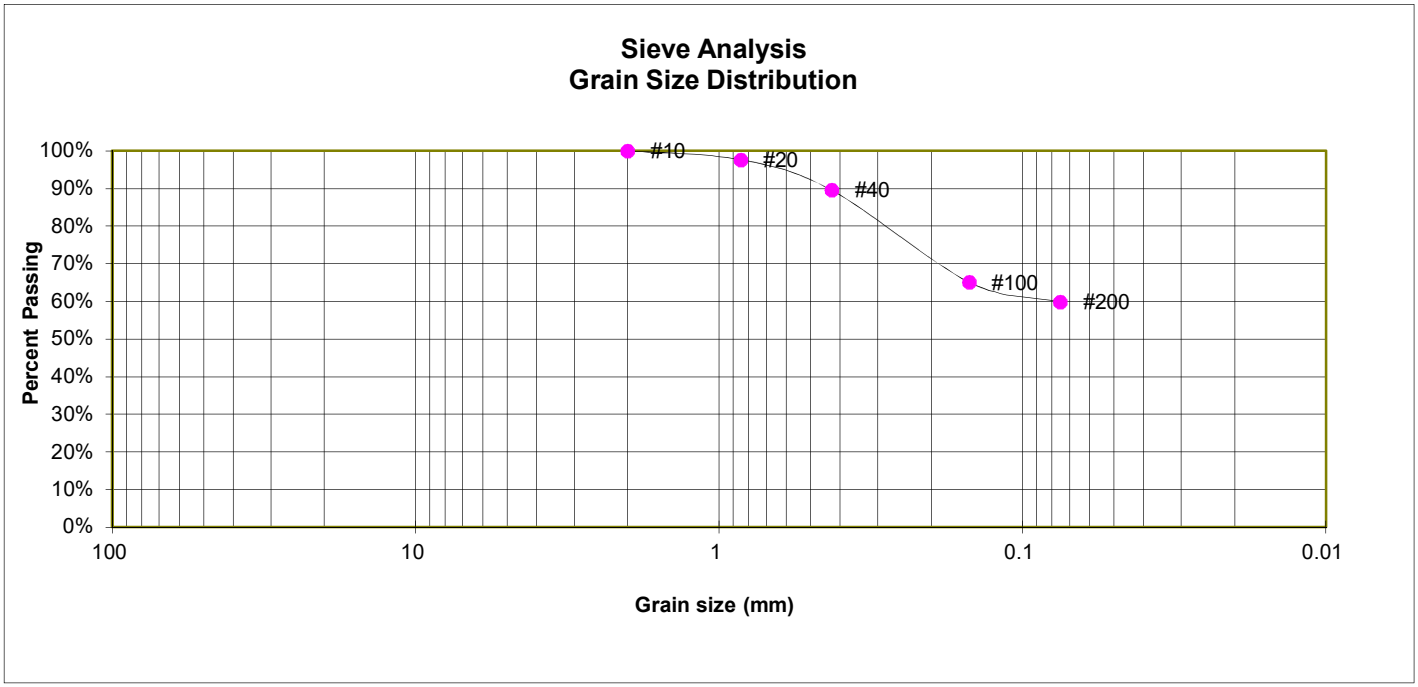
LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-10

TEST BORING	1	SOIL DESCRIPTION	SILTSTONE (SILT, SANDY)
DEPTH (FT)	15	SOIL TYPE	5



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	97.7%
40	89.5%
100	65.2%
200	59.8%

ATTERBERG LIMITS

Plastic Limit	27
Liquid Limit	40
Plastic Index	13

SOIL CLASSIFICATION

USCS CLASSIFICATION: ML

ENTECH ENGINEERING, INC.

