GEOTECHNICAL ENGINEERING REPORT

HELOTES TOWNHOME DEVELOPMENT
FM 1560
Helotes, Texas
UES Project No. A252533
June 30, 2025

Prepared for:

WOODMONT HELOTES LOT DEVELOPMENT LLC
2100 West 7th Street
Fort Worth, Texas, 76107
Attention: Stephen Coslik & Jennifer Chatman

Prepared by:

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June 30, 2025

WOODMONT HELOTES LOT DEVELOPMENT LLC
2100 West 7th Street
Fort Worth, Texas, 76107

Attention: Stephen Coslik & Jennifer Chatman

Re: Geotechnical Engineering Report
Helotes Townhome Development
FM 1560
Helotes, Texas
UES Project No. A252533

UES has performed a geotechnical exploration for the project referenced above. This study was authorized by Stephen Coslik with Woodmont Helotes Lot Development, LLC and performed in accordance with UES Proposal No. 112924 dated May 20, 2025.

The results of this exploration, together with our recommendations, are presented in the accompanying report, an electronic copy of which is being transmitted herewith.

UES appreciates the opportunity to be of service on this project. If we can be of further assistance, such as providing materials testing services during construction, please contact our office.

Sincerely,

STATE OF TEXAS
LEE E. GURECKY
120055
LICENSED
PROFESSIONAL ENGINEER

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1.0 INTRODUCTION

Purpose and Scope. The purpose of this geotechnical study was to evaluate some of the physical and engineering properties of subsurface materials at selected locations on the subject site to develop geotechnical engineering design parameters and recommendations for the proposed project. To accomplish this, the scope of this study included field exploration consisting of drilling test borings and collecting samples of the subsurface materials, performing laboratory testing on selected samples obtained during the field exploration, performing engineering analysis and evaluation of the subsurface conditions with respect to the project characteristics, and development of geotechnical recommendations suitable for the proposed project. The scope of services did not include an environmental assessment of the site.

Limitations. Recommendations provided in this report were developed from information obtained in test borings depicting subsurface conditions only at the specific boring locations and at the particular time designated on the logs. Subsurface conditions at other locations may differ from those observed at the boring locations, and subsurface conditions at boring locations may vary at different times of the year. The scope of work may not fully define the variability of subsurface materials and conditions that are present on the site. The nature and extent of variations between borings may not become evident until construction. If significant variations then appear evident, our office should be contacted to re-evaluate our recommendations after performing on-site observations and possibly other tests.

Project Location. The project is located on FM 1560 in Helotes, Texas. The general location and orientation of the site are provided in **Appendix A – Project Location Diagram**.

Project Description. The project consists of the development of new residential townhomes. The purpose of the geotechnical study will be to provide information for use in the design of typical shallow foundations and private pavement for the proposed project. Both rigid and flexible pavements will be considered for this project.

Loading Information. Structure loading information was not available at the time of this report. We have assumed the maximum foundation loading for the structure will be up to 50 kips. *Any change in the structural loads should be brought to our attention to review the design and assess the suitability of the recommendations provided.*

Site Grading. The site grading plan was not available at the time of writing this report. Our recommendations provided herein are on the basis that cuts and fills of less than 1-foot will be required to bring the site to grade. When the site grading plan is available, we should be notified and allowed to review the site grading plan to assess and modify our recommendations, as necessary.

2.0 FIELD EXPLORATION

Test Borings. The field exploration for this project included performing a total of eight (8) test borings as summarized in the following table. Boring depths were measured from the existing ground surface at the respective boring location at time of the field exploration.

Summary of Boring Depths and Locations		
Boring Identification	Depth, feet	Location
B-01 to B-08	15	Townhome Lots

Test borings were advanced using standard rotary drilling equipment and air rotary methods to advance the borings to termination depths at the approximate locations as shown in **Appendix B - Boring Location Diagram**. The boring locations were not surveyed. UES located the borings in the field using a hand-held GPS unit with lateral accuracy of ± 20 feet. Therefore, the boring locations should be considered approximate.

Disturbed Soil Sampling. Disturbed soil samples were generally obtained using split-barrel sampling procedures in general accordance with ASTM D1586. In the split-barrel procedure, a disturbed sample is obtained in a standard 2-inch outside diameter (OD) split barrel sampling spoon driven 18 inches into the ground using a 140-pound (lb) hammer falling freely 30 inches. The number of blows for the last 12 inches of a standard 18-inch penetration is recorded as the Standard Penetration Test resistance (N-value). The N-values are recorded on the boring logs at the depth of sampling. Samples were sealed and returned to the laboratory for further evaluation and possible testing.

Groundwater Observations. A summary of groundwater observations is provided in Section 3.3.

Borehole Backfilling and Plugging. Upon completion of the borings, the boreholes were backfilled with on-site soil cuttings.

3.0 SUBSURFACE CONDITIONS

3.1 Geology

Geologic Formation. Based on our experience and a review of the Geologic Map of Texas, published by the University of Texas at Austin, Bureau of Economic Geology, has mapped the Edwards Limestone (ked) formation in the general area of the project site. The Edwards Limestone formation generally consists of limestone, dolostone, and chert. The limestone is known to be very hard particularly with the presence of brown, gray or black nodular chert (a form of flint). Blasting to facilitate excavation has sometimes been required in the Edwards Limestone formation.

Karst features such as vugs, voids, solution cavities or sinkholes are common in the Edwards Limestone formation. While many Karst features are relatively minor and consist of solution enlarged fractures or solution enlarged features following a bedding plane, some Karst features can consist of caves or cavities that can significantly impact the proposed development. Karst features that are characteristic in limestone were not encountered in our borings.

3.2 Subsurface Lithology

Stratigraphy. Descriptions of the various strata and their approximate depths and thickness per the Unified Soil Classification System (USCS) are provided on the boring logs included in **Appendix C - Boring Logs and Laboratory Results**. Terms and symbols used in the USCS are presented in Appendix C following the Boring Logs. Within the 15-foot maximum depth explored at the site, the subsurface materials generally consist of low to very high plasticity Fat Clay (CH), Clayey Sand with Gravel (SC), and Clayey Gravel with Sand (GC), generally overlying Limestone. Limestone was encountered in the borings at depths ranging from about 2 to 12 feet below the existing ground surface at this site at the time of the study. Depths referenced in this report are measured from the existing ground surface at the respective boring locations at time of the field exploration.

It should be noted that the depths provided in the above tables and on the boring logs are based on our Field Technician's and Engineer's interpretation of conditions believed to exist between actual samples retrieved. Therefore, information on the boring logs contains both factual and interpretive information. Lines delineating subsurface strata are approximate and the actual transition between strata may be gradual or not clearly defined. In addition, variations may occur between or beyond the boring locations.

3.3 Groundwater Observations

Groundwater Levels. During field exploration, no free groundwater was noted on the drilling tools or in the open borehole upon completion.

Long-term Groundwater Monitoring. Groundwater observations in this report are those that were present at the time the borings were drilled. The depth and amount of water encountered in an open borehole largely depends on the permeability of the soils and rock encountered at the boring location. In relatively impervious soils, such as clayey soils, a suitable estimate of the groundwater depths generally requires long-term monitoring. Long-term monitoring of groundwater conditions via piezometers or groundwater monitoring wells was not performed during this study and was beyond the scope of this study. Long-term monitoring can reveal groundwater levels materially different than those measured in the borings.

Groundwater Fluctuations. Subsurface groundwater fluctuations can occur. Future construction activities can alter the surface and subsurface drainage characteristics of this site. Seasonal variations, temperature, land-use, proximity to water bodies, and rainfall can also influence groundwater levels. UES recommends that the contractor verifies the groundwater elevation before construction starts.

