ECS SOUTHWEST, LLP

Geotechnical Engineering Report

Flying W, Units 1 thru 4 & 6

FM 1102
New Braunfels, Texas

ECS Project No. 20:1609

March 10, 2023

March 10, 2023

Mr. Josh Majors
TriOak Development, LLC
4634 94th Street
Lubbock, Texas 79424

ECS Project No. 20:1609

Reference: Geotechnical Engineering Report
Flying W Units 1 thru 4 & 6
FM 1102
New Braunfels, Texas

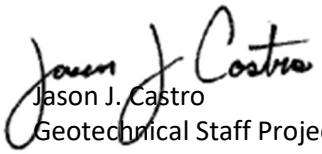
Dear Mr. Majors:

ECS Southwest, LLP (ECS) has completed the subsurface exploration, laboratory testing, and geotechnical engineering analyses for the above-referenced project. Our services were performed in general accordance with our agreed to scope of work. This report presents our understanding of the geotechnical aspects of the project along with the results of the field exploration and laboratory testing conducted, and our design and construction recommendations.

It has been our pleasure to be of service to TriOak Development, LLC during the design phase of this project. We would appreciate the opportunity to remain involved during the continuation of the design phase, and we would like to provide our services during construction phase operations as well to verify subsurface conditions assumed for this report. Should you have questions concerning the information contained in this report, or if we can be of further assistance to you, please contact us.

Respectfully submitted,

ECS SOUTHWEST, LLP



Jason J. Castro
Geotechnical Staff Project Manager
JJCastro@ECSLimited.com

Richard E. Webb, P.E.
Geotechnical Associate Principal
REWebb@ECSLimited.com

Electronic seal approved by Richard E. Webb, P.E. on March 10, 2023

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EXECUTIVE SUMMARY

The following summarizes the main findings of the exploration, particularly those that may have a cost impact on the planned development. Further, our principal geotechnical recommendations are summarized. Information gleaned from the Executive Summary should not be utilized in lieu of reading the geotechnical report in its entirety.

- The predominate geotechnical and geological conditions that need to be addressed at the site are the moderate sloping terrain at the site, and excavation of hard chalk.

- Groundwater was not encountered in the test borings. For specific subsurface information refer to the Boring Logs in Appendix B.

- Preliminary information regarding the proposed wastewater treatment plant and associated lift stations are presented. This information is for planning purposes and a final geotechnical report for the design of these structures should be performed.

- We have estimated potential heave utilizing the TxDOT PVR method (Tex-124-E). We estimate the existing PVR at the site to be about 1¼ inches.

- As requested, flexible asphalt pavements thickness recommendations have been provided in accordance with City of New Braunfels Street Design Guide (Draft). Our report includes our recommended pavement sections for Major and Minor Collector and Local A and B Streets.

- It is recommended that ECS conduct a geotechnical review of the project plans (prior to issuance for construction) to check to see that ECS' geotechnical recommendations have been properly interpreted and implemented.

- To avert misinterpretation of our recommendations, ECS should be retained to perform quality control testing and documentation during construction of the earthwork and foundations for the project.

1.0 INTRODUCTION

The purpose of this study was to provide geotechnical information for the design of municipal roadways and preliminary geotechnical information for the proposed wastewater treatment plant and associated lift stations. The recommendations developed for this report are based on project information supplied by Mr. Javier Castillo.

Our services were provided in accordance with our Revised Proposal No. 20:1488, dated January 23, 2023, as authorized by Josh Majors on January 23, 2023.

This report contains the procedures and results of our subsurface exploration and laboratory testing programs, review of existing site conditions, engineering analyses, and recommendations for the design and construction of the project.

The report includes the following items.

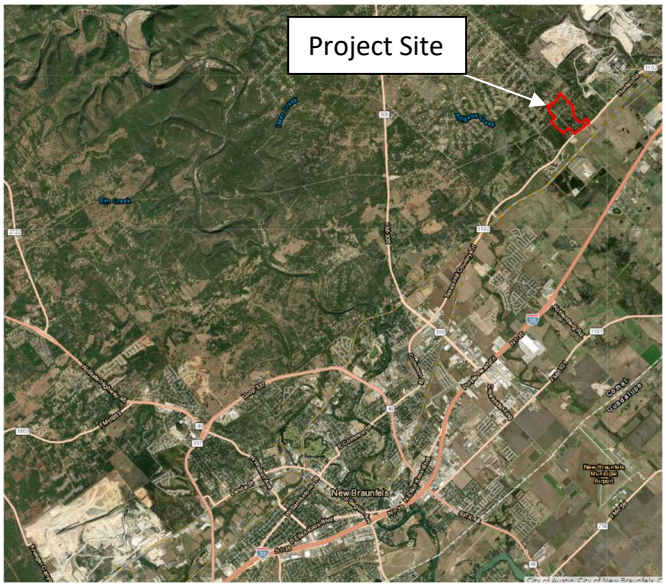
- A brief review and description of our field and laboratory test procedures and the results of testing conducted.
- A review of surface topographical features and site conditions.
- A review of area and site geologic conditions.
- A review of subsurface soil stratigraphy with pertinent available physical properties.
- A final copy of our soil test boring logs.
- Recommendations for site preparation, grading, and drainage.
- Recommendations for municipal pavement design and construction.
- Preliminary geotechnical information for proposed wastewater treatment plant and lift stations.

2.0 PROJECT INFORMATION

2.1 PROJECT LOCATION/CURRENT SITE USE/PAST SITE USE

The project site is in the western quadrant of the intersection of Farm to Market Road 1102 and Watson Lane West in New Braunfels, Texas. The site is approximately 150 acres and is partially developed with residential and equipment storage structures and dirt roads. The undeveloped areas are covered with trees, underbrush, and dried grasses. There are large areas of clear of trees and underbrush.

Based on review of the information obtained from available published information, the site slopes downward from about EL 790 feet in the western corner to about EL 760 is the eastern corner of the site. The site location is shown both in the following figure and on the Site Location Diagram included in Appendix A.



2.2 PROPOSED CONSTRUCTION

We understand that the proposed development will consist of a single-family residential subdivision and will include single-family residential lots, a public park, a detention pond, a wastewater treatment plant, two lift stations, and roadways. We understand that the roadways with the subdivision will be designed to public standards designated as Local Streets and Collector Streets with a 60-foot right-of-way. Site grading information was not available at the time of this report, and it is anticipated that the proposed final grades is going to be within ±5 feet of the existing site grades.

Our scope is limited to providing pavement section recommendations, and does not include preliminary recommendations for foundations, bridges, culverts, embankments, retaining walls, or below-grade drainage structures that may be required as part of the planned development. Our understanding is based on the drawing entitled Flying W/Units 2-4 Plat Limits and Infrastructure dated January 2023 and the information provided by Mr. Javier Castello, P.E., M.S.C.E with Crude Engineers. If ECS' understanding of the project is not correct, especially if the structural loads are different, please contact ECS so that we may review these changes and revise our recommendations as appropriate.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

Our exploration procedures are explained in greater detail in Appendix B including the insert titled Site Exploration Procedure. Our scope of work included drilling nineteen borings. Our borings were located with a handheld GPS unit and their approximate locations are shown on the Boring Location Diagram in Appendix A.

3.1 SUBSURFACE CHARACTERIZATION

The Geologic Atlas of Texas, San Antonio Sheet, indicates that this site is underlain by soils of the Austin Chalk (Kau) as shown on the Site Geologic Diagram in Appendix A. The Austin Chalk consists of a fairly thick-bedded impure chalk, interstratified with marly beds. The rocks are mostly white on the surface, but

their subterranean parts have a bluish color, which they lose when dried in air. Lithologies in this formation vary from a thin veneer of dark brown clays, caliche, and limestone rock fragments in the weathering profile, to interbedded hard and soft layers of chalky, marly fossiliferous limestone in the unweathered portion of the formation.

The subsurface conditions encountered were generally consistent with published geological mapping. The following sections provide generalized characterizations of the rock strata. Please refer to the boring logs in Appendix B.

STRATUM	APPROXIMATE RANGE OF DEPTH (FEET)	MATERIAL DESCRIPTION	PI [(1)] RANGE	N [(2)] RANGE
IA	0 to 2.5	(CH) FAT CLAY, (CH) GRAVELLEY FAT CLAY WITH SAND, (CH) SANDY FAT CLAY WITH GRAVEL, dark brown	30 to 50	13 to 50/0”
IB	0 to 2.5	(ML) SANDY SILT, (SM) SILTY SAND WITH GRAVEL, (GM) SILTY GRAVEL, (GM) SILTY GRAVEL WITH SAND, (SC) CLAYEY SAND, (SC) CLAYEY SAND WITH GRAVEL, (GC) CLAYEY GRAVEL WITH SAND, (GW-GP) WELL GRADED GRAVEL WITH CLAY AND SAND, dark brown to light brown with light yellowish white	10 to 34	35 to 50/2”
II	0.3 to 28.50	CHALK, light yellowish white to gray	---	50/6” to 50/0”

Notes: (1) Plasticity Index, Lime treatment of the subgrade soils required for soils with a PI exceeding 20.
(2) Standard Penetration Test (SPT) Value, blows per foot

A graphical presentation of the subsurface conditions is shown on the Generalized Subsurface Profiles included in Appendix A.

3.2 GROUNDWATER OBSERVATIONS

Groundwater level observations were made in the borings during drilling operations. In auger rotary drilling operations, water is not introduced into the borehole and the groundwater position can often be found out by observing water flowing into the excavation. Furthermore, visual observation of soil samples retrieved can often be used in evaluating the groundwater conditions. Groundwater was not observed during or upon completion of drilling the borings at the site. Upon completion of field operations, the boreholes were backfilled with soil cuttings generated during our field operations.

Water levels in open excavations may require several hours to several days to stabilize depending on the permeability of the soils and that groundwater levels at the site may be subject to seasonal conditions, recent rainfall, drought, or temperature effects. Clays and intact chalk are generally not conducive to the presence of groundwater; however, gravels, sands and silts, and open fractures and solution features; where present, can store and transmit “perched” groundwater flow or seepage.

The groundwater conditions at this site are expected to be significantly influenced by surface water runoff and rainfall and should be evaluated just prior to construction. Specifically, rainfall that enters the site,

either directly from overland flow or adjacent properties, begins to percolate through surficial soils and within granular seams and fissures. This groundwater flow continues downhill with the water table occasionally surfacing to form wet springs and intermittent streams. In low-lying areas and areas adjacent to existing creeks or ponds, shallow groundwater tables can be present continuously.

3.3 LABORATORY TESTING

The laboratory testing consisted of selected tests performed on samples obtained during our field exploration operations. Classification and index property tests were performed on representative soil samples in general accordance with the following standards:

LABORATORY TEST	TEST STANDARD
Moisture Content	ASTM D2216
Sieve Analyses	ASTM D1140 and ASTM D422
Atterberg Limits	ASTM D4318
Moisture Density Relationship	ASTM D698
California Bearing Ratio (CBR)	ASTM D1883

Each sample was visually classified on the basis of texture and plasticity in general accordance with ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedures) and ASTM D2487 Standard Practice for Classification for Engineering Purposes (Unified Soil Classification System (USCS)). After classification, the samples were grouped in the major zones noted on the boring logs in Appendix B. The USCS classification symbols for each soil type are indicated in parentheses along with the soil descriptions. The stratification lines between strata on the logs are approximate; in situ, the transitions may be gradual.

Samples not tested in the laboratory are planned to be stored for a period of 60 days subsequent to submittal of this report and discarded after this period, unless we receive alternate instructions regarding their disposition.

4.0 DESIGN RECOMMENDATIONS

The following recommendations have been developed based on the previously described project characteristics and subsurface conditions. If there are changes to the project characteristics or if different subsurface conditions are encountered during construction, ECS should be consulted so that the recommendations of this report can be reviewed.

Preliminary information regarding the proposed wastewater treatment plant and associated lift stations are presented. This information is for planning purposes and a final geotechnical report for the design of these structures should be performed.

4.1 POTENTIAL VERTICAL RISE & SUBGRADE IMPROVEMENTS

Structural damage and/or cosmetic/operational distress can be caused by volume changes in clay soils. The expansive clays found at this site are capable of swelling and shrinking in volume dependent on potentially changing soil water conditions during or after construction. Clays can shrink when they lose water and swell (increase in volume) when they gain water. The potential of expansive clays to shrink and swell is related to; amongst other things, the Plasticity Index (PI). Clays with a higher PI generally have a greater potential for soil volume changes due to moisture content variations.

We have estimated potential heave for this site utilizing the TxDOT PVR method (Tex-124-E). The Tex-124-E method provides an estimate of potential vertical rise (PVR) using the liquid limits, plasticity indices, grain size analyses, and water contents of the soils. The PVR is estimated in the seasonally active zone, which extends to the depth of the underlying chalk.

Estimated PVR values are based upon anticipated typical changes in soil moisture content from a dry to wet condition; however, soil movements in the field depend on the actual changes in moisture content. Thus, actual soil movements could be less than that calculated if little soil moisture variations occur or could exceed the estimated values if actual soil moisture content changes are greater than anticipated. These conditions can occur as the result of excessive droughts, flooding, “perched” groundwater infiltration, poor surface-drainage, excessive landscape irrigation, and/or leaking irrigation lines or plumbing.

We estimate the existing PVR to be approximately 1¼ inches. ECS recommends the PVR for the grade-supported structures associated with the wastewater treatment plant and lift stations be improved to approximately 1 inch. To reduce the PVR to about 1 inch we recommend undercutting the existing ground, and then filling to the proposed finished subgrade elevation with at least 1 foot of properly compacted select fill.

In this general area, it is common for structural and geotechnical engineers to consider a PVR of approximately 1 inch to be within acceptable tolerances for at-grade structures supported on properly designed slab-on-grade/mat foundation systems. However, this movement does not take into consideration the movement criteria required or perceived by the facility owner or occupants. These “operational” performance criteria may be, and often are, more restrictive than the structural criteria or tolerances.

4.2 STREET PAVEMENT RECOMMENDATIONS

ECS has prepared the following recommendations for the design and construction of a flexible system for use on the subject project. The “City of New Braunfels Street Design Guide (Draft)” dated March 2021 and Texas Flexible Pavement Design System FPS21 version 1.5 released on December 12, 2018, were used to develop the pavement thickness recommendations in this report. Pavement thickness design considers pavement performance, traffic, roadbed soil, pavement materials, environment, drainage, and reliability. Each of these items is incorporated into the design methodology.

Using the pavement design parameters presented in the design guide, summarized below, which are considered to be typical for the area. In addition, we obtained a CBR value of 1.4 percent on a bulk sample recovered from the surficial soils at boring location B-10.

Road Classification	Major Collector	Minor Collector	Local B	Local A
Design Lane ESAL	1,500,000	1,000,000	500,000	250,000
Reliability	95	95	90	80
Initial Serviceability Index, Flexible Pavements	4.2	4.2	4.2	4.2
Terminal Serviceability Index, All Pavements	2.5	2.5	2.0	2.0
Standard Deviation, Flexible Pavements	0.45	0.45	0.45	0.45

Based on the information provided, we understand that the street roadways are planned to serve as Local and Collector Streets within the proposed residential development. Based on the results of our borings and the City of New Braunfels regulations, we consider the following minimum pavement sections appropriate for use on this project.

Road Classification	Major Collector	Minor Collector	Local B	Local A
Surface Course Thickness (Type "D" HMAC)	4.0 Inches	4.0 Inches	3.0 Inches	3.0 inches
Crushed Limestone Base Course Thickness	14.0 Inches	9.5 Inches	7.0 Inches	6.0 inches
Lime-Treated Subgrade Depth of Compaction[1]	8.0 Inches	8.0 Inches	8.0 inches	8.0 inches

[1] Lime-treated subgrade is not required where chalk is exposed at the subgrade level.

We recommend that the project civil engineer confirm the anticipated traffic is appropriate for use on the project.

4.2.1 Pavement Materials

Recommendations regarding material requirements for the various pavement sections are summarized below:

Hot Mix Asphalt Concrete (HMAC) Surface Course - The asphalt concrete surface course should be plant mixed, hot laid Type D (Fine Graded Surface) or Type C (Coarse Graded Surface Course) meeting the specifications requirements of TxDOT Item 340 and specific criteria for the job mix formula. The mix should be compacted to between 92 and 97 percent of the maximum theoretical density as established by Tex-227-F.

Crushed Limestone Base Course - Crushed limestone base should be placed in maximum 6-inch compacted lifts. The base materials should be compacted to at least 98 percent of the maximum dry density as established by TxDOT Tex-113-E. Flexible base materials should be moisture conditioned to between -2 and +3 percentage points of the optimum moisture content during compaction. Flexible base materials should meet the requirements specified in 2014 TxDOT Standard Specification Item 247, Type A, Grade 1-2.

Lime-Treated Subgrade – Lime mixing and placement should be performed in accordance with TxDOT Item 260. After proper curing time, the lime-treated soils should be compacted to a minimum 95 percent of the maximum dry density as established by TxDOT Tex-113-E, at moisture contents between optimum and +4 percentage points of optimum. Sufficient lime should be mixed with subgrade soils to result in a soil-lime mixture with pH of at least 12.4 when tested in accordance with ASTM D6276 or TXDOT test method Tex-121-E. We anticipate that approximately 6 to 8 percent hydrated lime (by dry unit weight) is required to treat the subgrade soils. We recommend that the subgrade soils at the proposed final subgrade elevation be further evaluated for sulfate content. Excessive concentrations of sulfate in the subgrade soils can result in poor performance of lime-treated subgrade. Lime stabilization should extend at least 1 foot beyond the edge of the planned pavement, where practical.

4.2.2 Pavement Drainage, Subdrainage, and Trenching

Longitudinal cracks and apparent distress due to expansive soils may appear in the pavement after construction and the introduction of landscape irrigation. These cracks and distress are not pavement failures with respect to traffic support, although they may be aesthetically undesirable. In addition, without regular maintenance, the cracks can allow additional moisture intrusion and rapid degradation of the pavement section. The pavement sections are primarily designed to support the traffic and not resist the forces generated by swelling soils.

Positive drainage should be provided on and around pavement areas to avoid ponding of water. Irrigation of lawn and landscaped areas adjacent to the pavements should be moderate, with approximately no excessive wetting or drying of soils. If landscaped islands are provided, they should be designed to restrict excess water from migrating to the pavement subgrade by using self-contained beds, raised planter boxes, vertical moisture barriers, and/or edge drains. Curbs should extend through the base course and at least 4 inches into the underlying subgrade. Good perimeter surface drainage guiding surface water away from the pavement area is also recommended.

4.3 SUBSURFACE INFORMATION FOR THE PROPOSED LIFT STATIONS

The provided site plane indicates that two lift stations are planned to be constructed for the proposed subdivision. Borings B-2 and B-19 were drilled in the approximate locations indicated on the provided site plan. The borings indicate that there is 2 feet of gravelly soils over shallow chalk. It is anticipated that the construction of the lift stations is likely to include the construction of below-grade structures that are going to be constructed in the Stratum II Chalk. Excavations into the chalk are likely to require heavy-duty earth-moving equipment. These borings did not encounter groundwater during and after the completion of drilling operations.

4.4 SUBSURFACE INFORAMTION FOR THE PROPOSED WASTEWATER TREATMENT PLANT

The provided site plan also indicates that a wastewater treatment plant is planned for the proposed subdivision. Boring B-1 was drilled in the approximate location indicated on the provided site plan. The boring indicates that there is 2 feet of gravelly clay soils over shallow chalk. It is anticipated that the construction of the lift stations is likely to include the construction of below-grade structures that are likely going to be constructed in the Stratum II Chalk. Excavations into the chalk are likely to require heavy-

duty earth-moving equipment. The boring did not encounter groundwater during and after the completion of drilling operations.

5.0 SITE CONSTRUCTION RECOMMENDATIONS

5.1 SUBGRADE PREPARATION

In a dry and undisturbed state, the soils at the site can provide good subgrade support for fill placement and construction operations. However, when wet, this soil can degrade quickly with disturbance from contractor operations. Therefore, good site drainage should be maintained during earthwork operations, which would help maintain the integrity of the soil. We recommend that an attempt be made to enhance the natural drainage without interrupting its pattern.