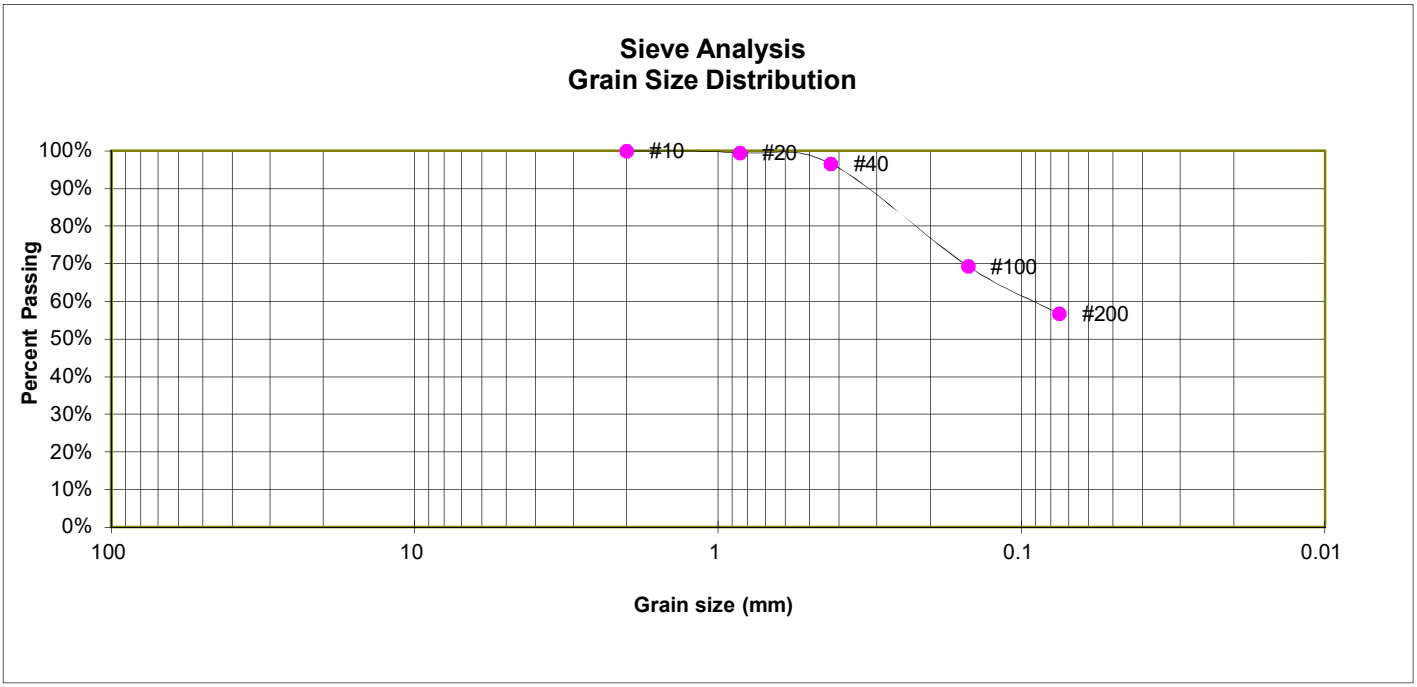
LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-11

TEST BORING	5	SOIL DESCRIPTION	CLAYSTONE (CLAY, SANDY)
DEPTH (FT)	15	SOIL TYPE	5



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	100.0%
20	99.5%
40	96.6%
100	69.3%
200	56.7%

SOIL CLASSIFICATION

USCS CLASSIFICATION: CL

ENTECH ENGINEERING, INC.