3.4 Seismic Site Classification

The Site Class assigned for seismic design considers various factors, such as the soil profile (whether it's soil or rock), shear wave velocity, and strength, averaged over a depth of 100 feet. Since the borings didn't reach depths of 100 feet, UES made determinations under the assumption that the subsurface materials beneath the borehole bottoms resembled those encountered at the termination depth. Following the guidelines outlined in Section 1613.2.2 of the 2024 International Building Code and Table 20.2-1 in the 2022 ASCE-7, UES recommends using Site Class C (very dense soil and soft rock) for seismic design purposes at this location.

4.0 LABORATORY TESTING

UES performs visual classification and laboratory tests, as appropriate, to define pertinent engineering characteristics of the soils encountered. Laboratory tests are performed in general accordance with ASTM or other applicable standards. Test results are included at the respective sample depths on the boring logs as presented in **Appendix C - Boring Logs and Laboratory Results**. Laboratory tests and procedures performed for this geotechnical study are summarized in the following table.

Summary of Laboratory Tests and Procedures	
Test Procedure	**Description**
ASTM D4220	Standard Practices for Preserving and Transporting Soil Samples
ASTM D2487	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
ASTM D2216	Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D1140	Standard Test Methods for Amount of Material in Soils Finer than the No. 200 (75-µm) Sieve

5.0 RECOMMENDATIONS

5.1 Demolition

Applicability. Recommendations in this section apply to the removal of any existing foundations, utilities or pavement which may be present on this site.

General. Special care should be taken in the demolition and removal of existing floor slabs, foundations, utilities and pavements to minimize disturbance of the subgrade. Excessive disturbance of the subgrade resulting from demolition activities can have serious detrimental effects on planned foundation and paving elements.

Existing Foundations. Existing foundations are typically slabs, shallow footings, or drilled piers. If slab or shallow footings are encountered, they should be completely removed. If drilled piers are encountered, they should be cut off at an elevation at least 24 inches below proposed grade beams/footings or the final subgrade elevation, whichever is deeper. The remainder of the drilled pier should remain in place. Foundation elements to remain in place should be surveyed and superimposed on the proposed development plans to determine the potential for obstructions to the planned construction. UES should be contacted if drilled piers are to be excavated and removed completely. Additional earthwork activities will be required to make the site suitable for new construction if the piers are to be removed completely.

Existing Utilities. Existing utilities and bedding to be abandoned should be completely removed. Existing utilities and bedding may be abandoned in place if they do not interfere with planned development. Utilities which are abandoned in place should be properly pressure-grouted to completely fill the utility.

Backfill. Excavations resulting from the excavation of existing foundations and utilities should be backfilled in accordance with Section 5.4.6.

Other Buried Structures. Other types of buried structures (wells, cisterns, etc.) could be located on the site. If encountered, UES should be contacted to address these types of structures on a case-by-case basis.

5.2 Potential Movement of Expansive Soil

Estimated Potential Movement. Our findings indicate grade supported structures supported within 1 foot of existing grade could experience post construction movements of approximately 1 inch due to shrinking and swelling of expansive soils (active clays). For the purpose of this report, movement due to shrinking and swelling of active clays will be referred to as potential vertical movement (PVR).

Method of Estimation. PVR estimated in general accordance with methods outlined by Texas Department of Transportation (TxDOT) Test Method Tex-124-E and engineering judgment and experience. Estimated PVR calculated assuming the moisture content of the in-situ soil within the normal zone of seasonal moisture content change varies between as defined by Tex-124-E. Also, it was assumed a 1 psi surcharge load from the floor slab acts on the subgrade soils. Movements exceeding our estimates could occur if positive drainage of surface water is not maintained or if soils are subject to an outside water source, such as leakage from a utility line or subsurface moisture migration from off-site locations.

5.3 Subgrade Improvements to Maintain Expansive Soil Movements

Our findings indicate potential movements for slab-on-grade construction due to shrinking and swelling of active clays could be maintained to about 1-inch by stripping any vegetation and conducting a proof-roll, per Section 5.4.2 – Site Preparation and Proof-roll, in the building area prior to the placement of the foundation system. Upon the completion of stripping and proof-roll, the building pad can be completed by placing and compacting non-expansive fill material to the bottom of the floor slab in the building area. Criteria for select fill and flexible base as non-expansive fill material are provided in Section 5.4.6 – Fill Compaction. *Note: On-site soil may also be used as non-expansive fill material provided it meets the select fill criteria per Section 5.4.6 of this report.*

UES should be notified if grading will be different than assumed. Additional analyses and recommendations could be required.

Risk Considerations. In choosing the recommended technique for maintaining soil movements, the Client is accepting some post construction movement of grade supported structures (about 1 inch). While structures can be designed to maintain structural integrity for a given level of movement, some degree of cosmetic distress manifesting in cracks, unevenness of floor slabs, differential movements, etc. associated with about 1 inch of movement should be expected. If some level of movement and associated risk is not acceptable, it will generally be required to structurally suspend the floor slab completely above the ground surface, out of contact with the expansive soils. Recommendations for a structurally suspended floor slab can be provided upon request.

Lateral Extents of Improvement. The recommended depth of non-expansive fill should extend throughout the entire building pad, at least 3 feet horizontally beyond the perimeter of the building, and below any additional flatwork for which it is desired to reduce movements.

Subgrade Improvement at Exterior Doorways. Subgrade improvement should extend beneath sidewalk areas that abut exterior doorways to the building. Failure to perform subgrade improvement in these areas can increase the probability of differential heaving between exterior sidewalks and doorways, resulting in exterior doors that will not or have difficulty opening outward due to “sticking” caused by heaving sidewalk slabs. Sidewalks tied to pavements and other flatworks that extend beyond the subgrades treated for PVR reduction may be subjected to movements similar to those experienced for untreated subgrades.

5.4 Earthwork

Variations in subsurface conditions could be encountered during construction. To permit correlation between test boring data and actual subsurface conditions encountered during construction, it is recommended a registered Professional Engineering firm be retained to observe construction procedures and materials.

Some construction problems, particularly degree or magnitude, cannot be reasonably anticipated until the course of construction. The recommendations offered in the following paragraphs are intended not to limit or preclude other conceivable solutions, but rather to provide our observations based on our experience and understanding of the project characteristics and subsurface conditions encountered in the borings.

5.4.1 Excavation Safety Considerations

Excavation Safety. The contractor is responsible for designing any excavation slopes, temporary sheeting or shoring. Design of these structures should include any imposed surface surcharges. Construction site safety is the sole responsibility of the contractor, who shall also be solely responsible for the means, methods and sequencing of construction operations. The contractor should also be aware that slope height, slope inclination or excavation depths (including utility trench excavations) should in no case exceed those specified in local, state and/or federal safety regulations, such as OSHA Health and Safety Standard for Excavations, 29 CFR Part 1926, or successor regulations. Stockpiles should be place well away from the edge of the excavation and their heights should be controlled so they do not surcharge the sides of the excavation. Surface drainage should be carefully controlled to prevent flow of water over the slopes and/or into the excavations. Construction slopes should be closely observed for signs of mass movement, including tension cracks near the crest or bulging at the toe. If potential stability problems are observed, a geotechnical engineer should be contacted immediately. Shoring, bracing or underpinning required for the project (if any) should be designed by a professional engineer registered in the State of Texas.

5.4.2 Site Preparation and Proof-roll

Site Clearing. In the area of improvements, all concrete, trees, stumps, brush, debris, abandoned structures, roots, vegetation, rubbish and any other undesirable matter should be removed and properly disposed.