The soils at the site are moisture and disturbance-sensitive and contain fines that are considered moderately erodible. Therefore, the contractor should carefully plan his operation to reduce exposure of the subgrade to weather and construction equipment traffic and provide and maintain good site drainage during earthwork operations to help maintain the integrity of the surficial soils. Erosion and sedimentation should be controlled per sound engineering practice and current jurisdictional requirements.

In preparing the site for construction, loose, or soft soils, vegetation, organic soil, existing pavements, foundations or utilities, or similar materials should be removed from proposed structural and paving areas, and areas receiving new fill.

After stripping and required cuts have been completed, the subgrade soils should be scarified, moisture conditioned and compacted to at least 95 percent of the maximum dry density as established by Tex-114-E to a depth of at least 8 inches. The soils should be moisture conditioned to between optimum and +4 percentage points of the optimum moisture content just prior to compaction.

5.1.1 Removals, Stripping and Grubbing

The subgrade preparation should consist of stripping deleterious materials (as described above) 5 feet beyond pavement limits and the toe of fills. ECS should be called on to check that topsoil and deleterious surficial materials have been removed before the placement of fill or construction of structures.

5.1.2 Proof Rolling

After stripping and grubbing, cutting to the proposed grade, and before compacting the subgrade or placing of structural fill, the exposed subgrade should be reviewed by the Geotechnical Engineer or authorized representative. The exposed subgrade should be proof rolled with previously consented construction equipment having a minimum axle load of 25 tons (e.g., amply loaded tandem-axle dump truck). The areas subject to proof rolling should be traversed by the equipment in two perpendiculars (orthogonal) directions with overlapping passes of the vehicle under the observation of the Geotechnical Engineer or authorized representative. This procedure is intended to assist in identifying localized yielding materials. If yielding or “pumping” subgrade is identified by the proof rolling, those areas should be marked for repair before the compacting the subgrade or placing fills or other construction materials. Subgrade repair methods, such as undercutting, moisture conditioning or lime/cement treatment, should

be discussed with the Geotechnical Engineer to identify the appropriate procedure about the existing conditions causing the yielding.

If the area is deemed too small for a piece of equipment to traverse, the excavated area should be probed by the Geotechnical Engineer or authorized representative.

5.2 EARTHWORK OPERATIONS

After stripping and grubbing, undercutting/removals, subgrade preparation (including proof rolling) and evaluation have been completed, fill placement may begin. Fills in pavement and landscape areas can consist of materials meeting the requirements of the General Fill section below.

Soil moisture levels should be preserved (by various methods that can include covering with plastic, watering, etc.) until new fill, pavements, or slabs are placed. Fill soils should be placed in 8 inches loose lifts for mass grading operations and 4-inch lifts for trench-type excavations where walk-behind or "jumping jack" compaction equipment is used.

Upon completion of the filling operations, care should be taken to maintain the soil moisture content before the construction of foundations and pavements. If the soil becomes desiccated, the affected material should be removed and replaced, or these materials should be scarified, moisture conditioned, and re-compacted.

Utility cuts should not be left open for extended periods and should be properly backfilled. Backfilling should be accomplished with properly compacted on-site soils, rather than granular materials.

Field density and moisture tests should be performed on each lift as necessary to check that adequate compaction is achieved. As a guide, one test per 10,000 square feet per lift is recommended for paving areas (two tests minimum per lift). Utility trench backfill should be tested at a rate of one test per lift per 150 linear feet of the trench (two tests minimum per lift). Certain jurisdictional requirements may require testing in addition to that noted previously. Therefore, these specifications should be reviewed, and more stringent specifications should be followed.

5.2.1 Weathered Rock and Rock

Shallow chalk was encountered at the site during our subsurface exploration and rock excavation techniques is necessary for this project. For purposes of contract terms, we recommend that "rock" be defined as follows: "Rock should be defined as those natural materials which cannot be excavated in an open excavation with a Caterpillar Model No. D-8, heavy-duty track-type tractor, weighted at not less than 285 hp (flywheel power) and equipped with a single-shank hydraulic ripper, capable of exerting not less than 45,000 lbs. breakout force, or equivalent machinery. For footings, utility trenches and pits, rock should be defined as those materials that cannot be excavated with a Caterpillar Model No. 215D LC track-type hydraulic excavator, equipped with a 42-inch wide short-tip radius rock bucket, rated at not less than 120 hp flywheel power with bucket-curling force of not less than 25,000 lbs. and stick-crowd force of not less than 18,000 lbs."

Depending on the excavation methods, the rock at this site can likely excavate in relatively large, blocky, and platy pieces, which are difficult to compact for long-term performance. Also, these materials

experience rapid degradation due to weathering over relatively short periods of time, once exposed to air and water conditions. Therefore, these larger pieces, which break up as rock-like fragments in the initial excavation, must be compacted with sufficient compaction energy to substantially break them down into soil size particles during construction.

Excavated Stratum II Chalk materials may be adequate for fill within the paving limits. For the purposes of this report, rock materials excavated at the site should be considered nondurable. Nondurable rock materials removed during excavations may be used as fill if it is decomposed by mechanical effort. Durability is the term used to describe the ability of a rock or rock-like material to withstand long term chemical and mechanical weathering without size degradation. Rock excavated from the site and used as earthwork fill should have a grain size distribution with rock and soil particles ranging from clay or silt size particles to a maximum size of 4 inches in diameter. Particles larger than this should be decomposed by mechanical compaction equipment to achieve the desired grain size.

Once appropriately broken down, this material may then be placed and compacted at workable moisture contents above the optimum moisture content and compacted to at least 95% of the maximum dry density as obtained using the Tex-113-E proctor method.

5.2.2 General Fill

General fill should consist of on-site or imported soils, provided they meet the requirements described below. General fill materials should be without organics, construction debris, deleterious materials, and should be without rocks larger than 4 inches in greatest dimension. General Fill should have a Plasticity Index of 30 and lower. Proposed general fill should be evaluated and tested by ECS prior to placement in the field.

ECS recommends that general fill be placed in horizontal loose lifts of not more than 8 inches in thickness. Lift thickness should be decreased when using light compaction equipment. General fill should be compacted to at least 95% of the maximum dry density at moisture contents within the range of optimum to +4 percentage points of the optimum moisture content (Tex-114-E).

5.2.3 Select Fill

Select fill materials should be without organics, construction debris, deleterious materials, and should be without rocks larger than 4 inches in greatest dimension. Select fill should have a Plasticity Index of between 5 and 20. Select fill should be evaluated and tested by ECS prior to placement in the field.

ECS recommends that select fill be placed in horizontal loose lifts of not more than 8 inches in thickness. Select fill should be compacted to at least 95% of the maximum dry density at moisture contents within the range of -1 to +3 percentage points of the optimum moisture content (Tex-114-E).

5.3 EXCAVATION SAFETY

Excavations and slopes should be constructed and maintained in accordance with OSHA excavation safety standards. The contractor is solely responsible for designing, constructing, and maintaining steady temporary excavations and slopes. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In

possibly no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. ECS is providing this information solely as a service to our client. ECS is not assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

6.0 CLOSING

ECS has prepared this report to guide the geotechnical-related design and construction aspects of the project. We performed these services in accordance with the standard of care expected of professionals in the industry performing similar services on projects of like size and complexity at this time in the region. No other representation expressed or implied, and no warranty or guarantee is included or intended in this report.

The description of the proposed project is based on information provided to ECS by TriOak Development, LLC. If this information is untrue or changes, either because of our interpretation of the documents provided or site or design changes that may occur later, ECS should be contacted so we can review our recommendations and provide additional or alternate recommendations that reflect the proposed construction.

We recommend that ECS review the project plans and specifications so we can confirm that those plans/specifications are in accordance with the recommendations of this geotechnical report.

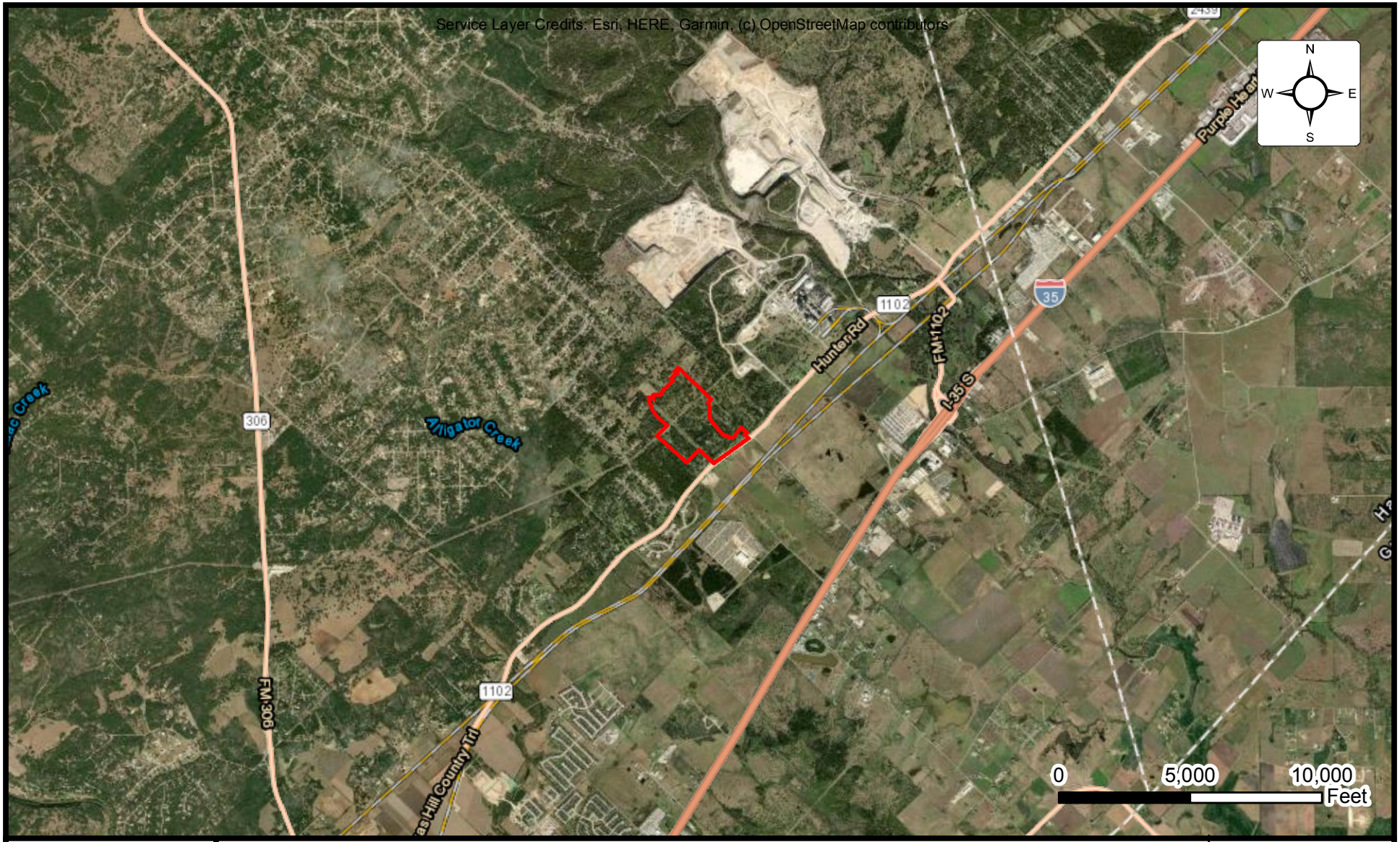
Field observations, and quality assurance testing during earthwork and foundation installation are an extension of, and integral to, the geotechnical design. We recommend that ECS be retained to apply our expertise throughout the geotechnical phases of construction, and to provide consultation and recommendation should issues arise.

ECS is not responsible for the conclusions, opinions, or recommendations of others based on the data in this report.

The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings and tests performed at the locations as indicated on the Boring Location Diagram and other information referenced in this report. This report does not reflect variations, which may occur between the borings. In the performance of the subsurface exploration, specific information is obtained at specific locations at specific times. However, it is a well-known fact that variations in subsurface conditions exist on many sites between boring locations and such situations as groundwater levels vary from time to time. The nature and extent of variations may not become evident until the course of construction. If variations then appear evident, after performing on-site observations during the construction period and noting characteristics and variations, a reevaluation of the recommendations for this report can be necessary.

APPENDIX A – Figures

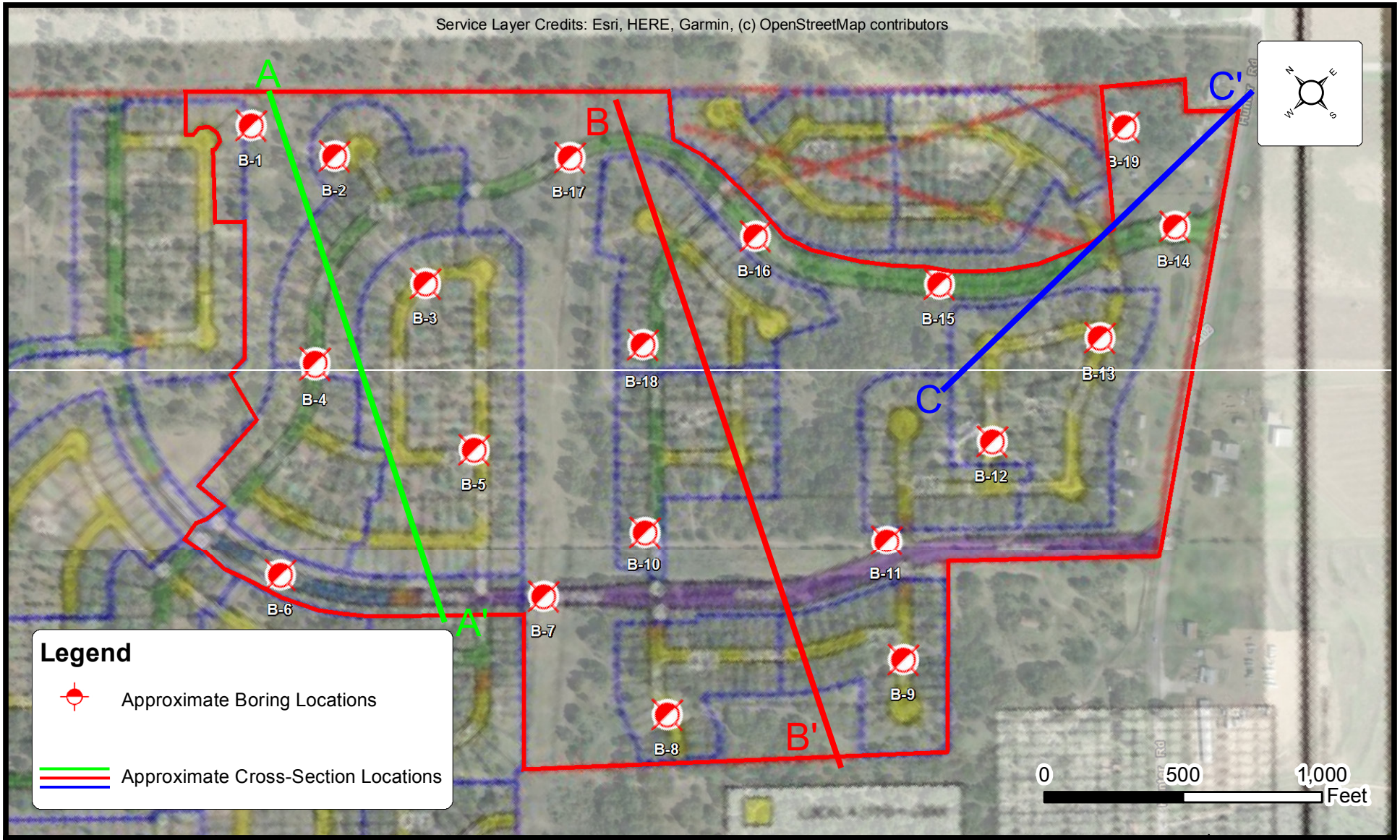
Site Location Diagram
Boring Location Diagram
Site Geologic Map
Generalized Subsurface Soil Profiles