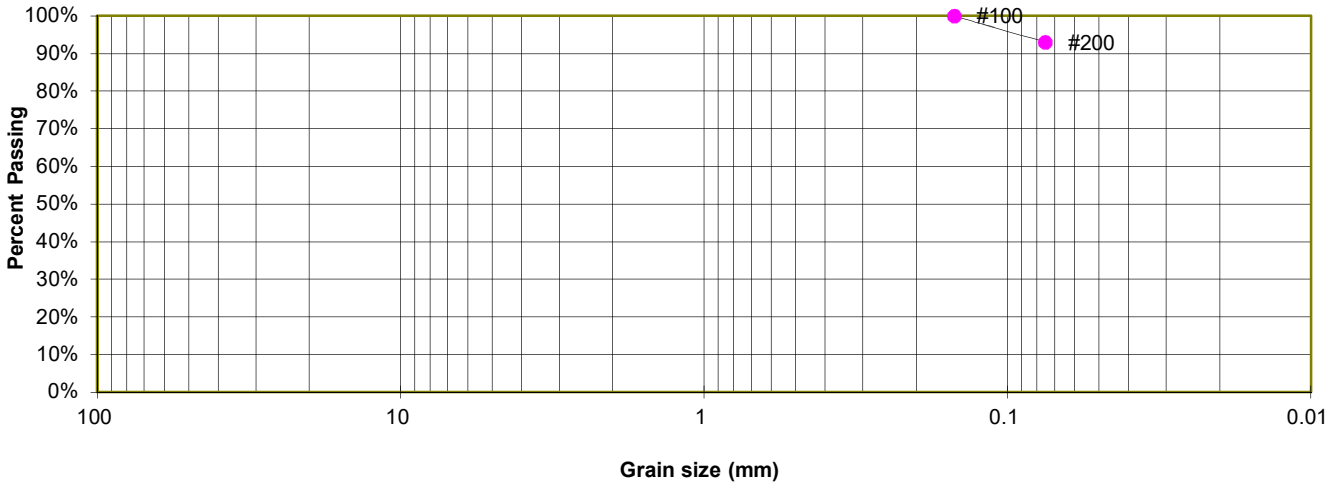
LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-12

TEST BORING	6	SOIL DESCRIPTION	SILTSTONE (SILT, SLIGHTLY SANDY)
DEPTH (FT)	20	SOIL TYPE	5



GRAIN SIZE ANALYSIS

U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	
10	
20	
40	
100	100.0%
200	93.0%

ATTERBERG LIMITS

Plastic Limit	33
Liquid Limit	49
Plastic Index	16

SOIL CLASSIFICATION

USCS CLASSIFICATION: ML

ENTECH ENGINEERING, INC.

LABORATORY TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-13

TEST BORING	4	SOIL DESCRIPTION	SILTSTONE (SILT, SLIGHTLY SANDY)
DEPTH (FT)	15	SOIL TYPE	5

SWELL/COLLAPSE TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF): 73
NATURAL MOISTURE CONTENT: 34.2%
SWELL/COLLAPSE (%): 0.4%

ENTECH ENGINEERING, INC.

SWELL TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-14

TEST BORING	5	SOIL DESCRIPTION	SANDSTONE (SAND, CLAYEY)
DEPTH (FT)	20	SOIL TYPE	4

SWELL/COLLAPSE TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF): 100
NATURAL MOISTURE CONTENT: 19.3%
SWELL/COLLAPSE (%): 0.3%

ENTECH ENGINEERING, INC.