Proof-roll. Building pad and paving subgrades should be proof-rolled in accordance TX-DOT Specification Item 216 with a fully loaded tandem axle dump truck or similar pneumatic-tire equipment weighing at least 20 tons to locate areas of loose subgrade. In areas to be cut, the proof-roll should be performed after the final grade is established. In areas to be filled, the proof-roll should be performed prior to fill placement. Areas of loose or soft subgrade encountered in the proof-roll should be removed and replaced with engineered fill, moisture conditioned (dried or wetted, as needed) and compacted in place. Prior to placement of any fill, the exposed soil subgrade should then be scarified to a minimum depth of 6 inches and re-compacted as outlined in Section 5.4.6.

5.4.3 Construction Considerations

Excavation of Rock. ***Due to the existence of shallow rock / bedrock in the vicinity, it is recommended that the construction contractor address the need for rock excavation. The necessity for rock excavation and/or over excavation will depend***

on the foundation and final floor elevations design for the building. Therefore, we suggest that the ultimate site grading plans undergo a thorough review by UES before commencing construction. It is important to note that in assessing grading factors, the distribution, depth, and extent of weathered rock, as well as rock lenses or seams, may significantly fluctuate within short distances across the geological area where this site is situated.

Maintenance of Subgrade during Construction. While the exposed subgrade is expected to remain relatively stable initially, unstable conditions may arise during general construction activities, particularly if the soil is exposed to wet weather conditions and repetitive construction traffic. The use of lighter construction equipment can help minimize disturbance to the subgrade. In the event of unstable conditions, stabilization measures will be necessary. After grading is completed, it's crucial to maintain the moisture content of the subgrade before proceeding with pavement construction. Minimizing construction traffic over the finished subgrade is advisable. If the subgrade becomes frozen, desiccated, saturated, or disturbed, the affected material should either be removed or treated by scarification, moisture conditioning, and re-compaction before pavement construction begins. UES should be retained to observe earthwork and to perform necessary tests and observations during subgrade preparation.

Wet Weather/Soft Subgrade. Soft and/or wet surface soils may be encountered during construction, especially following periods of wet weather. Wet or soft surface soils can present difficulties for compaction and other construction equipment. If specified compaction cannot be achieved due to soft or wet surface soils, one of the following corrective measures will be required:

1. Removal of the wet and/or soft soil and replacement with select fill,
2. Chemical treatment of the wet and/or soft soil with Lime-fly ash or cement to improve the subgrade stability, or
3. If allowed by the schedule, drying by natural means.

Chemical treatment is usually the most effective way to improve soft and/or wet surface soils. UES should be contacted for additional recommendations if chemical treatment is planned due to wet and/or soft soils.

Fill on Existing Slopes. If fill is to be placed on existing slopes (natural or constructed) steeper than six horizontal to one vertical (6:1), the fill materials should be benched into the existing slopes in such a manner as to provide a minimum bench-key width of five (5) feet. This should provide a good contact between the existing soils and new fill materials, reduce potential sliding planes, and allow relatively horizontal lift placements.

5.4.4 Grading, Drainage and Other Considerations

Efforts should be made to minimize the excessive wetting or drying of the underlying soil, as it can lead to swelling and shrinkage of these soil layers. Standard construction practices of providing good surface water drainage should be used. A positive slope of the ground away from any foundation should be provided. Ditches or swales should be provided to carry the run-off water both during and after construction. Stormwater runoff should be collected by gutters and downspouts and should discharge away from the buildings.

In areas with pavement or sidewalks adjacent to the structure, a positive seal must be maintained between the structure and the pavement or sidewalk to minimize seepage of water into the underlying supporting soils. Post-construction movement of pavement and flatwork is common. Normal maintenance should include inspection of all joints in paving and sidewalks, etc. as well as re-sealing where necessary.

Since granular bedding backfill is used for most utility lines, the backfilled trench should not become a conduit and allow access for surface or subsurface water to travel toward the new structures. Concrete cut-off collars or clay plugs should be provided where utility lines cross building lines to prevent water from traveling in the trench backfill and entering beneath the structures.

Root systems from trees and shrubs can draw a substantial amount of water from the clay soils at this site, causing the clays to dry and shrink in excess of our estimates. This could cause settlement beneath grade-supported slabs such as floors, walks and paving. Trees and large bushes should be located a distance equal to at least one-half their anticipated mature height away from grade slabs. Lawn areas should be watered moderately, without allowing the clay soils to become too dry or too wet.

5.4.5 Groundwater Control

Groundwater was not encountered during drilling nor following completion of drilling operations in the boring locations at this site. However from our experience, shallower groundwater seepage could be encountered in excavations for foundations, utilities and other general excavations at this site. The risk of seepage increases with depth of excavation and during or after periods of precipitation. The risk of seepage is also increased where marl rock is exposed in excavations and slopes or is near final grade. Standard sump pits and pumping may be adequate to control seepage on a local basis.

If groundwater is encountered during excavation, dewatering to bring the groundwater below the bottom of excavations may be required. Dewatering could consist of standard sump pits and pumping procedures, which may be adequate to control seepage on a local basis during excavation. Supplemental dewatering will be required in areas where standard sump pits and pumping is not effective. Supplemental dewatering could include submersible pumps in slotted casings, well points, or eductors. For supplemental dewatering, the contractor should submit a groundwater control plan, prepared by a licensed engineer experienced in that type of work.

5.4.6 Fill Compaction

Select Fill. Select fill used as non-expansive fill should consist of soil with a liquid limit of 35 or less and a Plasticity Index between 5 and 15. The select fill should be placed in loose lifts not exceeding 8-inches and should be compacted to at least 95 percent maximum dry density (per ASTM D-698) at a moisture content between optimum and 4 percent above optimum moisture content. The plasticity index and liquid limit of material used as select non-expansive material should be routinely verified during placement using laboratory tests. Visual observation and classification should not be relied upon to confirm the material to be used as select, non-expansive material satisfies the required Atterberg-limit criteria.

Flexible Base Material. Flexible base material used as non-expansive material in the building pad should consist of material meeting the requirements of TxDOT Standard Specifications Item 247, Type A or D, Grade 1-2 or 3. The flexible base should be compacted to at least 98 percent of standard Proctor maximum dry density (ASTM D 698) and within the range of 2 percentage points below to 2 percentage points above the material's optimum moisture content.

General Fill. General fill may be placed in improved areas outside of building pad areas. General fill should consist of material approved by the Geotechnical Engineer with a liquid limit less than 50. General fill should be placed in loose lifts not exceeding 8 inches and should be uniformly compacted to a minimum of 95 percent maximum dry density (per ASTM D-698) and within ±2 percent of the optimum moisture content. The subgrade to receive general fill should be scarified to a depth of 6 inches and compacted to at least 95 percent maximum dry density (per ASTM D-698) and at a moisture content between optimum and 4 percent above optimum moisture content.

Fill Restrictions. Non-Expansive fill and general fill should consist of those materials meeting the requirements stated. Fill soils should not contain material greater than 4 inches in any direction, debris, vegetation, waste material, environmentally contaminated material, or any other unsuitable material.

Fill Compaction Testing Guidelines. Field compaction and classification tests should be performed by UES. Compaction tests should be performed in each lift of the compacted material. We recommend the following minimum soil compaction testing be performed: one test per lift per 2,500 SF (with a minimum of two tests per lift) in the area of the building pad, one test per lift per 5,000 SF outside the building pad, and one test per lift per 100 linear feet of utility backfill. If the materials fail to meet the density or moisture content specified, the course should be reworked as necessary to obtain the specified compaction. Classification confirmation inspection/testing should be performed daily on select fill materials (whether on-site or imported) to confirm consistency with the project requirements. The testing frequency recommended herein can be altered (increased or decreased) at the discretion of the geotechnical engineer of record.