SITE LOCATION DIAGRAM
FLYING W, UNITS 1 THRU 4 & 6

FM 1102, NEW BRAUNFELS, TEXAS
TRIOAK DEVELOPMENT, LLC

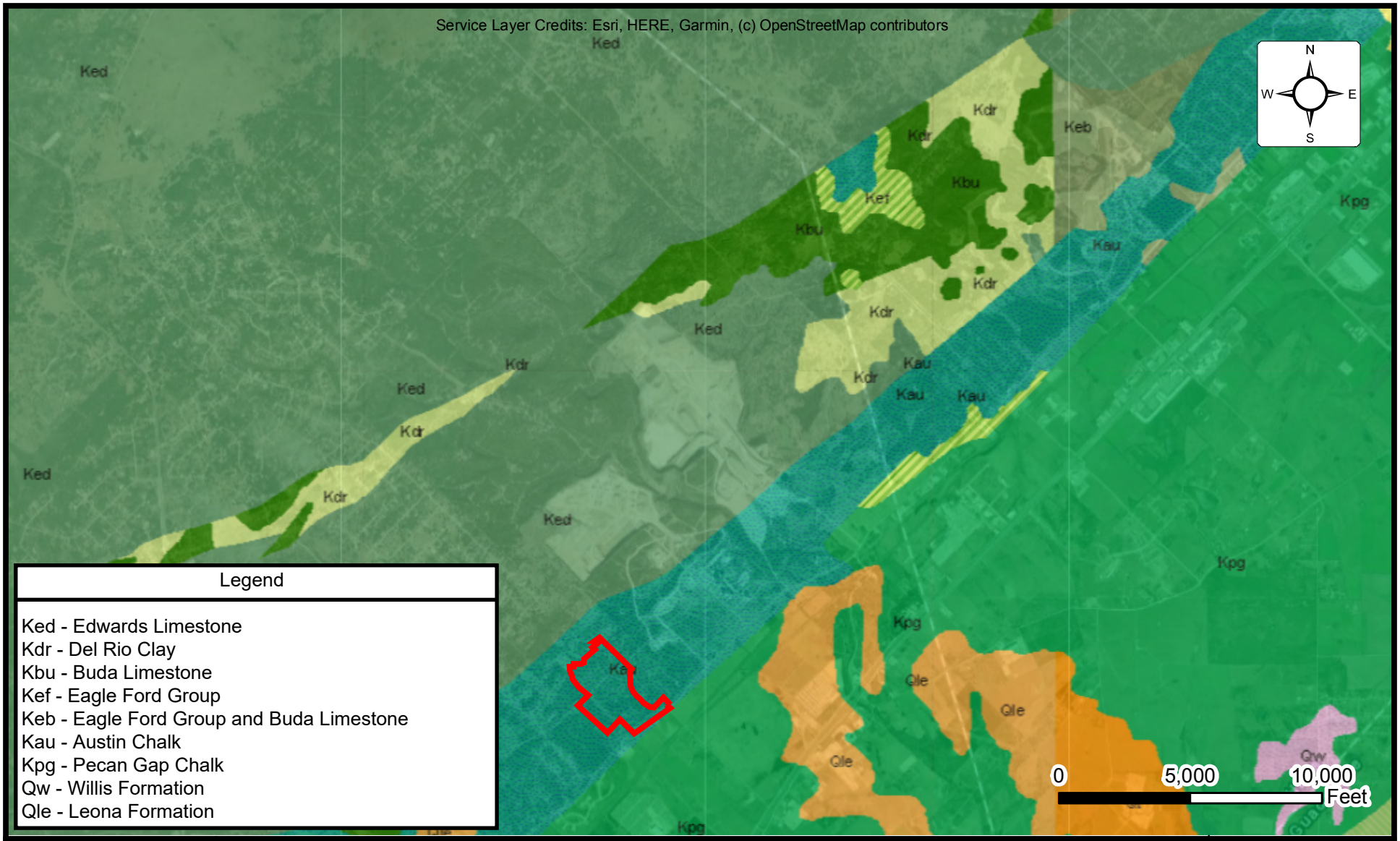
ENGINEER	REW
SCALE	AS NOTED
PROJECT NO.	20:1609
FIGURE	1 OF 1
DATE	3/6/2023



BORING LOCATION DIAGRAM
FLYING W, UNITS 1 THRU 4 & 6

FM 1102, NEW BRAUNFELS, TEXAS
TRIOAK DEVELOPMENT, LLC

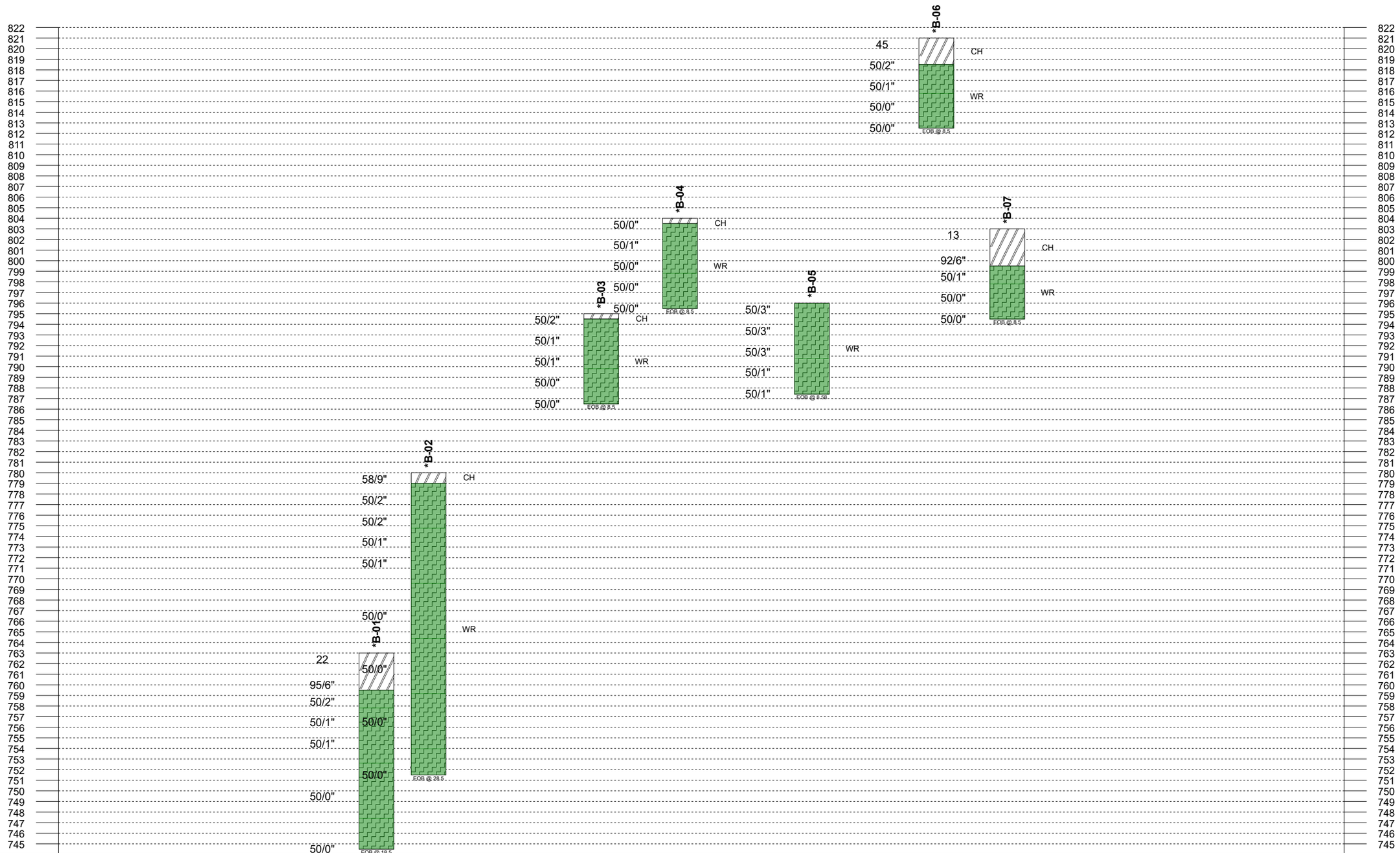
ENGINEER	REW
SCALE	AS NOTED
PROJECT NO.	20:1609
FIGURE	1 OF 1
DATE	3/6/2023



SITE GEOLOGIC DIAGRAM
FLYING W, UNITS 1 THRU 4 & 6

FM 1102, NEW BRAUNFELS, TEXAS
TRIOAK DEVELOPMENT, LLC

ENGINEER	REW
SCALE	AS NOTED
PROJECT NO.	20:1609
FIGURE	1 OF 1
DATE	3/6/2023



Legend Key

- Fat CLAY
- Weathered Rock

744.00

Notes:

1- EOB: END OF BORING AR: AUGER REFUSAL SR: SAMPLER REFUSAL.
2- THE NUMBER BELOW THE STRIPS IS THE DISTANCE ALONG THE BASELINE.
3- SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
4- STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).

Plastic Limit Water Content Liquid Limit
X———●———△
[FINES CONTENT %]

BOTTOM OF CASING
LOSS OF CIRCULATION

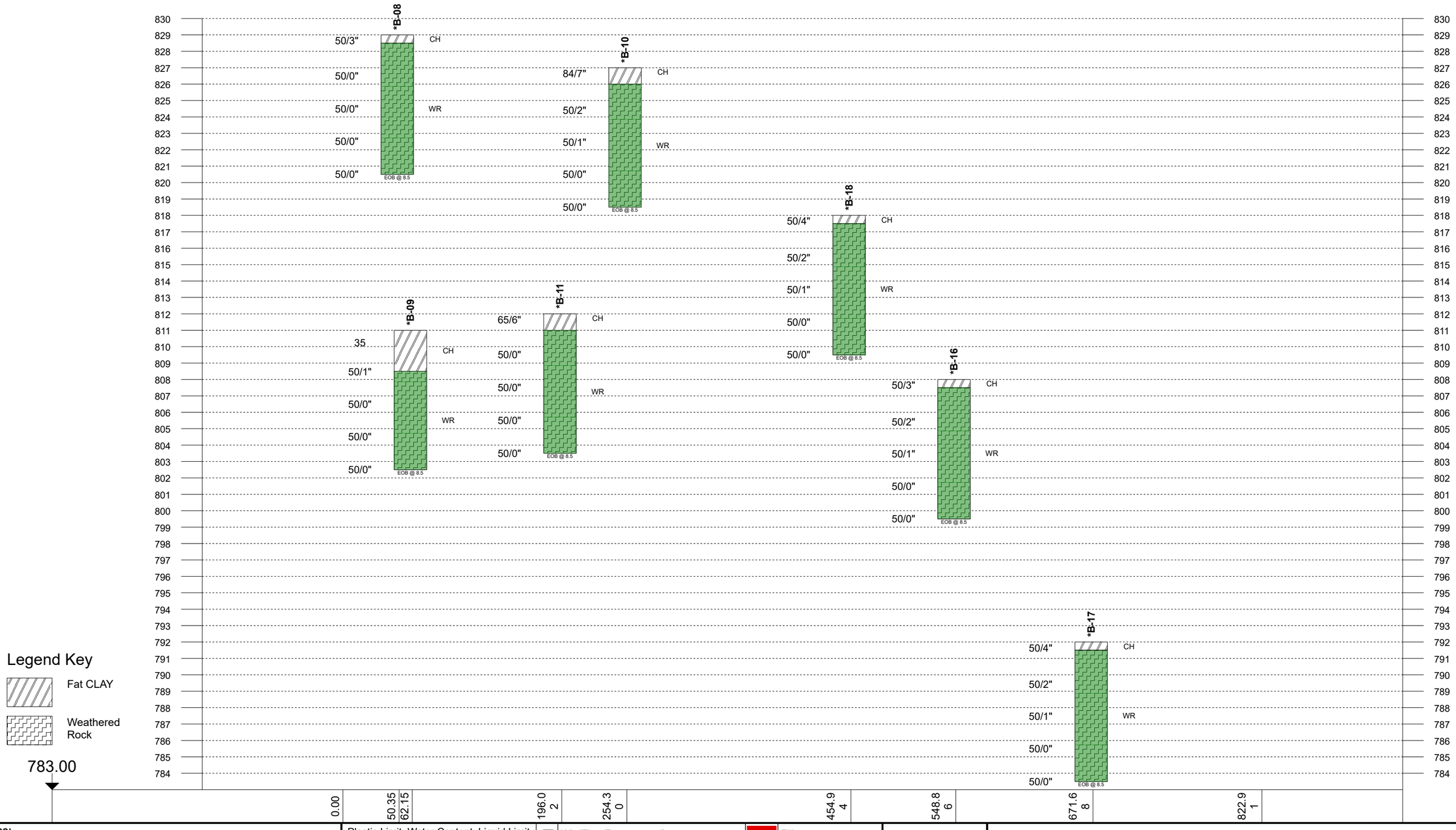
WL (First Encountered)
WL (Completion)
WL (Estimated Seasonal High Water)
WL (Stabilized)

Fill
Possible Fill
Probable Fill
Rock

GENERALIZED SUBSURFACE SOIL PROFILE SECTION LINE A-A'

Flying W, Units 1 thru 4 & 6
TriOak Development, LLC
FM 1102, New Braunfels, Texas, 78130-7857

Project No: 20:1609 Date: 3/6/2023



Legend Key

- Fat CLAY
- Weathered Rock

783.00

Notes:

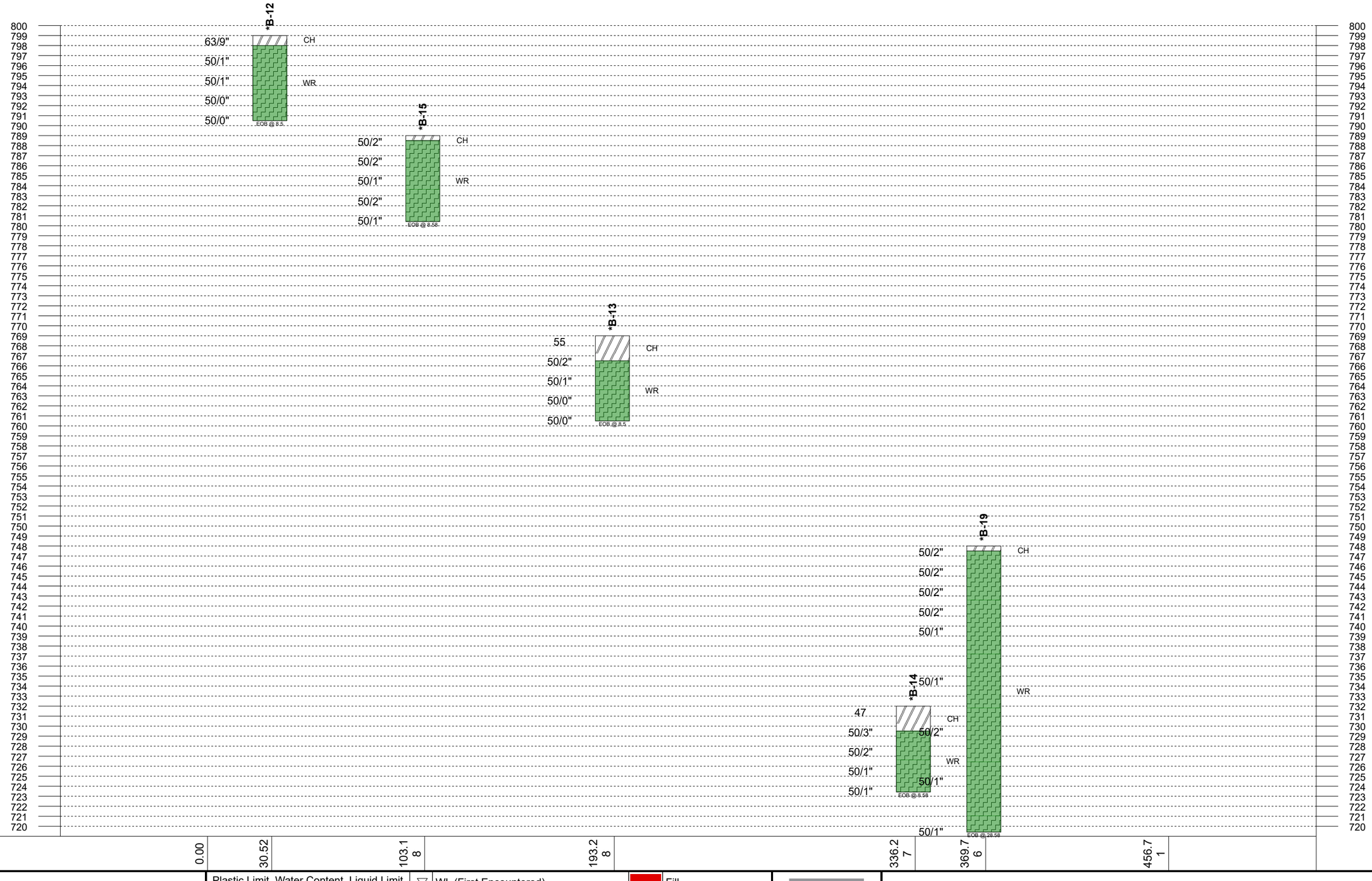
1- EOB: END OF BORING AR: AUGER REFUSAL SR: SAMPLER REFUSAL.
2- THE NUMBER BELOW THE STRIPS IS THE DISTANCE ALONG THE BASELINE.
3- SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
4- STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).

Plastic Limit Water Content Liquid Limit X——●——△ [FINES CONTENT %]			
BOTTOM OF CASING	WL (First Encountered)	Fill	
LOSS OF CIRCULATION	WL (Completion)	Possible Fill	
	WL (Estimated Seasonal High Water)	Probable Fill	
	WL (Stabilized)	Rock	

GENERALIZED SUBSURFACE SOIL PROFILE SECTION LINE B-B'

Flying W, Units 1 thru 4 & 6
TriOak Development, LLC
FM 1102, New Braunfels, Texas, 78130-7857

Project No: 20:1609 Date: 3/6/2023



Notes:

1- EOB: END OF BORING AR: AUGER REFUSAL SR: SAMPLER REFUSAL.
2- THE NUMBER BELOW THE STRIPS IS THE DISTANCE ALONG THE BASELINE.
3- SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL INFORMATION.
4- STANDARD PENETRATION TEST RESISTANCE (LEFT OF BORING) IN BLOWS PER FOOT (ASTM D1586).

Plastic Limit Water Content Liquid Limit X—●—△	WL (First Encountered)	Fill	
[FINES CONTENT %]	WL (Completion)	Possible Fill	
BOTTOM OF CASING	WL (Estimated Seasonal High Water)	Probable Fill	
LOSS OF CIRCULATION	WL (Stabilized)	Rock	

GENERALIZED SUBSURFACE SOIL PROFILE SECTION LINE C-C'

Flying W, Units 1 thru 4 & 6
TriOak Development, LLC
FM 1102, New Braunfels, Texas, 78130-7857

Project No: 20:1609 Date: 3/6/2023

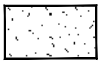
APPENDIX B – Field Operations

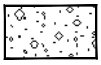
Reference Notes for Boring Logs
Site Exploration Procedure
Boring Logs

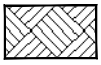
REFERENCE NOTES FOR BORING LOGS

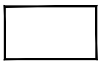
MATERIAL[1,2]

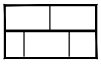

ASPHALT


CONCRETE


GRAVEL

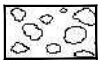

TOPSOIL

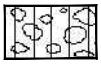

VOID


BRICK

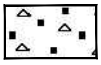

AGGREGATE BASE COURSE

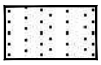

GW **WELL-GRADED GRAVEL**
gravel-sand mixtures, little or no fines

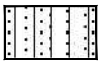

GP **POORLY-GRADED GRAVEL**
gravel-sand mixtures, little or no fines


GM **SILTY GRAVEL**
gravel-sand-silt mixtures

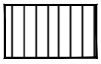

GC **CLAYEY GRAVEL**
gravel-sand-clay mixtures

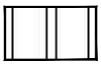

SW **WELL-GRADED SAND**
gravelly sand, little or no fines

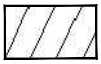

SP **POORLY-GRADED SAND**
gravelly sand, little or no fines


SM **SILTY SAND**
sand-silt mixtures

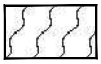

SC **CLAYEY SAND**
sand-clay mixtures

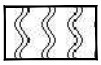

ML **SILT**
non-plastic to medium plasticity

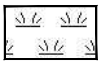

MH **ELASTIC SILT**
high plasticity


CL **LEAN CLAY**
low to medium plasticity


CH **FAT CLAY**
high plasticity


OL **ORGANIC SILT or CLAY**
non-plastic to low plasticity


OH **ORGANIC SILT or CLAY**
high plasticity


PT **PEAT**
highly organic soils

DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

SS	Split Spoon Sampler	PM	Pressuremeter Test
ST	Shelby Tube Sampler	RD	Rock Bit Drilling
WS	Wash Sample	RC	Rock Core, NX, BX, AX
BS	Bulk Sample of Cuttings	REC	Rock Sample Recovery %
PA	Power Auger (no sample)	RQD	Rock Quality Designation %
HSA	Hollow Stem Auger		

PARTICLE SIZE IDENTIFICATION

DESIGNATION		PARTICLE SIZES
Boulders		12 inches (300 mm) or larger
Cobbles		3 inches to 12 inches (75 mm to 300 mm)
Gravel:	Coarse	¾ inch to 3 inches (19 mm to 75 mm)
	Fine	4.75 mm to 19 mm (No. 4 sieve to ¾ inch)
Sand:	Coarse	2.00 mm to 4.75 mm (No. 10 to No. 4 sieve)
	Medium	0.425 mm to 2.00 mm (No. 40 to No. 10 sieve)
	Fine	0.074 mm to 0.425 mm (No. 200 to No. 40 sieve)
Silt & Clay ("Fines")		<0.074 mm (smaller than a No. 200 sieve)

COHESIVE SILTS & CLAYS

UNCONFINED COMPRESSIVE STRENGTH, Q_P[4]	SPT[5] (BPF)	CONSISTENCY[7] (COHESIVE)
<0.25	<2	Very Soft
0.25 - <0.50	2 - 4	Soft
0.50 - <1.00	5 - 8	Firm
1.00 - <2.00	9 - 15	Stiff
2.00 - <4.00	16 - 30	Very Stiff
4.00 - 8.00	31 - 50	Hard
>8.00	>50	Very Hard

GRAVELS, SANDS & NON-COHESIVE SILTS

SPT[5]	DENSITY
<5	Very Loose
5 - 10	Loose
11 - 30	Medium Dense
31 - 50	Dense
>50	Very Dense

RELATIVE AMOUNT[7]	COARSE GRAINED (%)[8]	FINE GRAINED (%)[8]
Trace	≤5	≤5
With	10 - 20	10 - 25
Adjective *(ex: "Silty")*	25 - 45	30 - 45

WATER LEVELS[6]

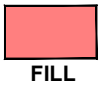

WL (First Encountered)


WL (Completion)


WL (Seasonal High Water)


WL (Stabilized)

FILL AND ROCK


FILL


POSSIBLE FILL


PROBABLE FILL


ROCK

[1]Classifications and symbols per ASTM D 2488-17 (Visual-Manual Procedure) unless noted otherwise.

[2]To be consistent with general practice, "POORLY GRADED" has been removed from GP, GP-GM, GP-GC, SP, SP-SM, SP-SC soil types on the boring logs.

[3]Non-ASTM designations are included in soil descriptions and symbols along with ASTM symbol [Ex: (SM-FILL)].

[4]Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

[5]Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2 inch OD split spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf). SPT correlations per 7.4.2 Method B and need to be corrected if using an auto hammer.

[6]The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally employed.

[7]Minor deviation from ASTM D 2488-17 Note 14.

[8]Percentages are estimated to the nearest 5% per ASTM D 2488-17.