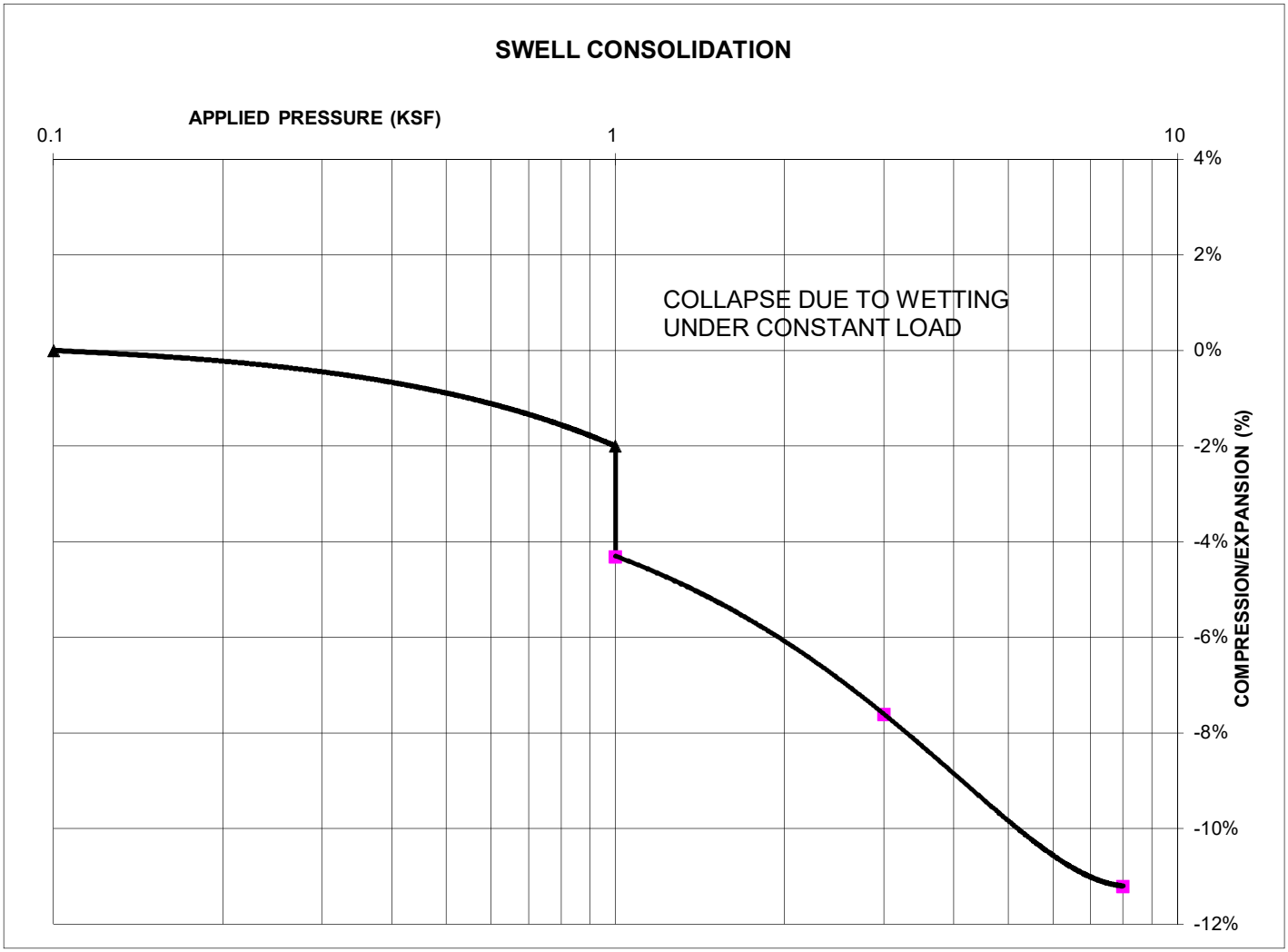
SWELL TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-15

TEST BORING	6	SOIL DESCRIPTION	SANDSTONE (SAND, SILTY)
DEPTH (FT)	10	SOIL TYPE	4



SWELL/COLLAPSE TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF): 86
NATURAL MOISTURE CONTENT: 17.1%
SWELL/COLLAPSE (%): -2.3%

ENTECH ENGINEERING, INC.

SWELL TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-16

TEST BORING	1	SOIL DESCRIPTION	SILTSTONE (SILT, SANDY)
DEPTH (FT)	15	SOIL TYPE	5

SWELL/COLLAPSE TEST RESULTS

NATURAL UNIT DRY WEIGHT (PCF):	83
NATURAL MOISTURE CONTENT:	23.2%
SWELL/COLLAPSE (%):	-0.3%

ENTECH ENGINEERING, INC.

SWELL TEST RESULTS

PREAMBLE AT HANNAH RIDGE, FILING NO. 3
ELITE PROPERTIES

JOB NO. 242070

FIG. C-17

APPENDIX D: Entech, SGS Addendum, Job No. 200006

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.

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

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.

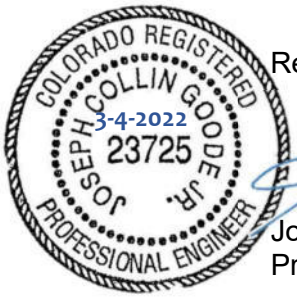
New fill should be placed in thin lifts not to exceed 6 inches after compaction while maintaining at least 95% of its maximum Modified Proctor Dry Density, ASTM D-1557. These materials should be placed at a moisture content conducive to compaction, usually 0 to ±2% of Proctor optimum moisture content. 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