5.4.7 Utilities

Bedding. Pipe bedding and pipe-zone backfill for underground utilities should meet the requirements of the pipe manufacturer. If no manufacturer requirement exists, then pipe bedding should be placed in accordance with applicable municipal or TxDOT requirements. Unless specified otherwise, the pipe-zone generally consists of all materials surrounding the pipe in the trench from six (6) inches below the pipe to 12 inches above the pipe. Since granular bedding backfill is used for most utility lines, the backfilled trench should not become a conduit and allow access for surface or subsurface water to travel toward the new structure. Concrete cut-off collars or clay plugs should be provided where utility lines cross building lines to prevent water from traveling in the trench backfill and entering beneath the structure. At least 1 foot of soil cover should exist between concrete plugs and structural elements. Local municipality or jurisdiction take precedence over pipe bedding recommendations herein.

Backfill. The trench backfill for utilities should be properly placed and compacted as outlined in Section 5.4.6 and in accordance with requirements of local City standards. Utility backfill in the building pad should be placed in accordance with applicable requirements for the building pad.

Trench Settlement. Even if fill is properly compacted, fills in excess of about 10 feet are still subject to settlements over time of up to about 1 to 2 percent of the total fill thickness. This should be considered when designing pavement over utility lines and/or other areas with deep fill. Where utility lines are deeper than 10 feet, the fill/backfill below 10 feet should be compacted to at least 100 percent of standard Proctor maximum dry density (ASTM D 698) and within –2 to +2 percentage points of the material's optimum moisture content. The portion of the fill/backfill shallower than 10 feet should be compacted as previously outlined. Density tests should be performed on each lift (maximum 12-inch thick) and should be performed as the trench is backfilled. Local municipality or jurisdiction take precedence over trench backfill recommendations herein.

Trench Excavation. If utility trenches or other excavations extend to a depth of 5 feet or more below construction grade, the contractor or others shall be required to develop an excavation safety plan to protect personnel entering the excavation or excavation vicinity. The collection of specific geotechnical data and the development of such a plan, which could include designs for sloping and benching or various types of temporary shoring, is beyond the scope of this study. Any such designs and safety plans shall be developed in accordance with current OSHA guidelines and other applicable industry standards.

5.4.8 Deep Fill Considerations

Deep Fill Compaction. Fills placed deeper than 10 feet should be compacted to at least 100 percent of standard Proctor maximum dry density (ASTM D 698) and within –2 to +2 percentage points of the material's optimum moisture content. The portion of the fill/backfill shallower than 10 feet should be compacted as previously outlined. Density tests should be performed on each lift (maximum 12-inch thick) and should be performed as the trench is backfilled.

Deep Fill Settlement. Even if fill is properly placed and compacted as recommended herein, fills more than about 10 feet deep can still settle about 1 to 2 percent of its thickness due to its own weight, independent of external loads. This settlement generally begins as soon as lift placement begins. However, settlement can still occur for a period of time after completion of fill placement. The time required for settlement to occur is a function of soil type, pore water, and drainage path conditions and can vary widely. As a result, some fill-related settlement should be expected before and after final lifts are placed. Movement of grade supported structures (foundations, flatwork, etc.) related to settling fill can be reduced by allowing as much time as possible between the time the fill placement is completed and construction of the grade supported structure. If this risk of post construction settlement of deep fills is not acceptable, survey monitoring of constructed fills can be performed to evaluate the rate and magnitude of settlement prior to construction of structures on the fill. UES can provide this service if desired.

5.5 Building Foundation System

Appropriate Foundation Types. A slab on grade foundation is appropriate to the project and site based on the geotechnical conditions encountered:

Foundation Determination. Foundation loading assumptions used in preparation of the following recommendations are summarized in Section 1.0. ***Final determination of the foundation type to be utilized for this project should be made by the Structural Engineer based on loading, economic factors and risk tolerance.***

Foundations Adjacent to Slopes. ***Foundations placed too close to adjacent slopes steeper than 5H:1V may experience reduced bearing capacities and/or excessive settlement. Recommendations provided herein assume foundations are not close enough to adjacent slopes in excess of 5H:1V to be detrimentally affected. Therefore, foundations closer than 5 times the depth of adjacent slopes, pits, or excavations in excess of 5H:1V should be brought to UES's attention to review the appropriateness of our recommendations.***

Design Applicability. The following foundation design recommendations are based on project information discussed in Section 1.0.

Foundation Plan Review. UES should be provided with final foundation plans, details and related structural loads, with adequate time to review, prior to finalizing the design to verify conformance with recommendations presented herein.

5.5.1 Slab Foundation

The proposed structure can be supported on a reinforced ground-supported slab foundation provided that recommendations in Section 5.3 – Subgrade Improvements to

Maintain Expansive Soil Movements are followed. The slab foundation should be conventionally reinforced or post-tension reinforced. The slab foundation should be designed with exterior and interior grade beams adequate to provide sufficient rigidity to the foundation system to sustain the vertical soil movements expected at this site as described above. All grade beams and floor slabs should be adequately reinforced with steel to minimize cracking as normal movements occur in the foundation soils.

Bearing Capacity. The slab should be designed using a net allowable bearing pressure of 2,000 psf. This bearing pressure is based on a safety factor of 3 against shear failure of the foundation bearing soils.

Foundation Depth. Grade beams should bear at a minimum depth of 18 inches below surrounding grade (supported on native soils or select fill). The bottom of the beam trenches should be free of any loose or soft material prior to the placement of the concrete.

Geometry. Grade beams should have a minimum width of 10 inches to reduce the potential for localized shear failure.

PTI Recommendations. A slab constructed on-grade will be subject to potential slab movements of about 1 inch or less based upon the information gathered during this study. The recommended foundation design parameters based on information published in the Post Tensioning Institute (PTI) Design of Post-Tensioned Slabs-on-Ground, 3rd Edition, are as follows:

Allowable PVR in Inches (per Structural Engineer)	Foundation Design Parameters per PTI 3rd Edition			
	Edge Moisture Variation Distance (feet)		Differential Soil Movement (inches)	
	Center Lift	Edge Lift	Center Lift	Edge Lift
1	8.7	4.5	1.0	1.2

IMPORTANT: The above foundation design parameters assume the suggested subgrade improvement recommendations provided in Section 5.3 – Subgrade Improvements to Maintain Expansive Soil Movements have been performed. The recommended foundation design parameters are applicable to climate controlled soil conditions only. These parameters are not applicable when non-climate related factors, such as vegetation, landscaping, trees, drainage, construction methods, land use, or other factors, may influence soil movement. UES should be contacted to evaluate the effect of non-climate related factors.

Construction and Observation. The foundation excavations should be observed by a representative of UES prior to steel or concrete placement to assess that the foundation materials are capable of supporting the design loads and to identify the acceptability of the select fill materials under the beams and footings.

Soft or loose zones encountered at the bottom of the beam or footing excavations should be removed to the level of competent materials as directed by the Geotechnical Engineer.

Cavities formed as a result of excavation of soft or loose zones should be backfilled with properly compacted select fill.

After opening, beam and footing excavations should be observed, and concrete placed as quickly as possible to avoid exposure of the beam and footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond. If it is required that beam and footing excavations be left open for an extended period, they should be protected to reduce evaporation or entry of moisture.
Slight differential movements of slab-on-grade foundations can cause distress to interior wall partitions, brittle floor coverings and rigid exterior facades resulting in cosmetic damage. The magnitude of movement can be reduced with good construction practices including performing the recommended preparation of the subgrade, compaction of the select fill building pad materials and maintaining the integrity of the beam and footing excavations prior to concrete placement. Placement of closely spaced expansion joints in rigid brick exterior walls is recommended to control the location of potential cracks that may occur due to slight differential foundation movements.