SITE EXPLORATION PROCEDURE

The field exploration was planned with the objective of characterizing the project site in general geotechnical and geological terms and to evaluate subsequent field and laboratory data to assist in the determination of geotechnical recommendations.

The subsurface conditions were explored by nineteen borings drilled to approximate depths of 10 to 30 feet below the existing site grades. A truck-mounted drill rig with continuous-flight augers was utilized to drill the borings. The boring locations were determined and identified in the field by ECS personnel using the boring locations provided. The approximate as-drilled boring locations are shown on the Boring Location Diagram in Appendix A. The ground surface elevations noted in this report were estimated using Google Earth Pro.

Standard Penetration Tests (SPTs) were performed to obtain representative samples and penetration resistance measurements in general accordance with ASTM D1586. Soil samples were obtained at various intervals with the 1.625-inch inside diameter, 2-inch outside diameter, Split-Barrel sampler. The Split-Barrel sampler was first seated 6 inches to penetrate loose cuttings, and then was driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler each 6-inch increment was recorded. The penetration resistance “N-value” is defined as the number of hammer blows required to drive the sampler the final 12 inches and is indicated on the test boring logs. In very dense materials such as weathered rock material, the SPT test is usually stopped after 50 blows from the hammer and the measurement is recorded as 50 blows per distance penetrated (i.e., 50 over 3 inches).

Field logs of the soils encountered in the borings were maintained by the drill crew. After recovery, each geotechnical soil sample was removed from the sampler and visually classified. Representative portions of each soil sample were then wrapped in plastic and transported to our laboratory for further visual examination and laboratory testing. After completion of the drilling operations, the boreholes were backfilled with auger cuttings to the existing ground surface.

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-01**	**1 of 1**

PROJECT NAME:	DRILLER/CONTRACTOR:
Flying W, Units 1 thru 4 & 6	

SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857** — LOSS OF CIRCULATION

NORTHING:	EASTING:	STATION:	SURFACE ELEVATION:	BOTTOM OF CASING
3016756.4	**920274.5**		**763**	

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	18	18	(CH) GRAVELLY FAT CLAY WITH SAND, dark brown, very stiff		763	4-8-14 (22)
	S-2	SS	12	12	CHALK, light brownish white to light yellowish white, very hard			36-45-50/0" (95/6")
5	S-3	SS	2	2			758	50/2" (50/2")
	S-4	SS	1	1				50/1" (50/1")
	S-5	SS	1	1				50/1" (50/1")
10	S-6	SS	0	0			753	50/0" (50/0")
15	S-7	SS	0	0			748	50/0" (50/0")
20					**END OF BORING AT 18.5 FT**		743	
25							738	
30							733	

STANDARD PENETRATION BLOWS/FT (20 40 60 80 100)
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC

LIQUID LIMIT
PLASTIC LIMIT
CALIBRATED PENETROMETER TSF (1 2 3 4 5)
WATER CONTENT %
[FINES CONTENT] %
(10 20 30 40 50)

22
95/6"
50/2"
50/1"
50/1"
50/0"
50/0"

22
21.9
72
[56.5%]
8.1
6.0
5.6

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 04 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 04 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-02**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3016669.0**	EASTING: **920318.1**	STATION:	SURFACE ELEVATION: **780**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT (20 40 60 80 100) / ROCK QUALITY DESIGNATION & RECOVERY (RQD, REC)	LIQUID LIMIT / PLASTIC LIMIT / CALIBRATED PENETROMETER TSF (1 2 3 4 5) / WATER CONTENT % [FINES CONTENT] % (10 20 30 40 50)
0	S-1	SS	15	15	(GC) CLAYEY GRAVEL WITH SAND, dark brown, very dense CHALK, brownish tan, very hard		780	9-8-50/3" (58/9")	58/9"	12.4; 19; 32; [26.0%]
	S-2	SS	2	2				50/2" (50/2")	50/2"	7.3
5	S-3	SS	2	2			775	50/2" (50/2")	50/2"	
	S-4	SS	1	1				50/1" (50/1")	50/1"	7.8
	S-5	SS	1	1				50/1" (50/1")	50/1"	
10							770			
	S-6	SS	0	0				50/0" (50/0")	50/0"	9.1
15							765			
	S-7	SS	0	0				50/0" (50/0")	50/0"	
20							760			
	S-8	SS	0	0				50/0" (50/0")	50/0"	7.2
25							755			
	S-9	SS	0	0	**END OF BORING AT 28.5 FT**			50/0" (50/0")	50/0"	
30							750			

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 04 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 04 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-03**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3016498.7**	EASTING: **920295.0**	STATION:	SURFACE ELEVATION: **795**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT (20 40 60 80 100) / ROCK QUALITY DESIGNATION & RECOVERY (RQD, REC)	LIQUID LIMIT / PLASTIC LIMIT / CALIBRATED PENETROMETER TSF (1 2 3 4 5) / WATER CONTENT % [FINES CONTENT] % (10 20 30 40 50)
0	S-1	SS	8	8	(GC) CLAYEY GRAVEL WITH SAND, dark brown, very dense		795	8-50/2" (50/2")	50/2"	16.0 [27.2%]
	S-2	SS	1	1	CHALK, light yellowish white, very hard			50/1" (50/1")	50/1"	
5	S-3	SS	1	1			790	50/1" (50/1")	50/1"	4.4
	S-4	SS	0	0				50/0" (50/0")	50/0"	
	S-5	SS	0	0	**END OF BORING AT 8.5 FT**			50/0" (50/0")	50/0"	4.9
10							785			
15							780			
20							775			
25							770			
30							765			

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered)	**Dry**	BORING STARTED: **Feb 03 2023**	CAVE IN DEPTH:
▼ WL (Completion)	**Dry**	BORING COMPLETED: **Feb 03 2023**	HAMMER TYPE: **Auto**
⧩ WL (Seasonal High Water)		EQUIPMENT: **Truck** / LOGGED BY:	DRILLING METHOD: **Auger**
⧩ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-04**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3016518.5**	EASTING: **920146.9**	STATION:	SURFACE ELEVATION: **804**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT (20 40 60 80 100) / ROCK QUALITY DESIGNATION & RECOVERY (RQD, REC)	LIQUID LIMIT / PLASTIC LIMIT / CALIBRATED PENETROMETER TSF (1 2 3 4 5) / WATER CONTENT % [FINES CONTENT] % (10 20 30 40 50)
0	S-1	SS	6	6	(GC) CLAYEY GRAVEL WITH SAND, dark brown, very dense		804	23-50/0" (50/0")	50/0"	16.6 [24.8%]
	S-2	SS	1	1	CHALK, light brownish tan to light yellowish white, very hard			50/1" (50/1")	50/1"	
5	S-3	SS	0	0			799	50/0" (50/0")	50/0"	4.3
	S-4	SS	0	0				50/0" (50/0")	50/0"	
	S-5	SS	0	0	**END OF BORING AT 8.5 FT**			50/0" (50/0")	50/0"	4.8
10							794			
15							789			
20							784			
25							779			
30							774			

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 03 2023**	CAVE IN DEPTH:	
WL (Completion) **Dry**	BORING COMPLETED: **Feb 03 2023**	HAMMER TYPE: **Auto**	
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-05**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3016330.7**	EASTING: **920210.5**	STATION:	SURFACE ELEVATION: **796**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT (20 40 60 80 100) / ROCK QUALITY DESIGNATION & RECOVERY (RQD, REC)	LIQUID LIMIT / PLASTIC LIMIT / CALIBRATED PENETROMETER TSF (1 2 3 4 5) / WATER CONTENT % [FINES CONTENT] % (10 20 30 40 50)
0	S-1	SS	3	3	(SC) CLAYEY SAND, dark brown, very dense			50/3" (50/3")	50/3"	17.8 [47.5%]
	S-2	SS	3	3	CHALK, light reddish tan, very hard			50/3" (50/3")	50/3"	4.9
5	S-3	SS	3	3			791	50/3" (50/3")	50/3"	
	S-4	SS	1	1				50/1" (50/1")	50/1"	4.6
	S-5	SS	1	1				50/1" (50/1")	50/1"	
10					**END OF BORING AT 8.58 FT**		786			
15							781			
20							776			
25							771			
30							766			

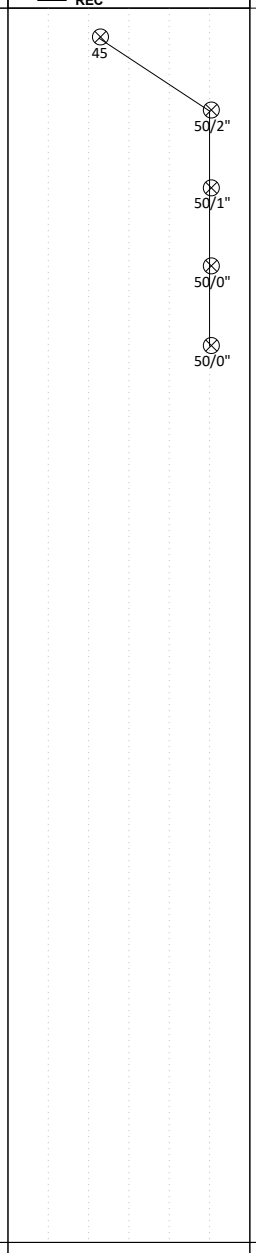
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

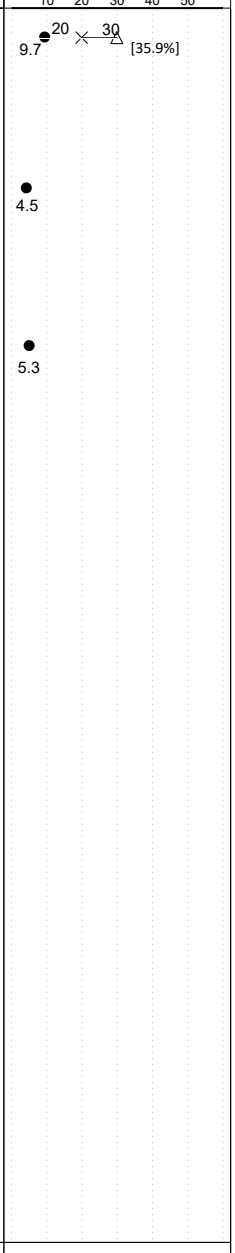
WL (First Encountered) **Dry**	BORING STARTED: **Feb 03 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 03 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-06**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3016374.5**	EASTING: **919959.1**	STATION:	SURFACE ELEVATION: **821**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	18	18	(SC) CLAYEY SAND WITH GRAVEL, dark brown, dense			10-27-18 (45)
	S-2	SS	2	2	CHALK, light grayish tan to light yellowish white, very hard			50/2" (50/2")
5	S-3	SS	1	1			816	50/1" (50/1")
	S-4	SS	0	0				50/0" (50/0")
	S-5	SS	0	0	**END OF BORING AT 8.5 FT**			50/0" (50/0")
10							811	
15							806	
20							801	
25							796	
30							791	





THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

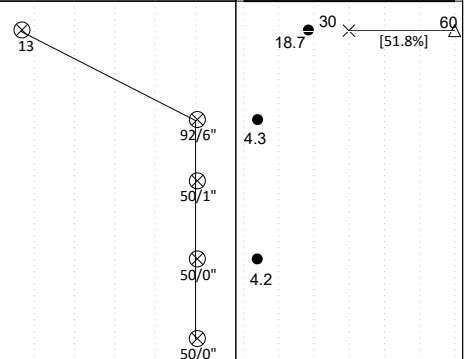
▽ WL (First Encountered)	**Dry**	BORING STARTED: **Feb 03 2023**	CAVE IN DEPTH:
▼ WL (Completion)	**Dry**	BORING COMPLETED: **Feb 03 2023**	HAMMER TYPE: **Auto**
⧩ WL (Seasonal High Water)		EQUIPMENT: **Truck** / LOGGED BY:	DRILLING METHOD: **Auger**
⧩ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-07**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3016159.5**	EASTING: **920154.1**	STATION:	SURFACE ELEVATION: **803**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	18	18	(CH) SANDY FAT CLAY WITH GRAVEL, dark brown, stiff			4-5-8 (13)
	S-2	SS	12	12	CHALK, light brownish white to light yellowish white, very hard			40-42-50/0" (92/6")
5	S-3	SS	1	1			798	50/1" (50/1")
	S-4	SS	0	0				50/0" (50/0")
	S-5	SS	0	0				50/0" (50/0")
					END OF BORING AT 8.5 FT			
10							793	
15							788	
20							783	
25							778	
30							773	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100
ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC
LIQUID LIMIT, PLASTIC LIMIT
CALIBRATED PENETROMETER TSF: 1 2 3 4 5
WATER CONTENT % [FINES CONTENT] %: 10 20 30 40 50



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered) **Dry**	BORING STARTED: **Feb 03 2023**	CAVE IN DEPTH:	
▼ WL (Completion) **Dry**	BORING COMPLETED: **Feb 03 2023**	HAMMER TYPE: **Auto**	
▼ WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
▽ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-08**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3015972.0**	EASTING: **920163.9**	STATION:	SURFACE ELEVATION: **829**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	9	9	(GM) SILTY GRAVEL WITH SAND, dark brown, very dense			15-50/3" (50/3")
	S-2	SS	0	0	CHALK, light brownish white, very hard			50/0" (50/0")
5	S-3	SS	0	0			824	50/0" (50/0")
	S-4	SS	0	0				50/0" (50/0")
	S-5	SS	0	0	**END OF BORING AT 8.5 FT**			50/0" (50/0")
10							819	
15							814	
20							809	
25							804	
30							799	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100

ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC

LIQUID LIMIT / PLASTIC LIMIT

CALIBRATED PENETROMETER TSF: 1 2 3 4 5

WATER CONTENT % [FINES CONTENT] %: 10 20 30 40 50

50/3" 50/0" 50/0" 50/0" 50/0"

13.4 3.4 3.3 30 55 [26.7%]

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 03 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 03 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

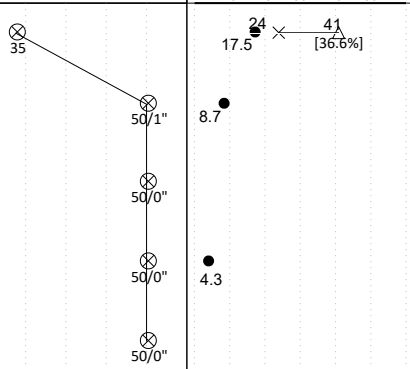
GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-09**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3015838.6**	EASTING: **920393.5**	STATION:	SURFACE ELEVATION: **811**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	18	18	(SC) CLAYEY SAND WITH GRAVEL, dark brown, dense			6-12-23 (35)
	~~S-2~~	~~SS~~	~~1~~	~~1~~	CHALK, light brownish tan to light yellowish white, very hard			50/1" (50/1")
5	~~S-3~~	~~SS~~	~~0~~	~~0~~			806	50/0" (50/0")
	~~S-4~~	~~SS~~	~~0~~	~~0~~				50/0" (50/0")
	~~S-5~~	~~SS~~	~~0~~	~~0~~	**END OF BORING AT 8.5 FT**			50/0" (50/0")
10							801	
15							796	
20							791	
25							786	
30							781	

STANDARD PENETRATION BLOWS/FT (20 40 60 80 100)
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC

LIQUID LIMIT
PLASTIC LIMIT
CALIBRATED PENETROMETER TSF (1 2 3 4 5)
WATER CONTENT %
[FINES CONTENT] %
(10 20 30 40 50)



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 03 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 03 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-10**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3016136.4**	EASTING: **920285.2**	STATION:	SURFACE ELEVATION: **827**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT (20 40 60 80 100) / ROCK QUALITY DESIGNATION & RECOVERY (RQD, REC)	LIQUID LIMIT / PLASTIC LIMIT / CALIBRATED PENETROMETER TSF (1 2 3 4 5) / WATER CONTENT % [FINES CONTENT] % (10 20 30 40 50)
0	S-1	SS	13	13	(ML) SANDY SILT, dark brown, very hard			13-34-50/1" (84/7")	84/7"	9.4; 29; 49 [69.4%]
	S-2	SS	2	2	CHALK, light yellowish brown, very hard			50/2" (50/2")	50/2"	
5	S-3	SS	1	1			822	50/1" (50/1")	50/1"	5.2
	S-4	SS	0	0				50/0" (50/0")	50/0"	
	S-5	SS	0	0	**END OF BORING AT 8.5 FT**			50/0" (50/0")	50/0"	5.4
10							817			
15							812			
20							807			
25							802			
30							797			

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 03 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 03 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-11**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3015947.7**	EASTING: **920471.5**	STATION:	SURFACE ELEVATION: **812**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	12	12	(GC) CLAYEY GRAVEL WITH SAND, dark brown, very dense			7-15-50/0" (65/6")
	S-2	SS	0	0	CHALK, light brownish tan, very hard			50/0" (50/0")
5	S-3	SS	0	0			807	50/0" (50/0")
	S-4	SS	0	0				50/0" (50/0")
	S-5	SS	0	0	**END OF BORING AT 8.5 FT**		802	50/0" (50/0")
10								
15							797	
20							792	
25							787	
30							782	

STANDARD PENETRATION BLOWS/FT (20 40 60 80 100)
ROCK QUALITY DESIGNATION & RECOVERY
RQD
REC

65/6" 50/0" 50/0" 50/0" 50/0"

LIQUID LIMIT
PLASTIC LIMIT
CALIBRATED PENETROMETER TSF (1 2 3 4 5)
WATER CONTENT %
[FINES CONTENT] %
(10 20 30 40 50)

9.0 7.2 6.9 39 57 [69.9%]

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 03 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 03 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-12**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3015947.9**	EASTING: **920630.5**	STATION:	SURFACE ELEVATION: **799**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	15	15	(SM) SILTY SAND WITH GRAVEL, dark brown, very dense			3-13-50/3" (63/9")
	S-2	SS	1	1	CHALK, light brownish tan, very hard			50/1" (50/1")
5	S-3	SS	1	1			794	50/1" (50/1")
	S-4	SS	0	0				50/0" (50/0")
	S-5	SS	0	0	**END OF BORING AT 8.5 FT**			50/0" (50/0")
10							789	
15							784	
20							779	
25							774	
30							769	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100
ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC
63/9", 50/1", 50/1", 50/0", 50/0"

LIQUID LIMIT
PLASTIC LIMIT
CALIBRATED PENETROMETER TSF: 1 2 3 4 5
WATER CONTENT %
[FINES CONTENT] %: 10 20 30 40 50
29, 49, 19.3, [34.1%], 7.5, 8.7

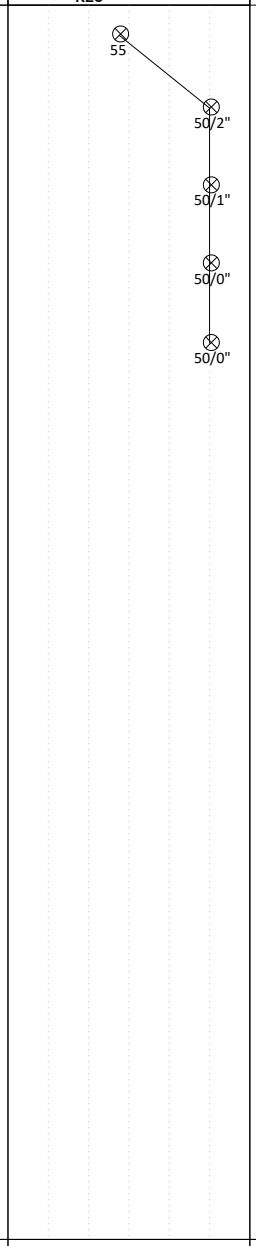
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