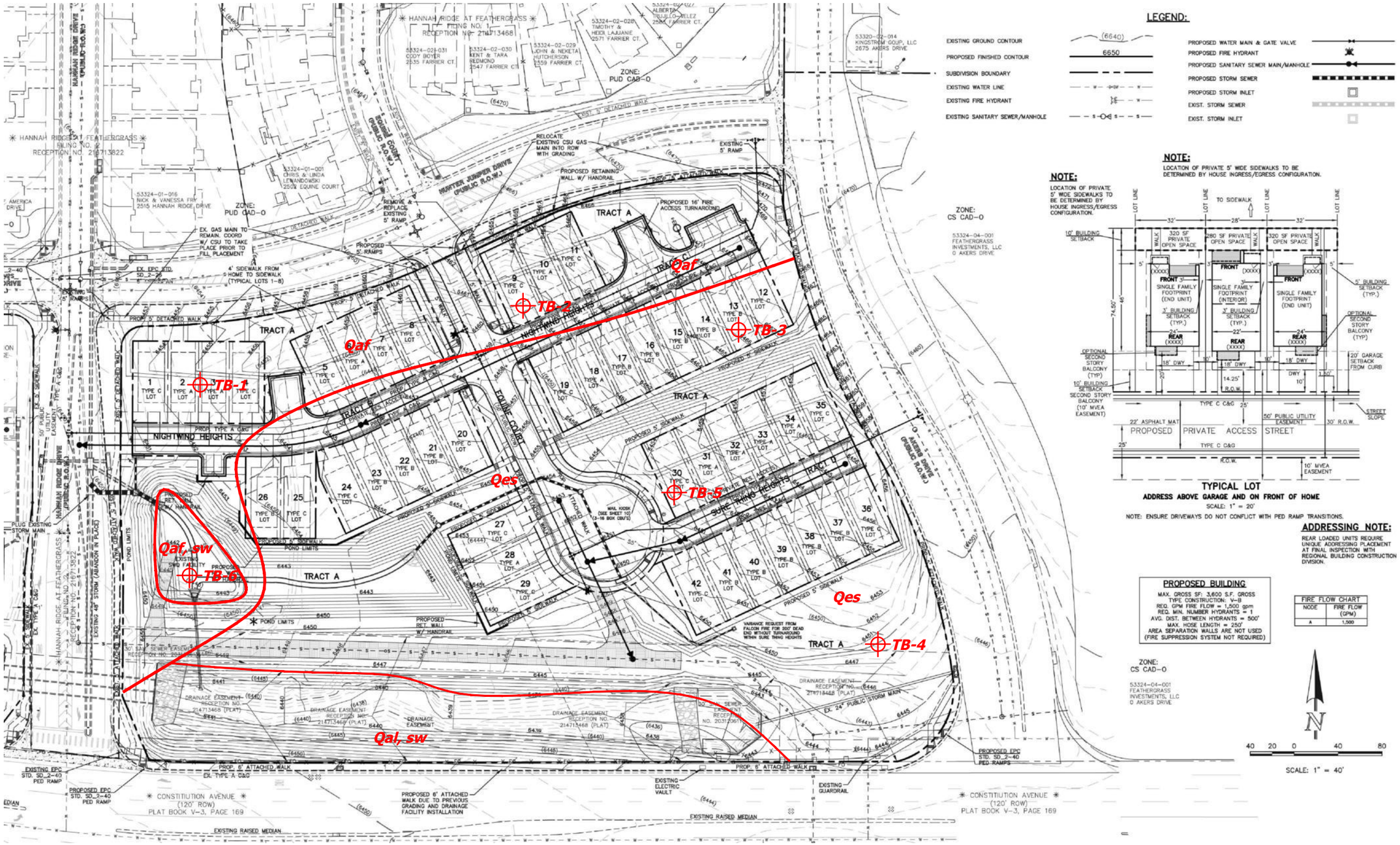
Reviewed by:

3-4-2022

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

LLL

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



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

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 (719) 531-5599
COLORADO SPRINGS, CO. 80907

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

APPENDIX E: 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: Flats, hills
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
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 content: 5 percent
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
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 22, Sep 3, 2024