5.6 Pavement

General. Recommendations for rigid and flexible pavement and preparation of the pavement subgrade are provided in the following sections. A traffic study indicating the number and type of vehicles on which to base the pavement design was not provided. Therefore, our recommendations are based upon our experience with similar projects assuming normal vehicular loading. **Any unusual loading conditions (e.g., heavy forklifts) should be brought to our attention prior to finalizing the pavement design so that we may assess and modify our recommendations as necessary.**

Civil and Drainage Consideration. **Pavement design is the responsibility of the project Civil Engineer.** We have recommended preliminary pavement sections based on geotechnical information and assumed traffic information in accordance with the American Association of State Highway and Transportation Officials (AASHTO) Guidelines for Design of Pavement Structures dated 1993. According to AASHTO design methodology, the pavement design thickness considers pavement performance, traffic, subgrade soils, pavement materials, environment, drainage and reliability. The applicability of our assumptions should be reviewed and approved by the project Civil Engineer before the pavement section is finalized. The recommended pavement sections assume good drainage quality prevails over the life of the pavement and that the pavement subgrade is exposed to moisture levels approaching saturation less than 25 percent of the time. Good drainage is defined by AASHTO as "the ability to remove water from the pavement within one (1) day". Therefore, it is critical that the project Civil Engineer provide appropriate pavement drainage design to assure validity of the assumed drainage conditions.

5.6.1 Pavement Subgrade

The pavement subgrade can be re-compacted and should be placed in loose lifts not exceeding 8 inches and should be uniformly compacted to a minimum of 95 percent maximum dry density (per ASTM D-698) and between optimum and 4 percent above optimum moisture content.

It is recommended the subgrade preparation extend at least 1 ft beyond the edge of the pavement to reduce the effects of seasonal shrinking and swelling upon the extreme edges of pavement. Also, the curb should be constructed such that the base of the curb extends at least 6-inches into the pavement subgrade. Good perimeter surface drainage with a minimum slope of 2-percent away from the pavement is recommended. Normal maintenance should be expected over the life of the pavement structures.

5.6.2 Rigid Pavements

Portland cement concrete (PCC) with a minimum 28-day compressive strength of 4,000 pounds per square inch (psi) should be utilized for rigid pavement. Grade 60 reinforcing steel should be utilized in the transverse and longitudinal directions. The following pavement thicknesses and reinforcing are recommended:

Rigid Pavement Design			
Paving Use	**Concrete Thickness (inches)**	**Re-Compacted Subgrade Thickness (inches)**	**Reinforcing**
Parking Areas for Automobiles and Light Trucks	6.0	6.0	No. 4 bars spaced on 22-inch intervals
Fire Lane and Drive Lanes and Areas Subjected to Light to Medium Trucks	7.0	6.0	No. 4 bars spaced on 18-inch intervals
Note: 1. Recommended pavement reinforcement is in accordance with ACI guidelines. 2. Pavement subgrade should be re-compacted per section 5.6.1			

Pavement Joints. Contraction joints should be spaced at about 25 times the pavement thickness up to a maximum of 15 feet in any direction. Saw cut control joints should be cut within 6 to 12 hours of concrete placement. ACI recommendations indicate that regularly spaced expansion joints may be deleted from concrete pavements. Therefore, the installation of expansion joints is optional and should be evaluated by the Civil Engineer. Dowels should have a diameter equal to $^{1}/_{8}$ the slab thickness, be spaced on 12-inch intervals, and be embedded at least 9 inches. Appropriate joint sealant is recommended to keep water from saturating the pavement subgrade and to prevent the introduction of incompressible material into the joints. Routine monitoring and maintenance of joint sealants are recommended. Where not specified herein, concrete pavement should comply with Texas Department of Transportation (TxDOT) Standard Specifications, Item 360, "Concrete Pavement", or local equivalent.

5.6.3 Flexible Pavements

General. Flexible asphaltic pavements subjected to soil-related shrinking and swelling do not perform as well as rigid pavements. As a result, the lifespan of flexible asphaltic pavement can be reduced substantially when compared to rigid pavement. The need for increased maintenance of flexible asphaltic pavements should be considered prior to its selection. The following Hot Mix Asphalt (HMA) paving sections are recommended:

Flexible Pavement Design				
Paving Use	**Asphalt Thickness (inches)**	**Aggregate Base Thickness (inches)**	**Geogrid**	**Re-Compacted Subgrade Thickness (inches)**
Parking Areas for Automobiles and Light Trucks	2.0	8.0	HX-5.5	6.0
Fire Lane and Drive Lanes and Areas Subjected to Light to Medium Trucks	2.5	10.0	HX-5.5	6.0
Note: 1. Pavement subgrade should be re-compacted per section 5.6.1				

Asphaltic concrete pavement should comply with TxDOT Standard Specifications, Item 340, “Dense-Graded Hot-Mix Asphalt (Method)”, or local equivalent. The flexible base course should comply with TxDOT Standard Specifications, Item 247, Grade 1-2, Type A or D, “Flexible Base”, or equivalent.

It is recommended that geogrid be placed beneath the base material and on top of the compacted subgrade. Geogrid should be Tensar HX-5.5 and should be overlapped in accordance with the manufacturer’s recommendations. Geogrid will significantly improve the long-term performance of the pavements and reduce cracking.

If alternate geogrid products are desired for use, additional base material thickness will apply, and UES should be contacted for the specific recommendations. If a direct substitution with an alternate geogrid is proposed by the local geogrid distributor, the geogrid should come with a pavement design specific for the site that is sealed by a licensed professional engineer in the state of Texas and the pavement design shall supersede the pavement recommendations provided herein.

6.0 LIMITATIONS/GENERAL COMMENTS

As with any geotechnical engineering report, this report presents technical information and provides detailed technical recommendations for civil and structural engineering design and construction purposes. UES, by necessity, has assumed the user of this document possesses the technical acumen to understand and properly utilize the information and recommendations provided herein. UES strives to be clear in its presentation and, like the user, does not want potentially detrimental misinterpretation or misunderstanding of this report. Therefore, we encourage any user of this report with questions regarding its content to contact UES for clarification. Clarification will be provided verbally and/or issued by UES in the form of a report addendum, as appropriate.

Professional services provided in this geotechnical exploration were performed, findings obtained, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. The scope of services provided herein does not include an environmental assessment of the site or investigation for the

presence or absence of hazardous materials in the soil, surface water or groundwater. UES, upon written request, can be retained to provide these services.