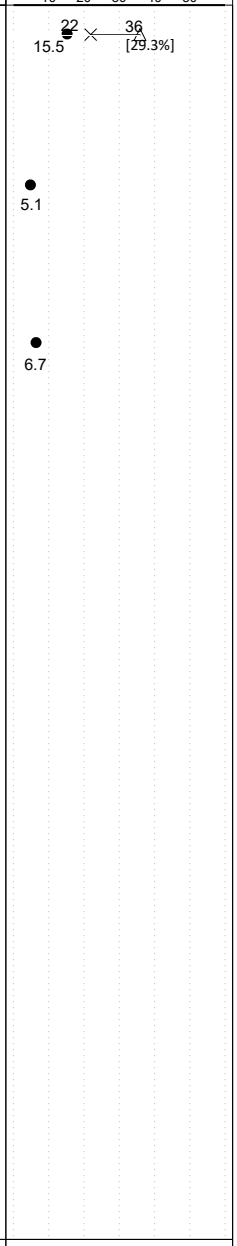
WL (First Encountered) **Dry**	BORING STARTED: **Feb 03 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 03 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-13**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3015947.9**	EASTING: **920793.3**	STATION:	SURFACE ELEVATION: **769**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	18	18	(GC) CLAYEY GRAVEL WITH SAND, dark brown, very dense			6-18-37 (55)
	S-2	SS	2	2	CHALK, light brownish white, very hard			50/2" (50/2")
5	S-3	SS	1	1			764	50/1" (50/1")
	S-4	SS	0	0				50/0" (50/0")
	S-5	SS	0	0	**END OF BORING AT 8.5 FT**			50/0" (50/0")
10							759	
15							754	
20							749	
25							744	
30							739	





THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 03 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 03 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-14**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3015980.0**	EASTING: **920936.6**	STATION:	SURFACE ELEVATION: **732**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	18	18	(GW-GC) WELL-GRADED GRAVEL WITH CLAY AND SAND, dark brown, dense			5-14-33 (47)
	S-2	SS	3	3	CHALK, light yellowish brown, very hard			50/3" (50/3")
5	S-3	SS	2	2			727	50/2" (50/2")
	S-4	SS	1	1				50/1" (50/1")
	S-5	SS	1	1				50/1" (50/1")
					END OF BORING AT 8.58 FT			
10							722	
15							717	
20							712	
25							707	
30							702	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100
ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC
47 (S-1); 50/3" (S-2); 50/2" (S-3); 50/1" (S-4); 50/1" (S-5)

LIQUID LIMIT / PLASTIC LIMIT
CALIBRATED PENETROMETER TSF: 1 2 3 4 5
WATER CONTENT % [FINES CONTENT] %: 10 20 30 40 50
24 / 38 / 19.5 [8.6%]; 5.1; 6.1

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 03 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 03 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-15**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3016111.9**	EASTING: **920705.0**	STATION:	SURFACE ELEVATION: **789**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT (20 40 60 80 100) / ROCK QUALITY DESIGNATION & RECOVERY (RQD, REC)	LIQUID LIMIT / PLASTIC LIMIT / CALIBRATED PENETROMETER TSF (1 2 3 4 5) / WATER CONTENT % [FINES CONTENT] % (10 20 30 40 50)
0	S-1	SS	8	8	(GM) SILTY GRAVEL, dark brown, very dense		789	6-50/2" (50/2")	50/2"	26.9 [16.2%]
	S-2	SS	2	2	CHALK, light yellowish white, very hard			50/2" (50/2")	50/2"	
5	S-3	SS	1	1			784	50/1" (50/1")	50/1"	
	S-4	SS	2	2				50/2" (50/2")	50/2"	4.0
	S-5	SS	1	1				50/1" (50/1")	50/1"	
					END OF BORING AT 8.58 FT					
10							779			
15							774			
20							769			
25							764			
30							759			

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 06 2023**	CAVE IN DEPTH:	
WL (Completion) **Dry**	BORING COMPLETED: **Feb 06 2023**	HAMMER TYPE: **Auto**	
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-16**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3016288.5**	EASTING: **920593.7**	STATION:	SURFACE ELEVATION: **808**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	9	9	(SC) CLAYEY SAND WITH GRAVEL, dark brown, very dense			6-50/3" (50/3")
	S-2	SS	2	2	CHALK, light brownish white, very hard			50/2" (50/2")
5	S-3	SS	1	1			803	50/1" (50/1")
	S-4	SS	0	0				50/0" (50/0")
	S-5	SS	0	0	**END OF BORING AT 8.5 FT**			50/0" (50/0")
10							798	
15							793	
20							788	
25							783	
30							778	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100

ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC

LIQUID LIMIT, PLASTIC LIMIT

CALIBRATED PENETROMETER TSF: 1 2 3 4 5

WATER CONTENT % [FINES CONTENT] %: 10 20 30 40 50

22 14.2 33 [20.2%] 4.8

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

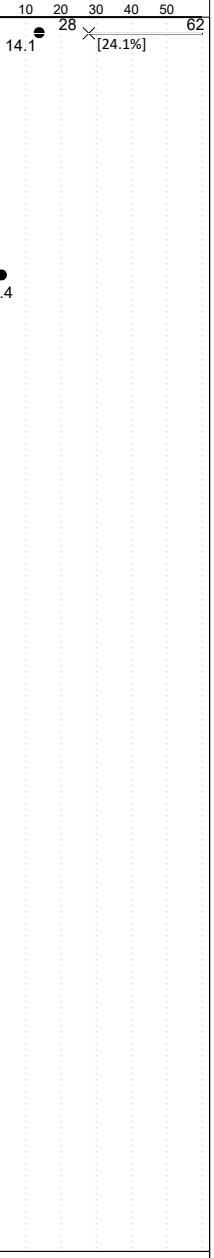
WL (First Encountered) **Dry**	BORING STARTED: **Feb 04 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 04 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-17**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3016491.1**	EASTING: **920505.3**	STATION:	SURFACE ELEVATION: **792**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"
0	S-1	SS	10	10	(GC) CLAYEY GRAVEL WITH SAND, dark brown, very dense			5-50/4" (50/4")
	S-2	SS	2	2	CHALK, light yellowish brown, very hard			50/2" (50/2")
5	S-3	SS	1	1			787	50/1" (50/1")
	S-4	SS	0	0				50/0" (50/0")
	S-5	SS	0	0	**END OF BORING AT 8.5 FT**			50/0" (50/0")
10							782	
15							777	
20							772	
25							767	
30							762	

STANDARD PENETRATION BLOWS/FT: 20 40 60 80 100
ROCK QUALITY DESIGNATION & RECOVERY: RQD, REC
LIQUID LIMIT, PLASTIC LIMIT
CALIBRATED PENETROMETER TSF: 1 2 3 4 5
WATER CONTENT % [FINES CONTENT] %: 10 20 30 40 50



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 04 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 04 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-18**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3016286.5**	EASTING: **920422.8**	STATION:	SURFACE ELEVATION: **818**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT (20 40 60 80 100) / ROCK QUALITY DESIGNATION & RECOVERY (RQD, REC)	LIQUID LIMIT / PLASTIC LIMIT / CALIBRATED PENETROMETER TSF (1 2 3 4 5) / WATER CONTENT % [FINES CONTENT] % (10 20 30 40 50)
0	S-1	SS	10	10	(GC) CLAYEY GRAVEL WITH SAND, dark brown, very dense			4-50/4" (50/4")	50/4"	16.6 [20.5%]
	S-2	SS	2	2	CHALK, light yellowish white, very hard			50/2" (50/2")	50/2"	
5	S-3	SS	1	1			813	50/1" (50/1")	50/1"	
	S-4	SS	0	0				50/0" (50/0")	50/0"	
	S-5	SS	0	0	**END OF BORING AT 8.5 FT**			50/0" (50/0")	50/0"	4.5
10							808			
15							803			
20							798			
25							793			
30							788			

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

▽ WL (First Encountered)	**Dry**	BORING STARTED: **Feb 04 2023**	CAVE IN DEPTH:
▼ WL (Completion)	**Dry**	BORING COMPLETED: **Feb 04 2023**	HAMMER TYPE: **Auto**
⧩ WL (Seasonal High Water)		EQUIPMENT: **Truck** / LOGGED BY:	DRILLING METHOD: **Auger**
⧩ WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

CLIENT:	PROJECT NO.:	BORING NO.:	SHEET:
TriOak Development, LLC	**20:1609**	**B-19**	**1 of 1**
PROJECT NAME: **Flying W, Units 1 thru 4 & 6**	DRILLER/CONTRACTOR:		
SITE LOCATION: **FM 1102, New Braunfels, Texas, 78130-7857**			LOSS OF CIRCULATION
NORTHING: **3016098.5**	EASTING: **920971.4**	STATION:	SURFACE ELEVATION: **748**
			BOTTOM OF CASING

DEPTH (FT)	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DIST. (IN)	RECOVERY (IN)	DESCRIPTION OF MATERIAL	WATER LEVELS	ELEVATION (FT)	BLOWS/6"	STANDARD PENETRATION BLOWS/FT (20 40 60 80 100) / ROCK QUALITY DESIGNATION & RECOVERY (RQD, REC)	LIQUID LIMIT / PLASTIC LIMIT / CALIBRATED PENETROMETER TSF (1 2 3 4 5) / WATER CONTENT % [FINES CONTENT] % (10 20 30 40 50)
0	S-1	SS	8	8	(GM) SILTY GRAVEL WITH SAND, dark brown, very dense CHALK, light grayish white, very hard		748	35-50/2" (50/2")	50/2"	9.4
	S-2	SS	2	2				50/2" (50/2")	50/2"	
5	S-3	SS	2	2			743	50/2" (50/2")	50/2"	6.8
	S-4	SS	2	2				50/2" (50/2")	50/2"	
	S-5	SS	1	1				50/1" (50/1")	50/1"	6.7
10							738			
	S-6	SS	1	1				50/1" (50/1")	50/1"	
15							733			
	S-7	SS	2	2				50/2" (50/2")	50/2"	5.8
20							728			
	S-8	SS	1	1				50/1" (50/1")	50/1"	
25							723			
	S-9	SS	1	1	**END OF BORING AT 28.58 FT**			50/1" (50/1")	50/1"	4.9
30							718			

33 [19.8%] 55

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL

WL (First Encountered) **Dry**	BORING STARTED: **Feb 06 2023**		CAVE IN DEPTH:
WL (Completion) **Dry**	BORING COMPLETED: **Feb 06 2023**		HAMMER TYPE: **Auto**
WL (Seasonal High Water)	EQUIPMENT: **Truck**	LOGGED BY:	DRILLING METHOD: **Auger**
WL (Stabilized)			

GEOTECHNICAL BOREHOLE LOG

APPENDIX C – Laboratory Testing

Laboratory Testing Summary
Particle Size Distribution
Moisture-Density Relationship
California Bearing Ratio

Laboratory Testing Summary

Sample Location	Sample Number	Depth (feet)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-01	S-1	0-1.5	21.9	CH	72	22	50	56.5					
B-01	S-3	4.5-4.67	8.1										
B-01	S-5	8.5-8.58	6.0										
B-01	S-7	18.5-18.5	5.6										
B-02	S-1	0-1.25	12.4	GC	32	19	13	26.0					
B-02	S-2	2.5-2.67	7.3										
B-02	S-4	6.5-6.58	7.8										
B-02	S-6	13.5-13.5	9.1										
B-02	S-8	23.5-23.5	7.2										
B-03	S-1	0-0.67	16.0					27.2					

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC

Project No.: 20:1609
Date Reported: 2/23/2023

Office / Lab	Address	Office Number / Fax
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received
JJCastro		JJCastro	

Laboratory Testing Summary

Sample Location	Sample Number	Depth (feet)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-03	S-3	4.5-4.58	4.4										
B-03	S-5	8.5-8.5	4.9										
B-04	S-1	0-0.5	16.6					24.8					
B-04	S-3	4.5-4.5	4.3										
B-04	S-5	8.5-8.5	4.8										
B-05	S-1	0-0.25	17.8	SC	48	26	22	47.5					
B-05	S-2	2.5-2.75	4.9										
B-05	S-4	6.5-6.58	4.6										
B-06	S-1	0-1.5	9.7	SC	30	20	10	35.9					
B-06	S-3	4.5-4.58	4.5										

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC

Project No.: 20:1609
Date Reported: 2/23/2023

Office / Lab	Address	Office Number / Fax
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received
JJCastro		JJCastro	

Laboratory Testing Summary

Sample Location	Sample Number	Depth (feet)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-06	S-5	8.5-8.5	5.3										
B-07	S-1	0-1.5	18.7	CH	60	30	30	51.8					
B-07	S-2	2.5-3.5	4.3										
B-07	S-4	6.5-6.5	4.2										
B-08	S-1	0-0.75	13.4	GM	55	30	25	26.7					
B-08	S-3	4.5-4.5	3.4										
B-08	S-5	8.5-8.5	3.3										
B-09	S-1	0-1.5	17.5	SC	41	24	17	36.6					
B-09	S-2	2.5-2.58	8.7										
B-09	S-4	6.5-6.5	4.3										

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC

Project No.: 20:1609
Date Reported: 2/23/2023

Office / Lab	Address	Office Number / Fax
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received
JJCastro		JJCastro	

Laboratory Testing Summary

Sample Location	Sample Number	Depth (feet)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-10	S-1	0-1.08	9.4	ML	49	29	20	69.4					
B-10	S-3	4.5-4.58	5.2										
B-10	S-5	8.5-8.5	5.4										
B-11	S-1	0-1	9.0					13.3					
B-11	S-2	2.5-2.5	7.2										
B-11	S-5	8.5-8.5	6.9										
B-12	S-1	0-1.25	19.3	SM	49	29	20	34.1					
B-12	S-3	4.5-4.58	7.5										
B-12	S-5	8.5-8.5	8.7										
B-13	S-1	0-1.5	15.5	GC	36	22	14	29.3					

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC

Project No.: 20:1609
Date Reported: 2/23/2023

Office / Lab	Address	Office Number / Fax
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received
JJCastro		JJCastro	

Laboratory Testing Summary

Sample Location	Sample Number	Depth (feet)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-13	S-3	4.5-4.58	5.1										
B-13	S-5	8.5-8.5	6.7										
B-14	S-1	0-1.5	19.5	GW-GC	38	24	14	8.6					
B-14	S-3	4.5-4.67	5.1										
B-14	S-5	8.5-8.58	6.1										
B-15	S-1	0-0.67	26.9	GM	65	34	31	16.2					
B-15	S-4	6.5-6.67	4.0										
B-16	S-1	0-0.75	14.2	SC	33	22	11	20.2					
B-16	S-3	4.5-4.58	4.8										
B-17	S-1	0-0.83	14.1	GC	62	28	34	24.1					

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC

Project No.: 20:1609
Date Reported: 2/23/2023

Office / Lab	Address	Office Number / Fax
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received
JJCastro		JJCastro	

Laboratory Testing Summary

Sample Location	Sample Number	Depth (feet)	^MC (%)	Soil Type	Atterberg Limits			**Percent Passing No. 200 Sieve	Moisture - Density		CBR (%)		#Organic Content (%)
					LL	PL	PI		<Maximum Density (pcf)	<Optimum Moisture (%)	0.1 in.	0.2 in.	
B-17	S-4	6.5-6.5	3.4										
B-18	S-1	0-0.83	16.6					20.5					
B-18	S-5	8.5-8.5	4.5										
B-19	S-1	0-0.67	9.4	GM	55	33	22	19.8					
B-19	S-3	4.5-4.67	6.8										
B-19	S-5	8.5-8.58	6.7										
B-19	S-7	18.5-18.67	5.8										
B-19	S-9	28.5-28.58	4.9										

Notes: See test reports for test method, ^ASTM D2216-19, *ASTM D2488, **ASTM D1140-17, #ASTM D2974-20e1 < See test report for D4718 corrected values

Definitions: MC: Moisture Content, Soil Type: USCS (Unified Soil Classification System), LL: Liquid Limit, PL: Plastic Limit, PI: Plasticity Index, CBR: California Bearing Ratio, OC: Organic Content

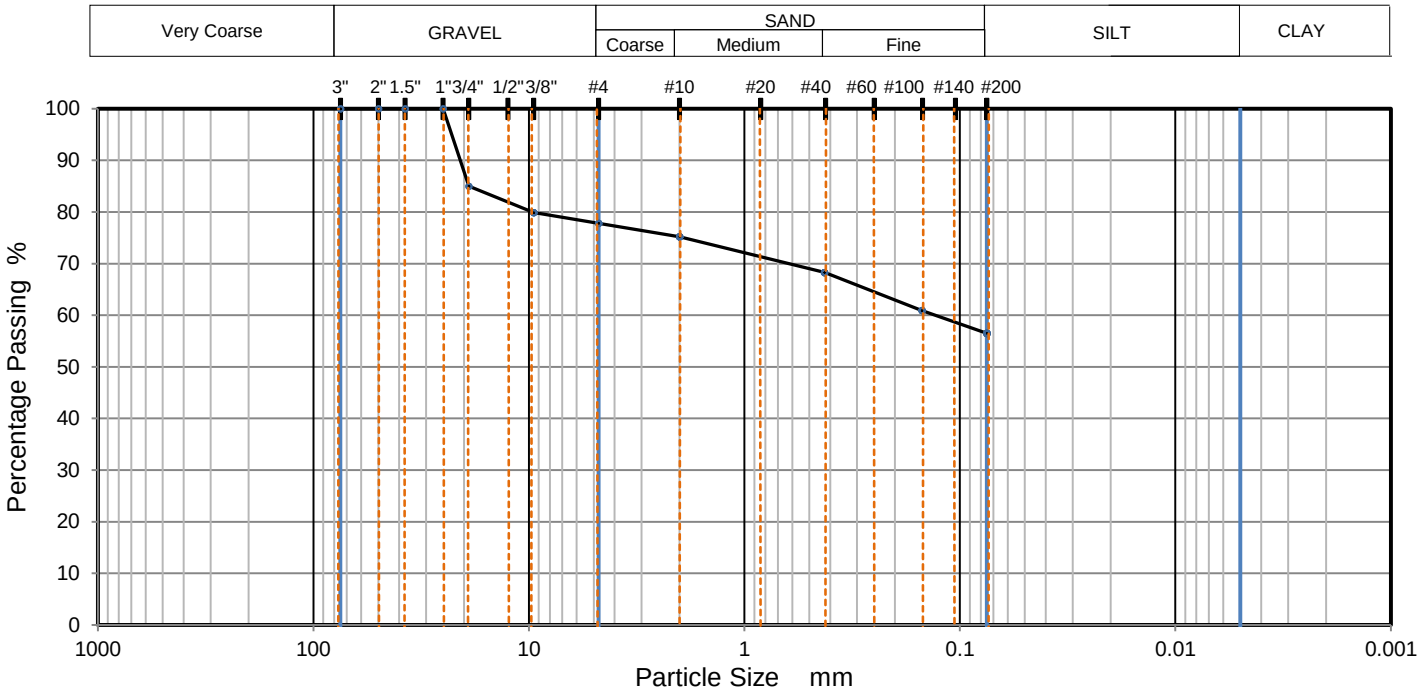
Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC

Project No.: 20:1609
Date Reported: 2/23/2023

Office / Lab	Address	Office Number / Fax
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received
JJCastro		JJCastro	

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	85		
3/8"	80		
#4	78		
#10	75		
#40	68		
#100	61		
#200	57		

Dry Mass of sample, g	164.3

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	22
Coarse Sand, #4 to #10 sieve	3
Medium Sand, #10 to #40	7
Fine Sand, #40 to #200	12
Fines <#200	57

USCS	CH	Liquid Limit	72	D90	20.820	D50		D10	
AASHTO	A-7-6	Plastic Limit	22	D85	19.000	D30		Cu	
USCS Group Name	Gravelly fat clay with sand	Plasticity Index	50	D60	0.130	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-01

Project No.: 20:1609
Depth (ft): 0 - 1.5
Sample No.: S-1
Date Reported: 2/23/2023

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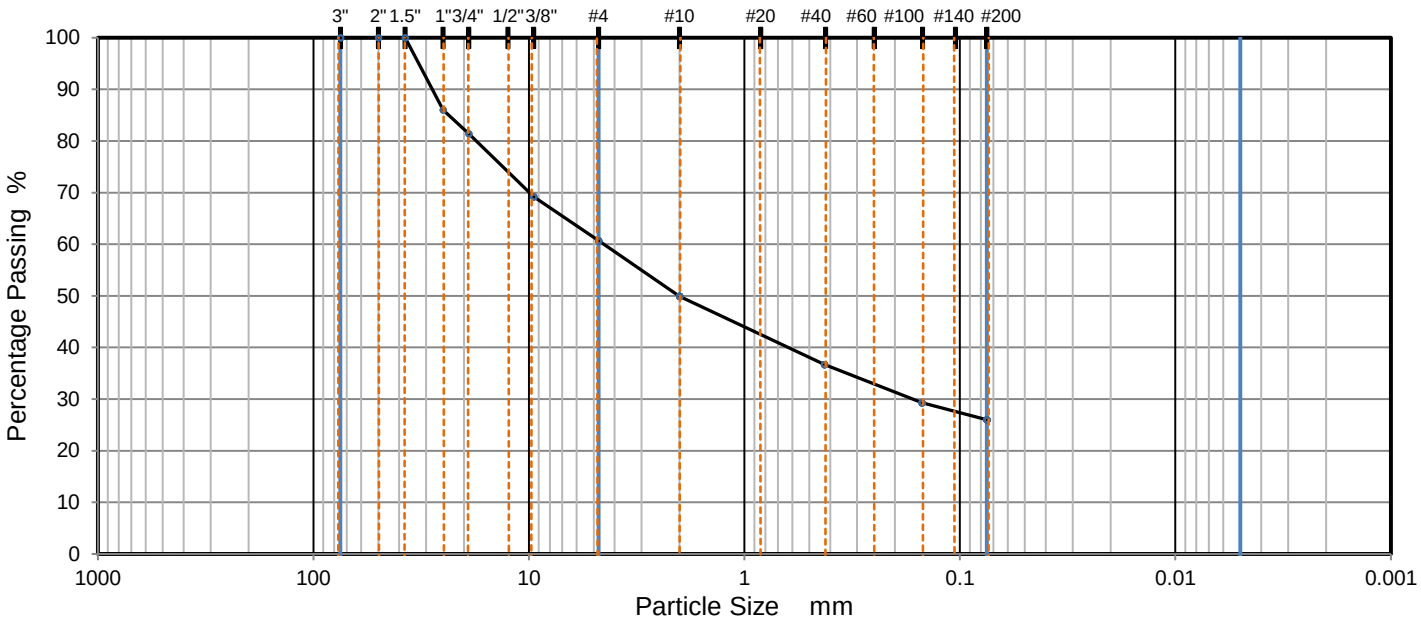
PARTICLE SIZE DISTRIBUTION

Very Coarse	GRAVEL	SAND			SILT	CLAY
		Coarse	Medium	Fine		



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	86		
3/4"	81		
3/8"	69		
#4	61		
#10	50		
#40	37		
#100	29		
#200	26		

Dry Mass of sample, g	270.1

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	39
Coarse Sand, #4 to #10 sieve	11
Medium Sand, #10 to #40	13
Fine Sand, #40 to #200	11
Fines <#200	26

USCS	GC	Liquid Limit	32	D90	28.070	D50	2.016	D10	
AASHTO	A-2-6	Plastic Limit	19	D85	23.550	D30	0.166	Cu	
USCS Group Name	Clayey gravel with sand	Plasticity Index	13	D60	4.491	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-02

Project No.: 20:1609
Depth (ft): 0 - 1.25
Sample No.: S-1
Date Reported: 2/23/2023

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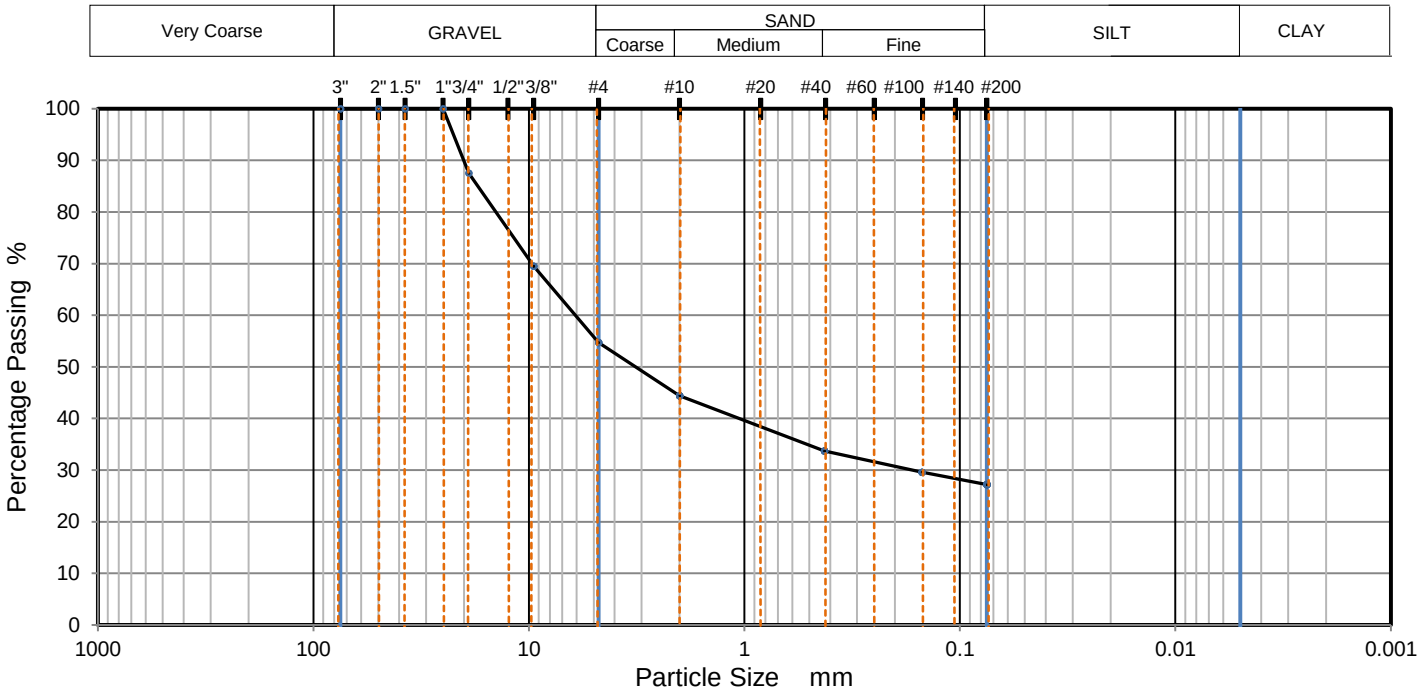
PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	88		
3/8"	70		
#4	55		
#10	44		
#40	34		
#100	30		
#200	27		

Dry Mass of sample, g	258.8

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	45
Coarse Sand, #4 to #10 sieve	10
Medium Sand, #10 to #40	11
Fine Sand, #40 to #200	7
Fines <#200	27

USCS		Liquid Limit		D90	20.070	D50	3.201	D10	
AASHTO	A-2-4	Plastic Limit		D85	17.260	D30	0.166	Cu	
USCS Group Name		Plasticity Index		D60	6.088	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-03

Project No.: 20:1609
Depth (ft): 0 - 0.67
Sample No.: S-1
Date Reported: 2/23/2023

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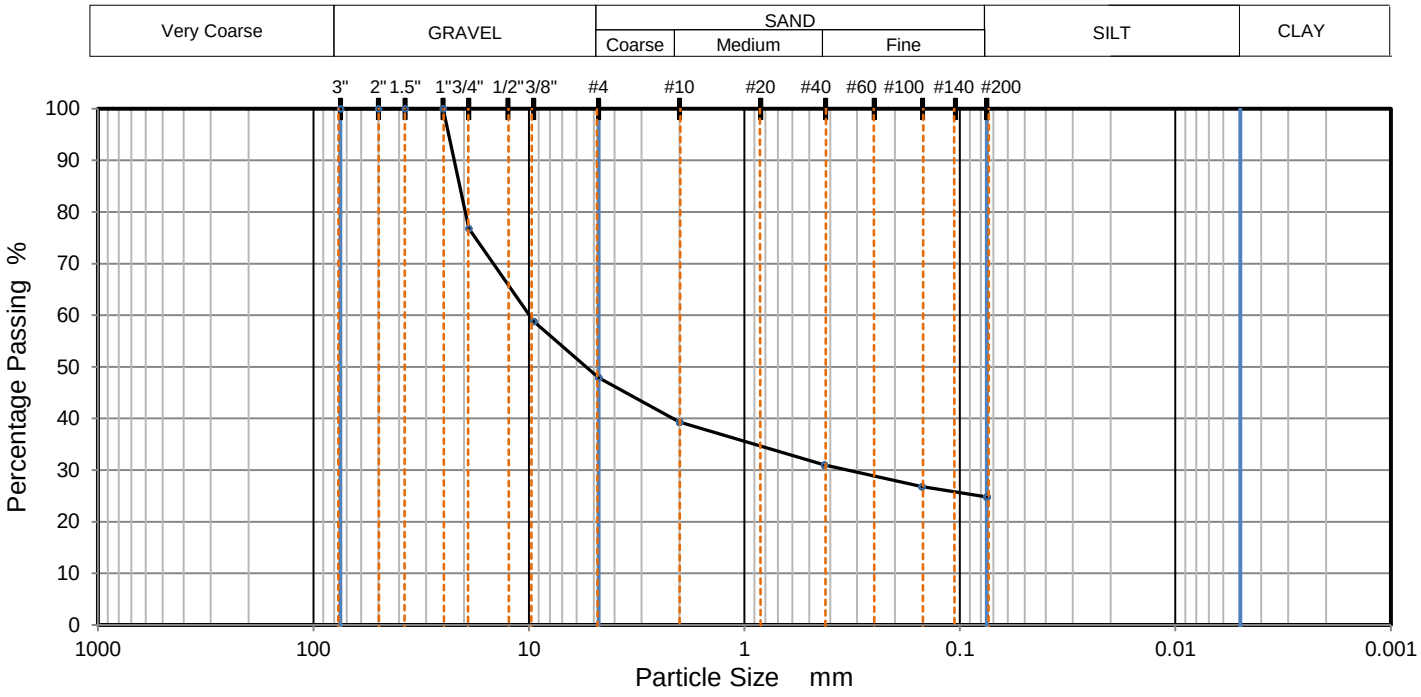
PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	77		
3/8"	59		
#4	48		
#10	39		
#40	31		
#100	27		
#200	25		

Dry Mass of sample, g	165.4

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	52
Coarse Sand, #4 to #10 sieve	9
Medium Sand, #10 to #40	8
Fine Sand, #40 to #200	6
Fines <#200	25

USCS		Liquid Limit		D90	22.210	D50	5.429	D10	
AASHTO	A-1-b	Plastic Limit		D85	20.940	D30	0.332	Cu	
USCS Group Name		Plasticity Index		D60	9.949	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-04

Project No.: 20:1609
Depth (ft): 0 - 0.5
Sample No.: S-1
Date Reported: 2/23/2023

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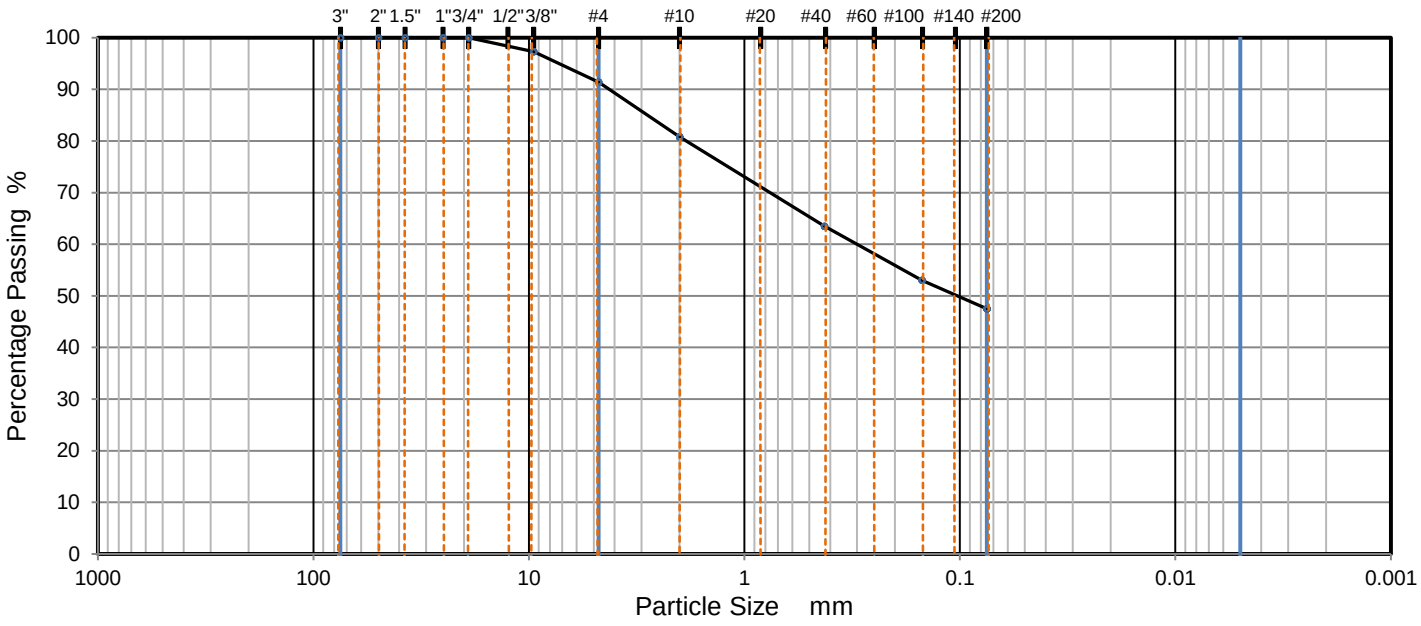
PARTICLE SIZE DISTRIBUTION

Very Coarse	GRAVEL	SAND			SILT	CLAY
		Coarse	Medium	Fine		



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	97		
#4	91		
#10	81		
#40	64		
#100	53		
#200	48		

Dry Mass of sample, g	110.1

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	9
Coarse Sand, #4 to #10 sieve	11
Medium Sand, #10 to #40	17
Fine Sand, #40 to #200	16
Fines <#200	48

USCS	SC	Liquid Limit	48	D90	4.237	D50	0.103	D10	
AASHTO	A-7-6	Plastic Limit	26	D85	2.818	D30		Cu	
USCS Group Name	Clayey sand	Plasticity Index	22	D60	0.300	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-05

Project No.: 20:1609
Depth (ft): 0 - 0.25
Sample No.: S-1
Date Reported: 2/23/2023

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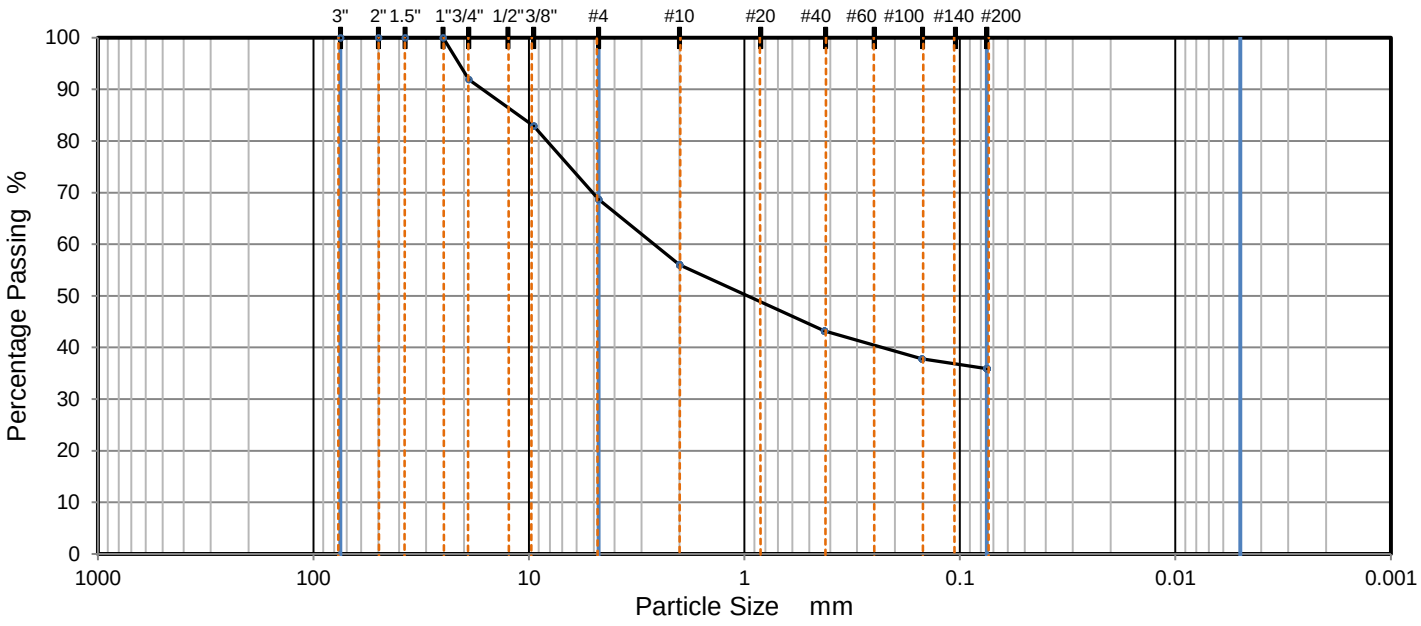
PARTICLE SIZE DISTRIBUTION

Very Coarse	GRAVEL	SAND			SILT	CLAY
		Coarse	Medium	Fine		



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	92		
3/8"	83		
#4	69		
#10	56		
#40	43		
#100	38		
#200	36		

Dry Mass of sample, g	274.8

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	31
Coarse Sand, #4 to #10 sieve	13
Medium Sand, #10 to #40	13
Fine Sand, #40 to #200	7
Fines <#200	36

USCS	SC	Liquid Limit	30	D90	16.410	D50	0.968	D10	
AASHTO	A-4	Plastic Limit	20	D85	11.170	D30		Cu	
USCS Group Name	Clayey sand with gravel	Plasticity Index	10	D60	2.626	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-06

Project No.: 20:1609
Depth (ft): 0 - 1.5
Sample No.: S-1
Date Reported: 2/23/2023

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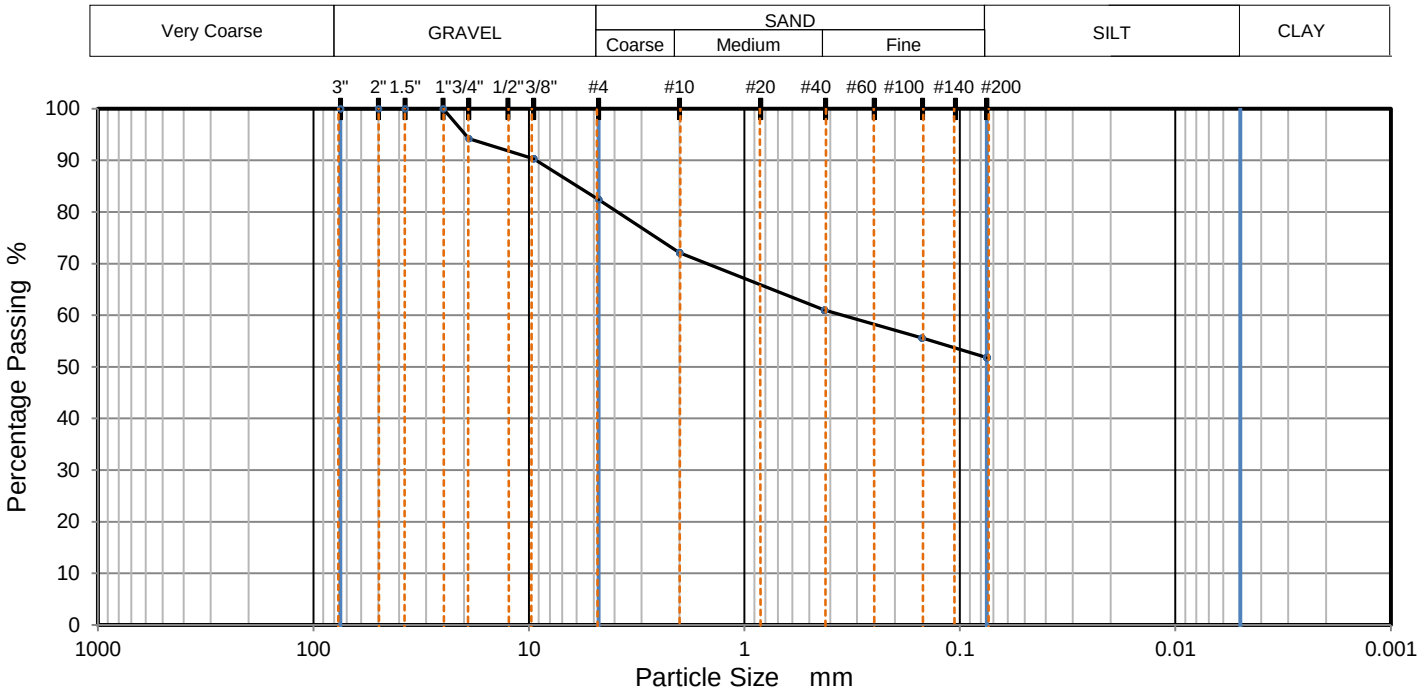

TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	94		
3/8"	90		
#4	82		
#10	72		
#40	61		
#100	56		
#200	52		

Dry Mass of sample, g: 217.7

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	18
Coarse Sand, #4 to #10 sieve	10
Medium Sand, #10 to #40	11
Fine Sand, #40 to #200	9
Fines <#200	52

USCS	CH	Liquid Limit	60	D90	9.253	D50		D10	
AASHTO	A-7-5	Plastic Limit	30	D85	5.967	D30		Cu	
USCS Group Name	Sandy fat clay with gravel	Plasticity Index	30	D60	0.351	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-07

Project No.: 20:1609
Depth (ft): 0 - 1.5
Sample No.: S-1
Date Reported: 2/23/2023

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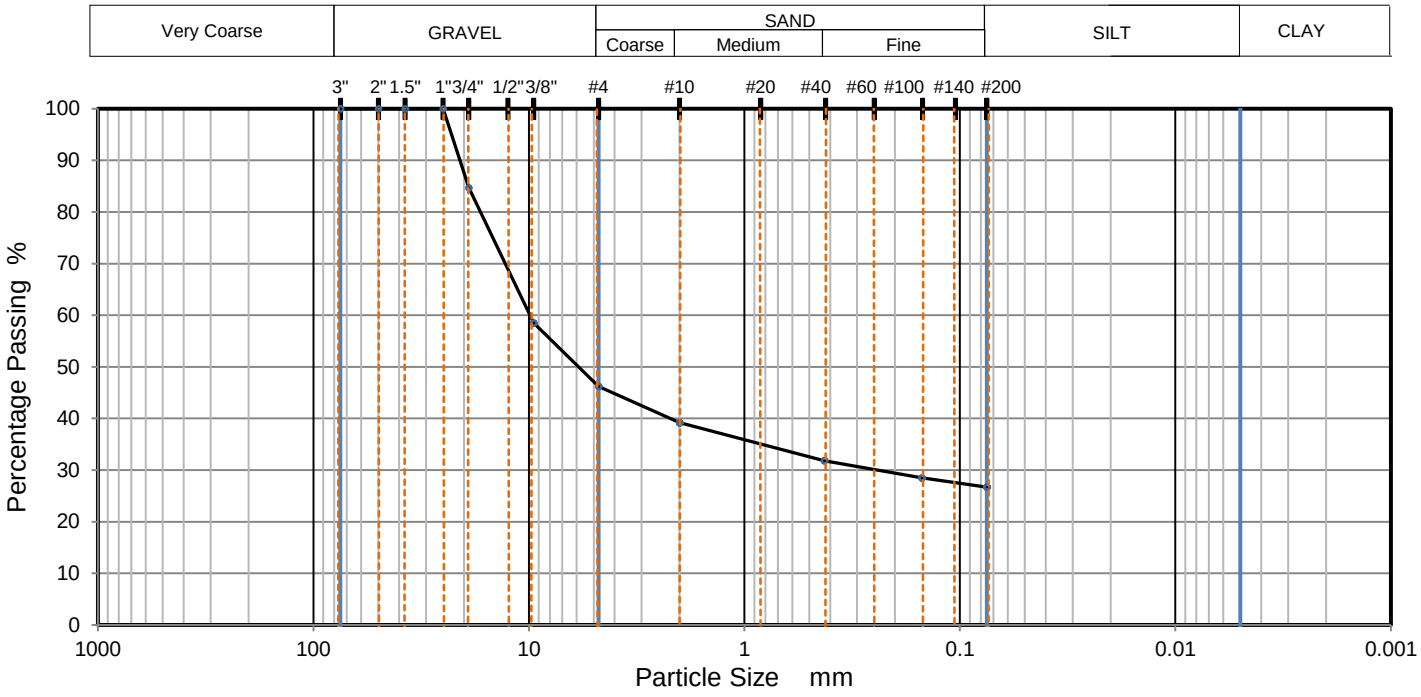

TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	85		
3/8"	59		
#4	46		
#10	39		
#40	32		
#100	29		
#200	27		

Dry Mass of sample, g	264.5

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	54
Coarse Sand, #4 to #10 sieve	7
Medium Sand, #10 to #40	7
Fine Sand, #40 to #200	5
Fines <#200	27

USCS	GM	Liquid Limit	55	D90	20.890	D50	5.884	D10	
AASHTO	A-2-7	Plastic Limit	30	D85	19.100	D30	0.241	Cu	
USCS Group Name	Silty gravel with sand	Plasticity Index	25	D60	9.885	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-08

Project No.: 20:1609
Depth (ft): 0 - 0.75
Sample No.: S-1
Date Reported: 2/23/2023

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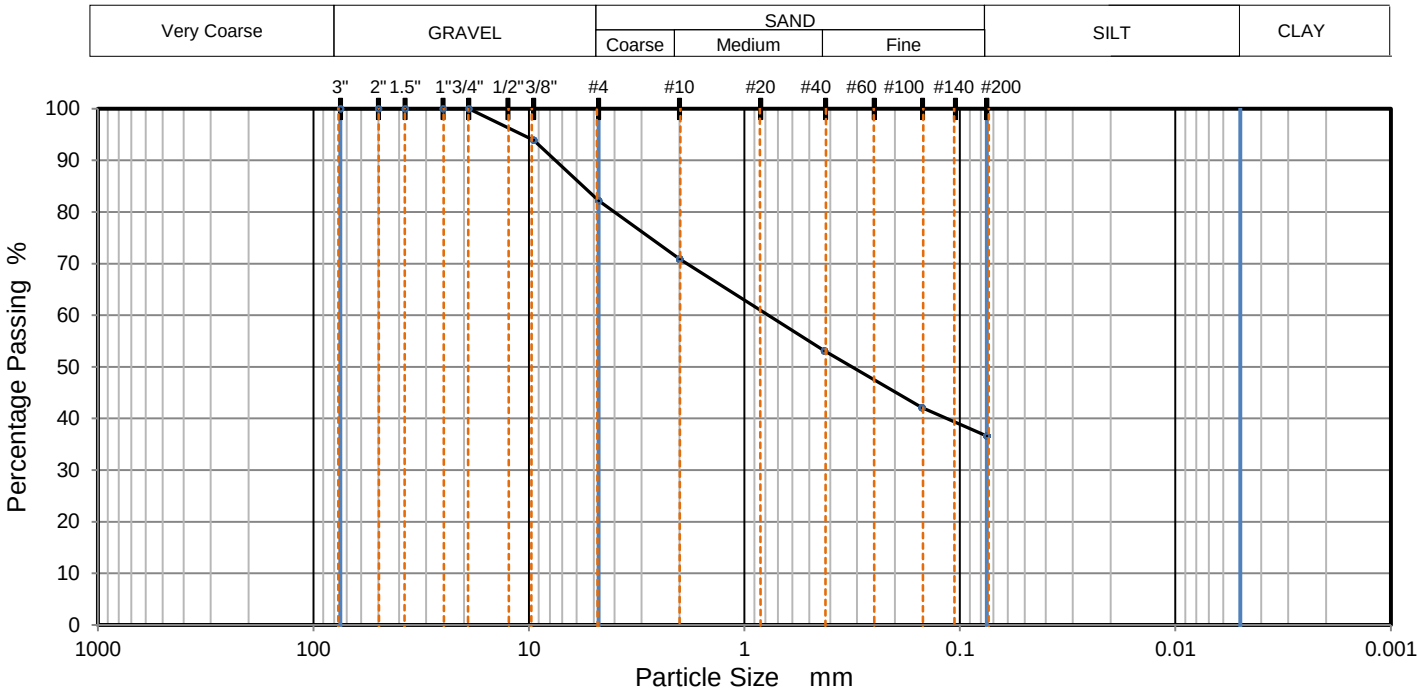
PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	94		
#4	82		
#10	71		
#40	53		
#100	42		
#200	37		

Dry Mass of sample, g	262.8

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	18
Coarse Sand, #4 to #10 sieve	11
Medium Sand, #10 to #40	18
Fine Sand, #40 to #200	17
Fines <#200	37

USCS	SC	Liquid Limit	41	D90	7.540	D50	0.317	D10	
AASHTO	A-7-6	Plastic Limit	24	D85	5.607	D30		Cu	
USCS Group Name	Clayey sand with gravel	Plasticity Index	17	D60	0.775	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-09

Project No.: 20:1609
Depth (ft): 0 - 1.5
Sample No.: S-1
Date Reported: 2/23/2023

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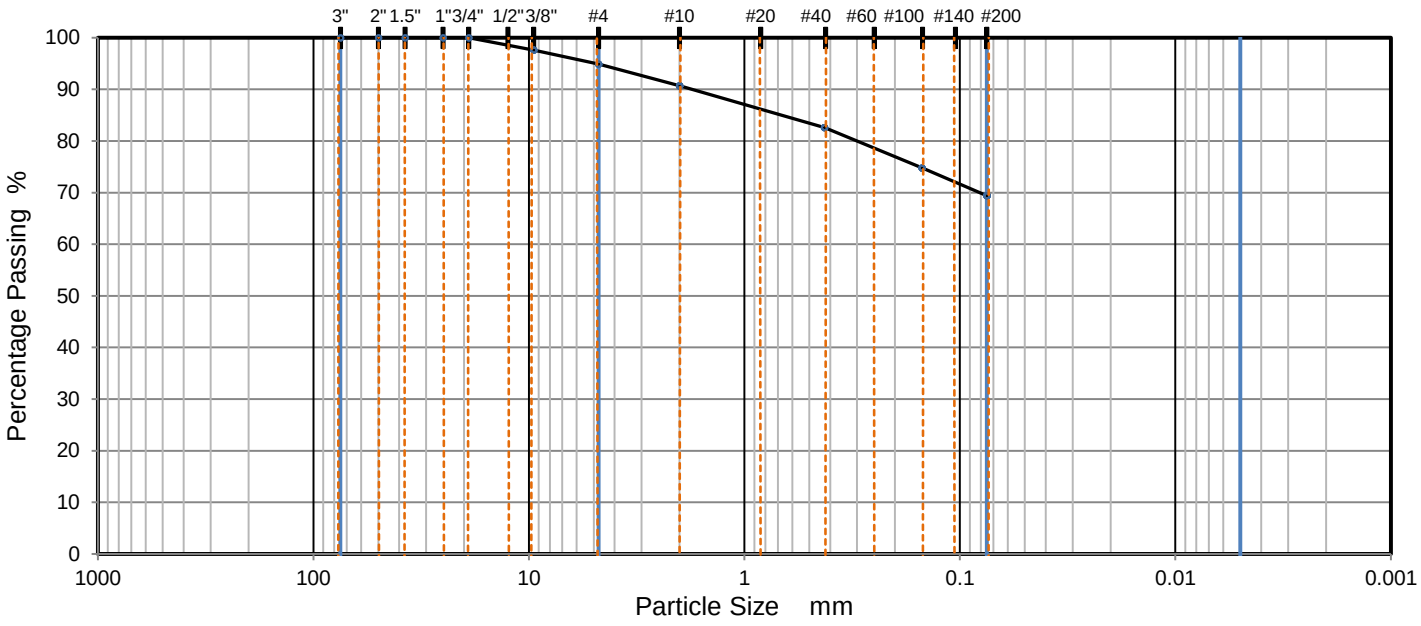
PARTICLE SIZE DISTRIBUTION

Very Coarse	GRAVEL	SAND			SILT	CLAY
		Coarse	Medium	Fine		



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	100		
3/8"	98		
#4	95		
#10	91		
#40	83		
#100	75		
#200	69		

Dry Mass of sample, g	277.0

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	5
Coarse Sand, #4 to #10 sieve	4
Medium Sand, #10 to #40	8
Fine Sand, #40 to #200	13
Fines <#200	69

USCS	ML	Liquid Limit	49	D90	1.749	D50		D10	
AASHTO	A-7-6	Plastic Limit	29	D85	0.673	D30		Cu	
USCS Group Name	Sandy silt	Plasticity Index	20	D60		D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-10

Project No.: 20:1609
Depth (ft): 0 - 1.08
Sample No.: S-1
Date Reported: 2/23/2023

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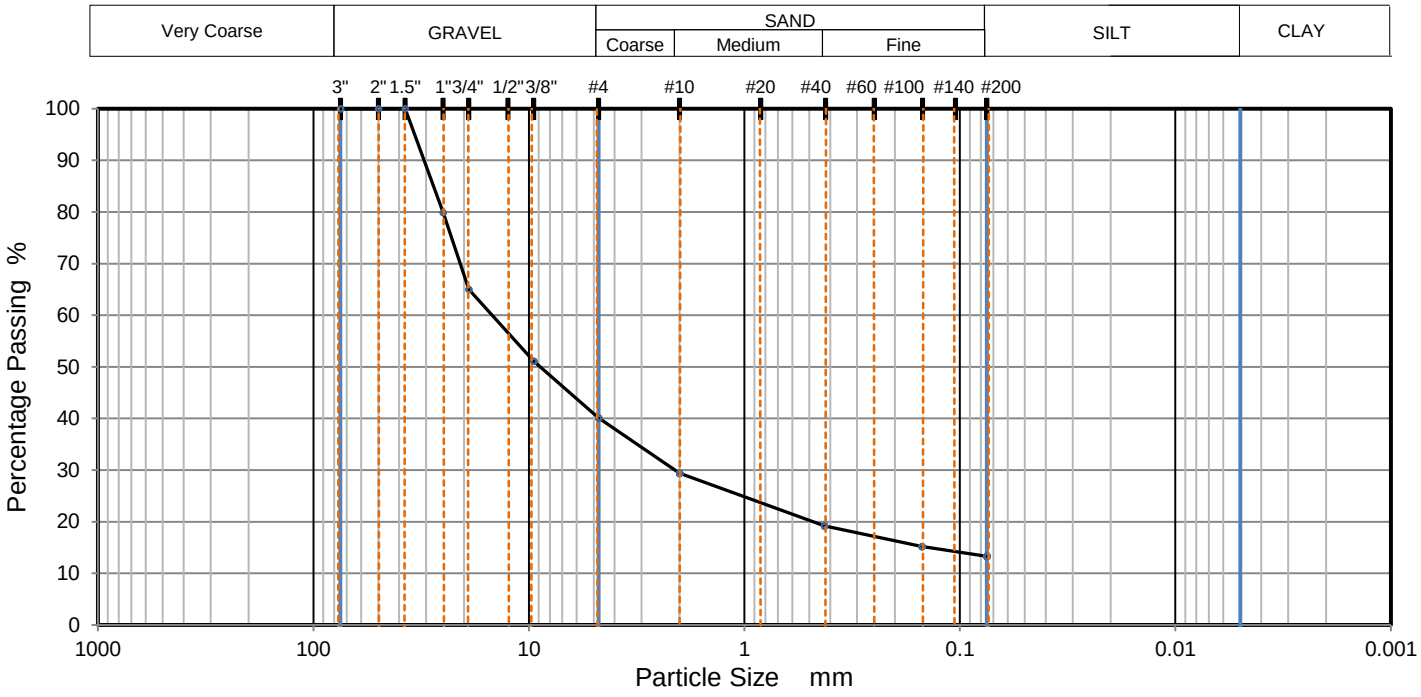
PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	80		
3/4"	65		
3/8"	51		
#4	40		
#10	29		
#40	19		
#100	15		
#200	13		

Dry Mass of sample, g	275.5

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	60
Coarse Sand, #4 to #10 sieve	11
Medium Sand, #10 to #40	10
Fine Sand, #40 to #200	6
Fines <#200	13

USCS		Liquid Limit		D90	30.650	D50	8.864	D10	
AASHTO	A-1-a	Plastic Limit		D85	27.710	D30	2.099	Cu	
USCS Group Name		Plasticity Index		D60	14.810	D15	0.139	Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-11

Project No.: 20:1609
Depth (ft): 0 - 1
Sample No.: S-1
Date Reported: 2/23/2023

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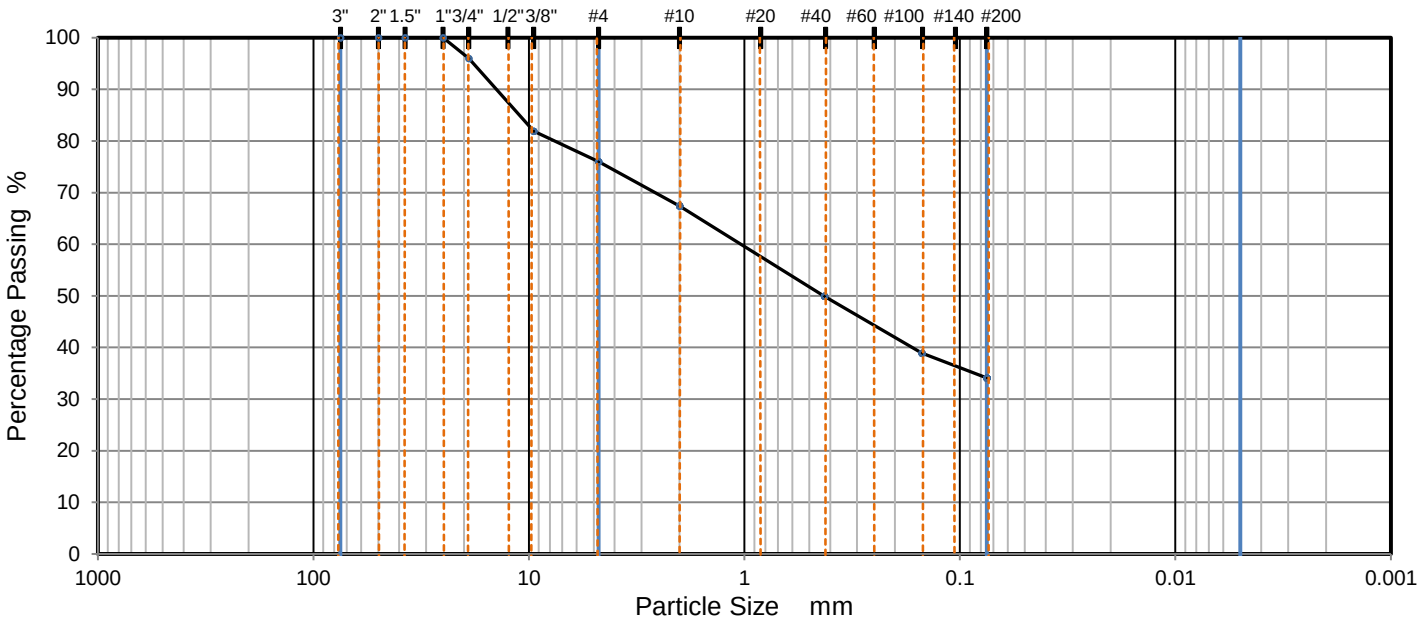
PARTICLE SIZE DISTRIBUTION

Very Coarse	GRAVEL	SAND			SILT	CLAY
		Coarse	Medium	Fine		



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	96		
3/8"	82		
#4	76		
#10	67		
#40	50		
#100	39		
#200	34		