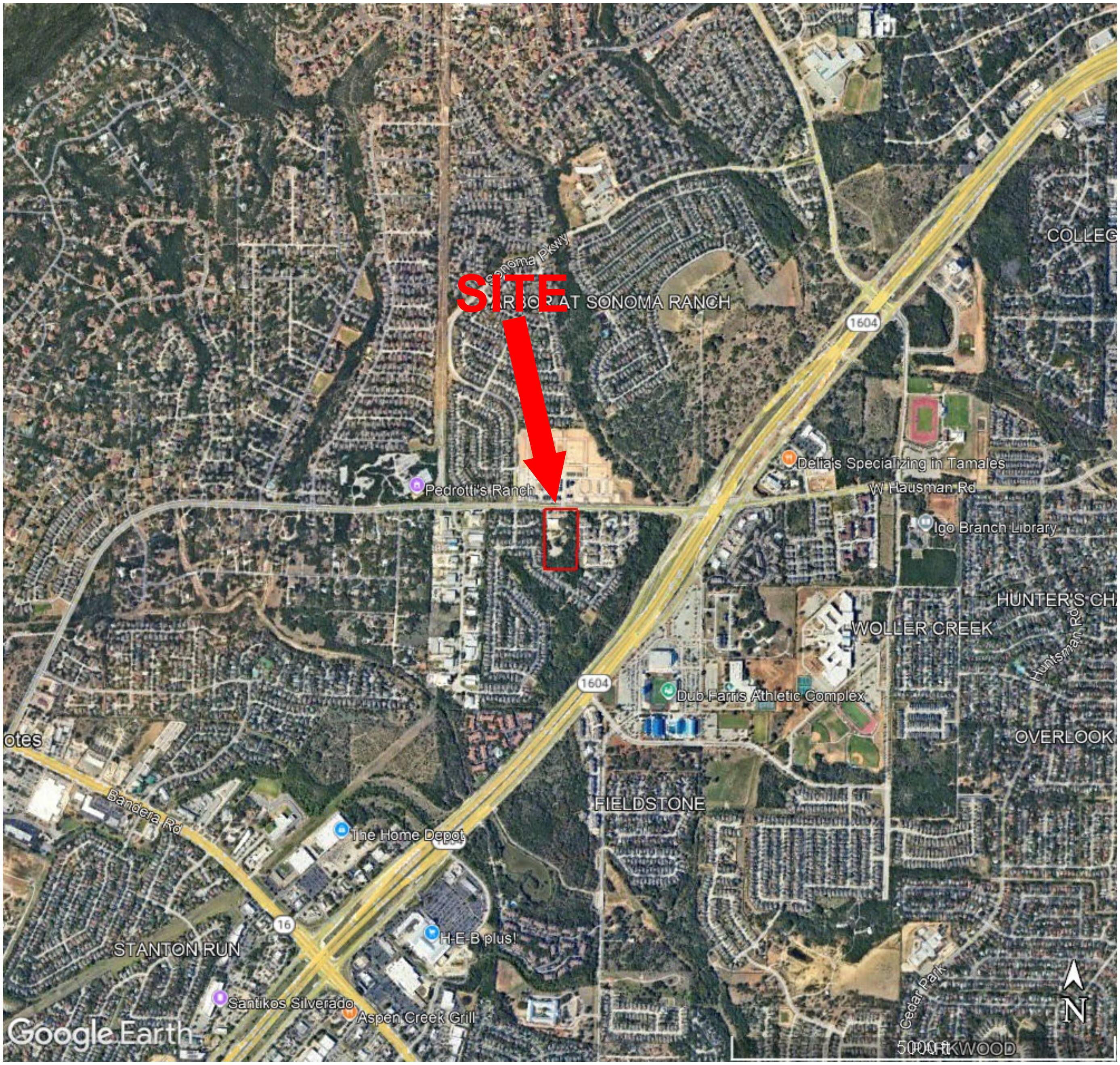
UES is not responsible for conclusions, opinions or recommendations made by others based on this data. Information contained in this report is intended for the exclusive use of the Client (and their designated design representatives), and is related solely to design of the specific structures outlined in Section 1.0. No party other than the Client (and their designated design representatives) shall use or rely upon this report in any manner whatsoever unless such party shall have obtained UES's written acceptance of such intended use. Any such third party using this report after obtaining UES's written acceptance shall be bound by the limitations and limitations of liability contained herein, including UES's liability being limited to the fee paid to it for this report. Recommendations presented in this report should not be used for design of any other structures except those specifically described in this report. In all areas of this report in which UES may provide additional services if requested to do so in writing, it is presumed that such requests have not been made if not evidenced by a written document accepted by UES. Further, subsurface conditions can change with passage of time. Recommendations contained herein are not considered applicable for an extended period of time after the completion date of this report. It is recommended our office be contacted for a review of the contents of this report for construction commencing more than one (1) year after completion of this report. Non-compliance with any of these requirements by the Client or anyone else shall release UES from any liability resulting from the use of, or reliance upon, this report.

Recommendations provided in this report are based on our understanding of information provided by the Client about characteristics of the project. If the Client notes any deviation from the facts about project characteristics, UES should be contacted immediately since this may materially alter the recommendations. Further, UES is not responsible for damages resulting from workmanship of designers or contractors. It is recommended the Owner retain qualified personnel, such as a Geotechnical Engineering firm, to verify construction is performed in accordance with plans and specifications.

APPENDIX A - Project Location Diagram

PROJECT LOCATION DIAGRAM

LOCATION IS APPROXIMATE



HELOTES TOWNHOME DEVELOPMENT

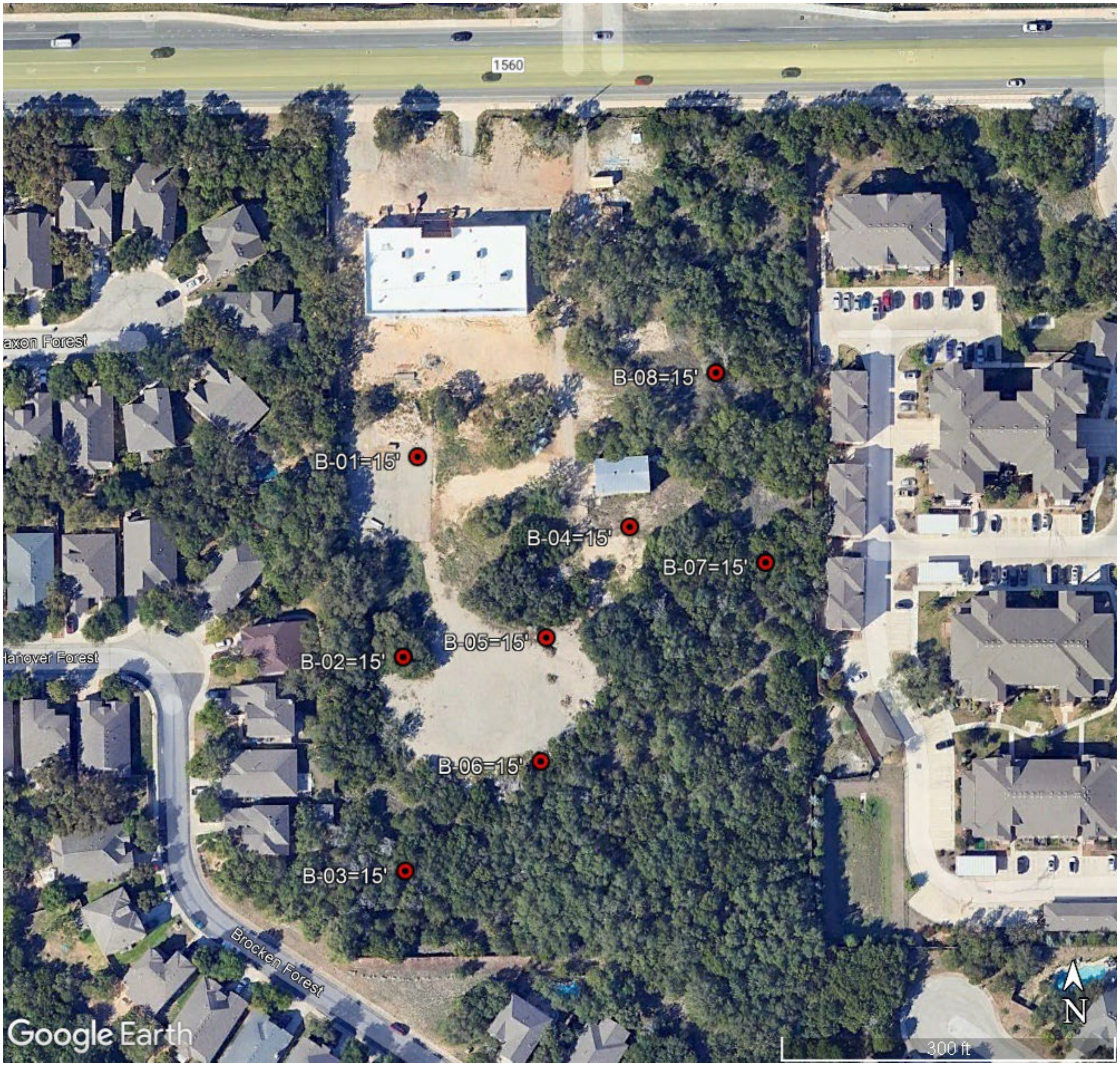
The Woodmont Company — FM 1560

UES Project No.: A252533 — Helotes, Texas

APPENDIX B - Boring Location Diagram

BORING LOCATION DIAGRAM

LOCATIONS ARE APPROXIMATE



HELOTES TOWNHOME DEVELOPMENT

The Woodmont Company
UES Project No.: A252533

FM 1560
Helotes, Texas

APPENDIX C - Boring Logs and Laboratory Results

SOIL BORING NUMBER: B-01

PROJECT NAME Helotes Townhome Development
PROJECT NUMBER A252533
DATE STARTED 06/10/2025 **COMPLETED** 06/10/2025
PROJECT LOCATION 8906 Saxon Forest, Helotes, TX
CLIENT The Woodmont Company
LATITUDE / LONGITUDE 29.568933, -98.658177
DRILLING METHOD Air Rotary
BORING ELEVATION N/A
NOTES
HAMMER WEIGHT - **HAMMER DROP** -

Groundwater Data	
During Drilling (ft):	N/A
After Drilling (ft):	N/A
After __ Hours (ft):	N/A

Depth (ft)	Material Description	Samples: Sample Graphic	REC (%) / RQD (%)	N-Value / Refusal / TCP	Pocket Pen (TSF)	Lab: Compressive Strength (TSF)	Confining Pressure (PSI)	Dry Density (PCF)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Swell	% Fines	Sulfate (PPM)
0 – 4.0	CLAYEY GRAVEL WITH SAND, medium dense to very dense, dark brown and gray. (GC)	X		18					3	66	27	39		19	
		X		50/5"					3						
4.0 – 6.5	CLAYEY SAND WITH GRAVEL, very dense, red brown. (SC)	X							8	97	35	62		25	
6.5 – 15.0	LIMESTONE, very hard, weathered, tan, with clay seams and MARL layers. (LS)	X		50/1"					3						
		X		50/1"					1						
		X		50/0"					0						
15.0	Boring is terminated at a depth of 15-feet.														

SOIL BORING NUMBER: B-02

PROJECT NAME Helotes Townhome Development
PROJECT NUMBER A252533
DATE STARTED 06/10/2025 **COMPLETED** 06/10/2025
PROJECT LOCATION 8906 Saxon Forest, Helotes, TX
CLIENT The Woodmont Company
LATITUDE / LONGITUDE 29.568442, -98.658220
DRILLING METHOD Air Rotary
BORING ELEVATION N/A
NOTES
HAMMER WEIGHT - **HAMMER DROP** -

Groundwater Data	
During Drilling (ft):	N/A
After Drilling (ft):	N/A
After __ Hours (ft):	N/A

Depth (ft)	Graphic Log	Material Description	Sample Graphic	REC (%) / RQD (%)	N-Value / Refusal / TCP	Pocket Pen (TSF)	Compressive Strength (TSF)	Confining Pressure (PSI)	Dry Density (PCF)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Swell	% Fines	Sulfate (PPM)
0–8.0		CLAYEY GRAVEL WITH SAND, loose to very dense, dark brown. (GC)	X		36					7						
			X		5					3					8	
5		-Becoming red brown below a depth of 4.5-feet.	X		26					20						
			X		50/4"					6	36	21	15		20	
8.0–15.0		LIMESTONE, very hard, weathered, tan, with clay seams and MARL layers. (LS)	X		50/0"					1						
10																
15			X		50/0"					0						
		Boring is terminated at a depth of 15-feet.														

SOIL BORING NUMBER: B-03

PROJECT NAME Helotes Townhome Development
PROJECT NUMBER A252533
DATE STARTED 06/10/2025 **COMPLETED** 06/10/2025
PROJECT LOCATION 8906 Saxon Forest, Helotes, TX
CLIENT The Woodmont Company
LATITUDE / LONGITUDE 29.567917, -98.658220
DRILLING METHOD Air Rotary
BORING ELEVATION N/A
NOTES
HAMMER WEIGHT - **HAMMER DROP** -

Groundwater Data	
During Drilling (ft):	N/A
After Drilling (ft):	N/A
After __ Hours (ft):	N/A

Depth (ft)	Graphic Log	Material Description	Sample Graphic	REC (%) / RQD (%)	N-Value / Refusal / TCP	Pocket Pen (TSF)	Compressive Strength (TSF)	Confining Pressure (PSI)	Dry Density (PCF)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Swell	% Fines	Sulfate (PPM)
0–2.0		FAT CLAY, hard, dark brown, with limestone fragments. (CH)	X		31					28	69	20	49		92	
2.0–15.0		LIMESTONE, very hard, weathered, tan, with clay seams and MARL layers. (LS)	X		50/0"					2						
			X		50/0"					1						
			X		50/0"					1						
			X		50/0"					1						
			X		50/0"					1						

Boring is terminated at a depth of 15-feet.

SOIL BORING NUMBER: B-04

PROJECT NAME Helotes Townhome Development
PROJECT NUMBER A252533
DATE STARTED 06/10/2025 **COMPLETED** 06/10/2025
PROJECT LOCATION 8906 Saxon Forest, Helotes, TX
CLIENT The Woodmont Company
LATITUDE / LONGITUDE 29.568758, -98.657197
DRILLING METHOD Air Rotary
BORING ELEVATION N/A
NOTES
HAMMER WEIGHT - **HAMMER DROP** -

Groundwater Data	
During Drilling (ft):	N/A
After Drilling (ft):	N/A
After __ Hours (ft):	N/A

Depth (ft)	Material Description	Sample Graphic	REC (%) / RQD (%)	N-Value / Refusal / TCP	Pocket Pen (TSF)	Compressive Strength (TSF)	Confining Pressure (PSI)	Dry Density (PCF)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Swell	% Fines	Sulfate (PPM)
0–2.0	CLAYEY GRAVEL WITH SAND, very dense, dark brown, with limestone fragments. (GC)	X		50/1"					5	46	20	26		18	
2.0–15.0	LIMESTONE, very hard, weathered, tan, with clay seams and MARL layers. (LS)	X		50/4"					6						
		X		50/0"					2						
		X		50/1"					2						
		X		50/0"					2						
	-Clay seam encountered at a depth of 13.5-feet.	X		29					2	63	17	46		21	
15.0	Boring is terminated at a depth of 15-feet.														

SOIL BORING NUMBER: B-05

PROJECT NAME Helotes Townhome Development
PROJECT NUMBER A252533
DATE STARTED 06/10/2025 **COMPLETED** 06/10/2025
PROJECT LOCATION 8906 Saxon Forest, Helotes, TX
CLIENT The Woodmont Company
LATITUDE / LONGITUDE 29.568373, -98.567693
DRILLING METHOD Air Rotary
BORING ELEVATION N/A
NOTES
HAMMER WEIGHT - **HAMMER DROP** -

Groundwater Data	
During Drilling (ft):	N/A
After Drilling (ft):	N/A
After __ Hours (ft):	N/A

Depth (ft)	Graphic Log	Material Description	Sample Graphic	REC (%) / RQD (%)	N-Value / Refusal / TCP	Pocket Pen (TSF)	Compressive Strength (TSF)	Confining Pressure (PSI)	Dry Density (PCF)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Swell	% Fines	Sulfate (PPM)
0–4.0	GC	CLAYEY GRAVEL WITH SAND, very dense, brown to red brown. (GC)	X		50/1"					2	37	14	23		12	
			X		50/3"					7						
4.0		4.0														
4.0–15.0	LS	LIMESTONE, very hard, weathered, tan, with clay seams and MARL layers. (LS)	X		50/0"					3						
5			X		50/2"					3						
			X		50/0"					1						
10																
			X		50/0"					1						
15		15.0														
		Boring is terminated at a depth of 15-feet.														

SOIL BORING NUMBER: B-06

PROJECT NAME Helotes Townhome Development
PROJECT NUMBER A252533
DATE STARTED 06/10/2025 **COMPLETED** 06/10/2025
PROJECT LOCATION 8906 Saxon Forest, Helotes, TX
CLIENT The Woodmont Company
LATITUDE / LONGITUDE 29.567994, -98.567705
DRILLING METHOD Air Rotary
BORING ELEVATION N/A
NOTES
HAMMER WEIGHT - **HAMMER DROP** -

Groundwater Data	
During Drilling (ft):	N/A
After Drilling (ft):	N/A
After __ Hours (ft):	N/A

Depth (ft)	Material Description	Sample Graphic	REC (%) / RQD (%)	N-Value / Refusal / TCP	Pocket Pen (TSF)	Compressive Strength (TSF)	Confining Pressure (PSI)	Dry Density (PCF)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Swell	% Fines	Sulfate (PPM)
0	CLAYEY GRAVEL WITH SAND, loose to very dense, dark brown. (GC)	X		7					9						
		X		15					3	42	18	24		8	
5	-Becoming red brown with limestone fragments below a depth of 4.5-feet.	X		19					4						
		X		33					4	37	22	15		11	
10		X		50/2"					4						
12.0	LIMESTONE, very hard, weathered, tan, with clay seams and MARL layers. (LS)														
		X		50/0"					1						
15.0	Boring is terminated at a depth of 15-feet.														

SOIL BORING NUMBER: B-07

PROJECT NAME Helotes Townhome Development
PROJECT NUMBER A252533
DATE STARTED 06/10/2025 **COMPLETED** 06/10/2025
PROJECT LOCATION 8906 Saxon Forest, Helotes, TX
CLIENT The Woodmont Company
LATITUDE / LONGITUDE 29.568570, -98.657196
DRILLING METHOD -
BORING ELEVATION N/A
NOTES
HAMMER WEIGHT - **HAMMER DROP** -

Groundwater Data	
During Drilling (ft):	N/A
After Drilling (ft):	N/A
After __ Hours (ft):	N/A

Depth (ft)	Material Description	Sample Graphic	REC (%) / RQD (%)	N-Value / Refusal / TCP	Pocket Pen (TSF)	Compressive Strength (TSF)	Confining Pressure (PSI)	Dry Density (PCF)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Swell	% Fines	Sulfate (PPM)
0–2.0	CLAYEY SAND WITH GRAVEL, very dense, red brown, with limestone fragments. (SC)	X		50/1"					6	31	16	15		33	
2.0–15.0	LIMESTONE, very hard, weathered, tan, with clay seams and MARL layers. (LS)	X		50/0"					1						
		X		50/0"					0						
		X		50/0"					1						
		X		50/0"					1						
		X		50/0"					1						
15.0	Boring is terminated at a depth of 15-feet.														

SOIL BORING NUMBER: B-08

PROJECT NAME Helotes Townhome Development
PROJECT NUMBER A252533
DATE STARTED 06/10/2025 **COMPLETED** 06/10/2025
PROJECT LOCATION 8906 Saxon Forest, Helotes, TX
CLIENT The Woodmont Company
LATITUDE / LONGITUDE 29.569136, -98.657334
DRILLING METHOD Air Rotary
BORING ELEVATION N/A
NOTES
HAMMER WEIGHT - **HAMMER DROP** -

Groundwater Data	
During Drilling (ft):	N/A
After Drilling (ft):	N/A
After __ Hours (ft):	N/A

Depth (ft)	Material Description	Sample Graphic	REC (%) / RQD (%)	N-Value / Refusal / TCP	Pocket Pen (TSF)	Compressive Strength (TSF)	Confining Pressure (PSI)	Dry Density (PCF)	Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Swell	% Fines	Sulfate (PPM)
0–1.5	SANDY SILTY CLAY, very dense, dark brown, with limestone fragments. (CL-ML)	X		55					12						
2.5–4	-Becoming red brown below a depth of 3-feet.	X		50/3"					6						
4.5–6		X		50/3"					7	24	17	7		59	
6.5–8		X		50/4"					6						
8.0	LIMESTONE, very hard, weathered, tan, with clay seams and MARL layers. (LS)														
8.5–10		X		50/0"					1						
13.5–15		X		50/0"					1						
15.0	Boring is terminated at a depth of 15-feet.														

UES™

KEY TO SOIL CLASSIFICATION AND SYMBOLS

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		SYMBOL	NAME
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well Graded Gravels or Gravel-Sand mixtures, little or no fines
		GP	Poorly Graded Gravels or Gravel-Sand mixtures, little or no fines
		GM	Silty Gravels, Gravel-Sand-Silt mixtures
		GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	SAND AND SANDY SOILS	SW	Well Graded Sands or Gravelly Sands, little or no fines
		SP	Poorly Graded Sands or Gravelly Sands, little or no fines
		SM	Silty Sands, Sand-Silt Mixtures
		SC	Clayey Sands, Sand-Clay mixtures
	SILTS AND CLAYS LL < 50	ML	Inorganic Silts and very fine Sands, Rock Flour, Silty or Clayey fine Sands or Clayey Silts
		CL	Inorganic Clays of low to medium plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
		OL	Organic Silts and Organic Silt-Clays of low plasticity
	SILTS AND CLAYS LL > 50	MH	Inorganic Silts, Micaceous or Diatomaceous fine Sandy or Silty soils, Elastic Silts
		CH	Inorganic Clays of high plasticity, Fat Clays
		OH	Organic Clays of medium to high plasticity, Organic Silts
NON USCS MATERIALS			Limestone
			Marl/Claystone
			Sandstone

TERMS CHARACTERIZING SOIL STRUCTURE

SLICKENSIDED - having inclined planes of weakness that are slick and glossy in appearance

FISSURED - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical

LAMINATED (VARVED) - composed of thin layers of varying color and texture, usually grading from sand or silt at the bottom to clay at the top

CRUMBLY - cohesive soils which break into small blocks or crumbs on drying

CALCAREOUS - containing appreciable quantities of calcium carbonate, generally nodular

WELL GRADED - having wide range in grain sizes and substantial amounts of all intermediate particle sizes

POORLY GRADED - predominantly of one grain size uniformly graded) or having a range of sizes with some intermediate size missing (gap or skip graded)

SYMBOLS FOR TEST DATA

— Groundwater Level (Initial Reading)

— Groundwater Level (Final Reading)

— Shelby Tube Sample

— SPT Samples

— Auger Sample

— Rock Core

— Texas Cone Penetrometer

— Grab Sample

TERMS DESCRIBING CONSISTENCY OF SOIL

COARSE GRAINED SOILS		FINE GRAINED SOILS		
DESCRIPTIVE TERM	NO. BLOWS/FT. STANDARD PEN. TEST	DESCRIPTIVE TERM	NO. BLOWS/FT. STANDARD PEN. TEST	UNCONFINED COMPRESSION TONS PER SQ. FT.
Very Loose	0 - 4	Very Soft	< 2	< 0.25
Loose	4 - 10	Soft	2 - 4	0.25 - 0.50
Medium Dense	10 - 30	Firm	4 - 8	0.50 - 1.00
Dense	30 - 50	Stiff	8 - 15	1.00 - 2.00
Very Dense	over 50	Very Stiff	15 - 30	2.00 - 4.00
		Hard	over 30	over 4.00

Field Classification for "Consistency" of Fine Grained Soils is determined with a 0.25" diameter penetrometer