Dry Mass of sample, g	257.2

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	24
Coarse Sand, #4 to #10 sieve	9
Medium Sand, #10 to #40	18
Fine Sand, #40 to #200	16
Fines <#200	34

USCS	SM	Liquid Limit	49	D90	14.150	D50	0.429	D10	
AASHTO	A-2-7	Plastic Limit	29	D85	11.060	D30		Cu	
USCS Group Name	Silty sand with gravel	Plasticity Index	20	D60	1.039	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-12

Project No.: 20:1609
Depth (ft): 0 - 1.25
Sample No.: S-1
Date Reported: 2/23/2023

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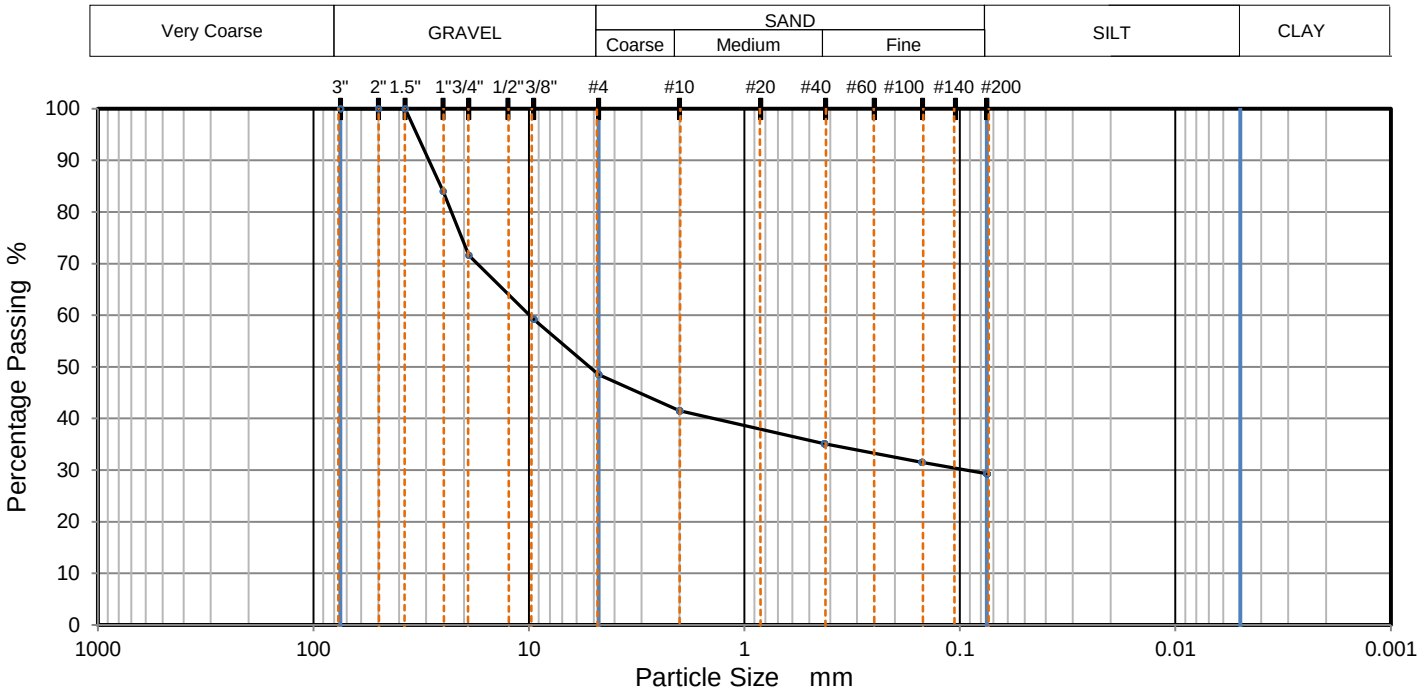

TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	84		
3/4"	72		
3/8"	59		
#4	49		
#10	42		
#40	35		
#100	32		
#200	29		

Dry Mass of sample, g: 275.1

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	52
Coarse Sand, #4 to #10 sieve	7
Medium Sand, #10 to #40	6
Fine Sand, #40 to #200	6
Fines <#200	29

USCS	GC	Liquid Limit	36	D90	29.110	D50	5.235	D10	
AASHTO	A-2-6	Plastic Limit	22	D85	25.640	D30	0.094	Cu	
USCS Group Name	Clayey gravel with sand	Plasticity Index	14	D60	9.934	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-13

Project No.: 20:1609
Depth (ft): 0 - 1.5
Sample No.: S-1
Date Reported: 2/23/2023

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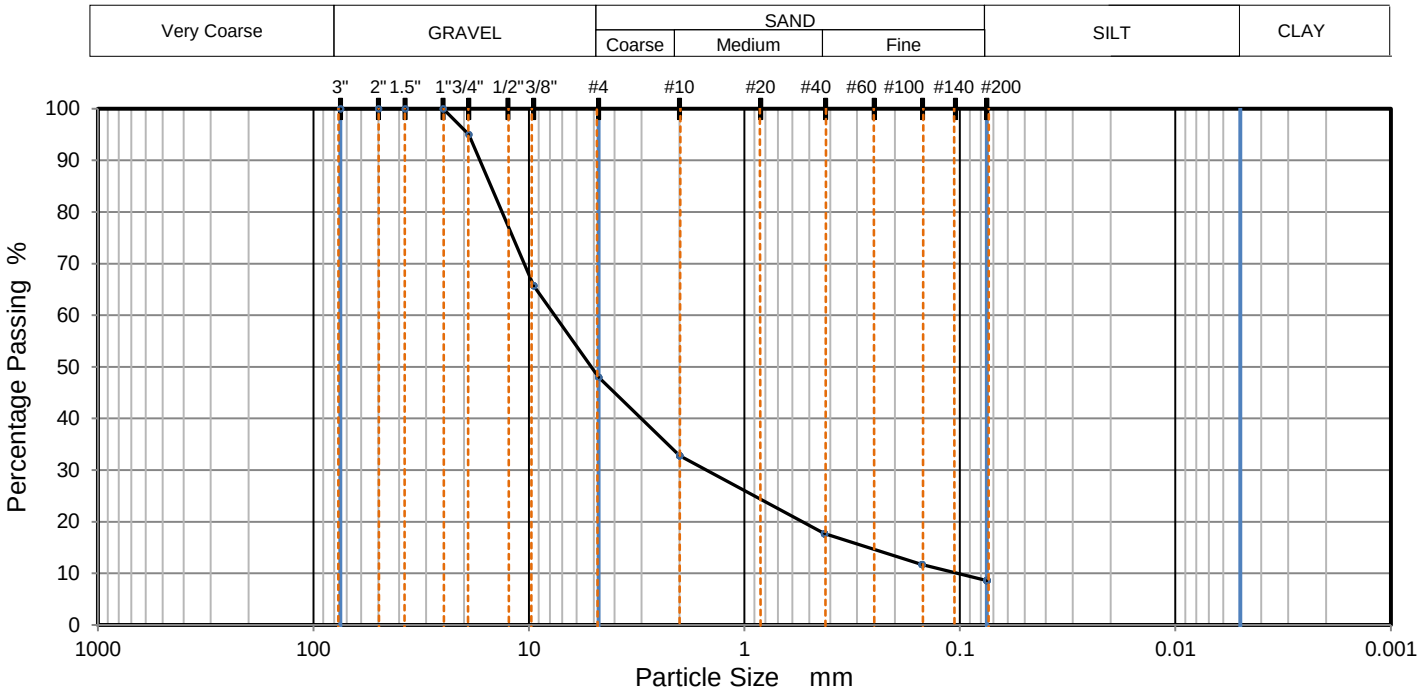
JJCastro		JJCastro		

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	95		
3/8"	66		
#4	48		
#10	33		
#40	18		
#100	12		
#200	9		

Dry Mass of sample, g	251.3

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	52
Coarse Sand, #4 to #10 sieve	15
Medium Sand, #10 to #40	15
Fine Sand, #40 to #200	9
Fines <#200	9

USCS	GW-GC	Liquid Limit	38	D90	16.880	D50	5.137	D10	0.103
AASHTO	A-2-6	Plastic Limit	24	D85	15.000	D30	1.501	Cu	74.064
USCS Group Name	Well graded gravel with clay and sand	Plasticity Index	14	D60	7.599	D15	0.266	Cc	2.890

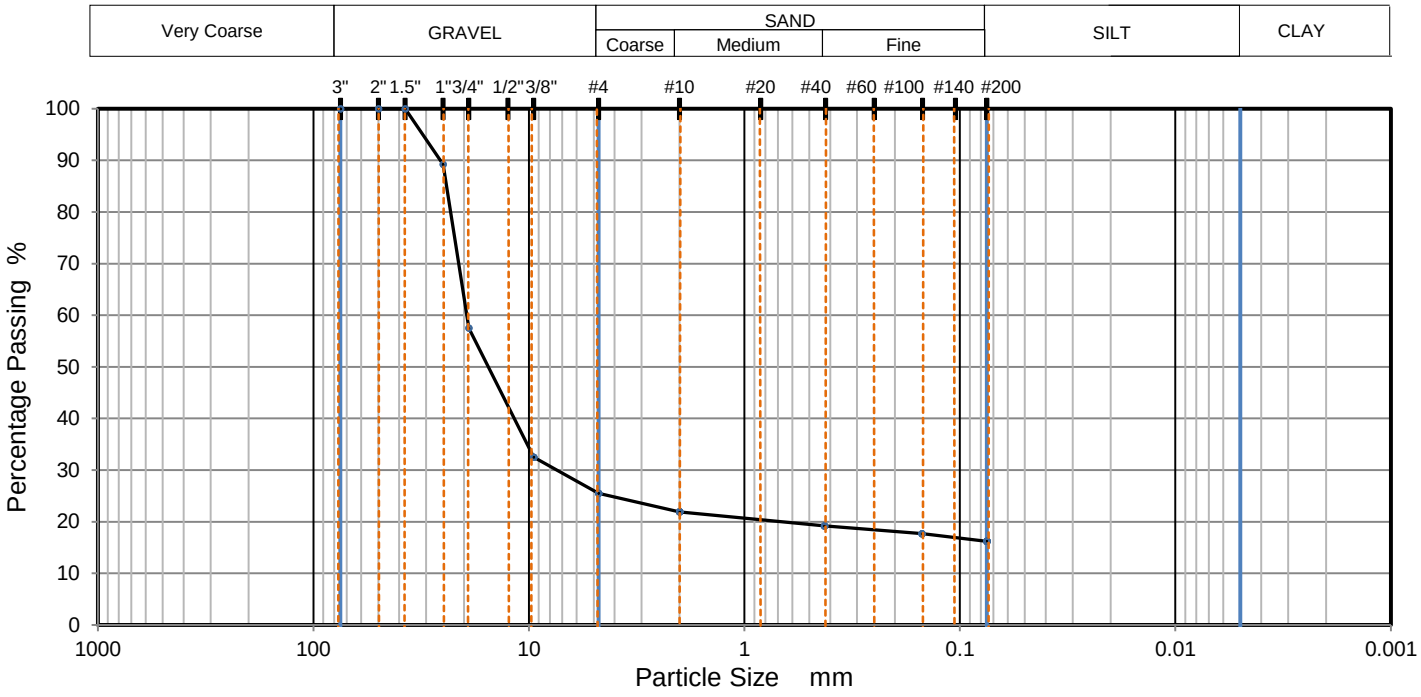
Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-14

Project No.: 20:1609
Depth (ft): 0 - 1.5
Sample No.: S-1
Date Reported: 2/23/2023

Office / Lab	Address	Office Number / Fax
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received	Remarks
JJCastro		JJCastro		

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	89		
3/4"	58		
3/8"	33		
#4	26		
#10	22		
#40	19		
#100	18		
#200	16		

Dry Mass of sample, g	234.8

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	75
Coarse Sand, #4 to #10 sieve	4
Medium Sand, #10 to #40	3
Fine Sand, #40 to #200	3
Fines <#200	16

USCS	GM	Liquid Limit	65	D90	25.760	D50	15.430	D10	
AASHTO	A-2-7	Plastic Limit	34	D85	24.110	D30	7.417	Cu	
USCS Group Name	Silty gravel	Plasticity Index	31	D60	19.420	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-15

Project No.: 20:1609
Depth (ft): 0 - 0.67
Sample No.: S-1
Date Reported: 2/23/2023

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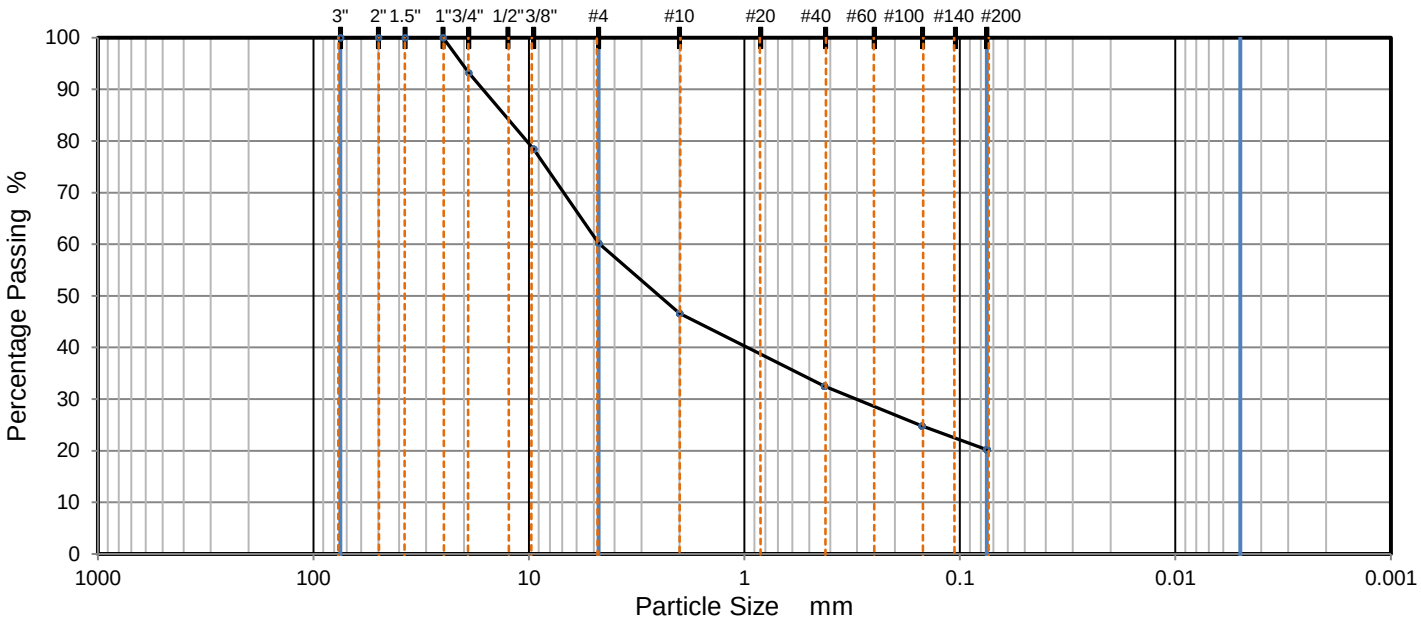
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received	Remarks
JJCastro		JJCastro		

PARTICLE SIZE DISTRIBUTION

Very Coarse	GRAVEL	SAND			SILT	CLAY
		Coarse	Medium	Fine		



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	93		
3/8"	78		
#4	60		
#10	47		
#40	33		
#100	25		
#200	20		

Dry Mass of sample, g	263.7

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	40
Coarse Sand, #4 to #10 sieve	14
Medium Sand, #10 to #40	14
Fine Sand, #40 to #200	12
Fines <#200	20

USCS	SC	Liquid Limit	33	D90	16.360	D50	2.483	D10	
AASHTO	A-2-6	Plastic Limit	22	D85	12.940	D30	0.303	Cu	
USCS Group Name	Clayey sand with gravel	Plasticity Index	11	D60	4.690	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-16

Project No.: 20:1609
Depth (ft): 0 - 0.75
Sample No.: S-1
Date Reported: 2/23/2023

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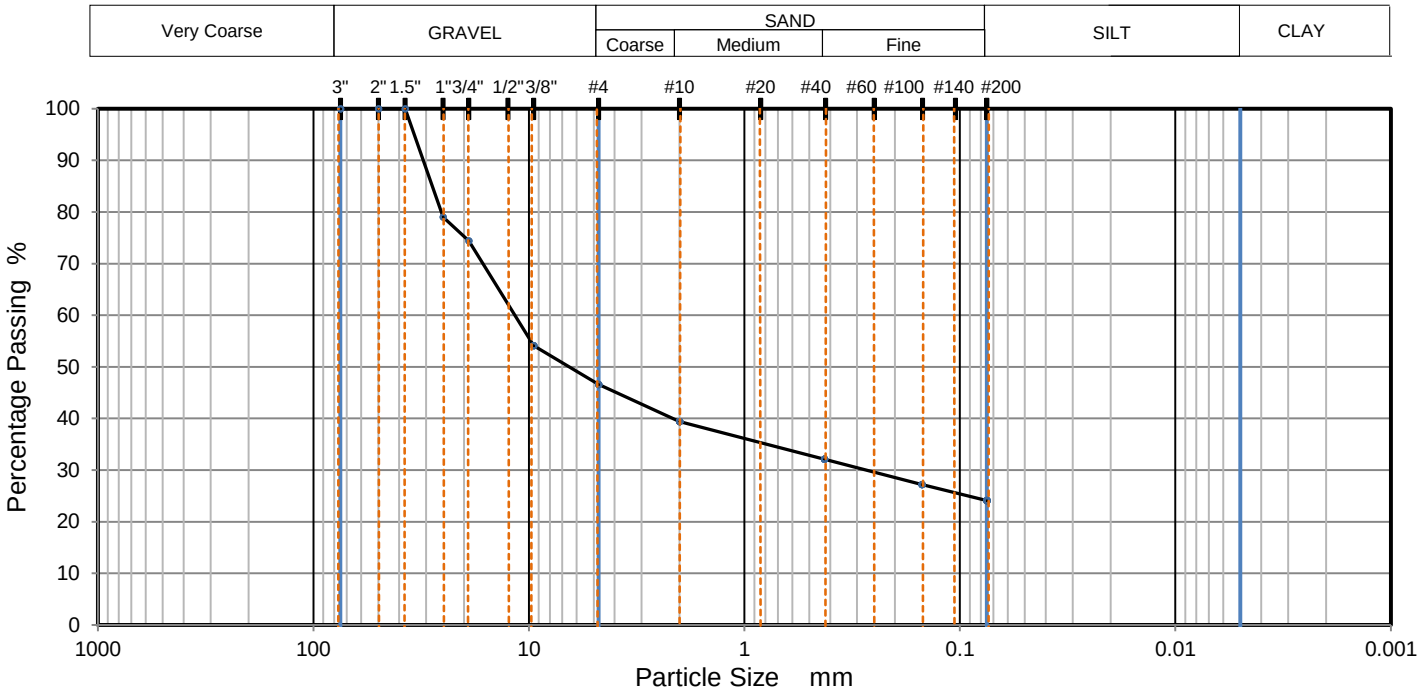
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received	Remarks
JJCastro		JJCastro		

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	79		
3/4"	74		
3/8"	54		
#4	47		
#10	39		
#40	32		
#100	27		
#200	24		

Dry Mass of sample, g: 170.4

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	53
Coarse Sand, #4 to #10 sieve	7
Medium Sand, #10 to #40	7
Fine Sand, #40 to #200	8
Fines <#200	24

USCS	GC	Liquid Limit	62	D90	30.920	D50	6.504	D10	
AASHTO	A-2-7	Plastic Limit	28	D85	28.070	D30	0.272	Cu	
USCS Group Name	Clayey gravel with sand	Plasticity Index	34	D60	11.620	D15		Cc	

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-17

Project No.: 20:1609
Depth (ft): 0 - 0.83
Sample No.: S-1
Date Reported: 2/23/2023

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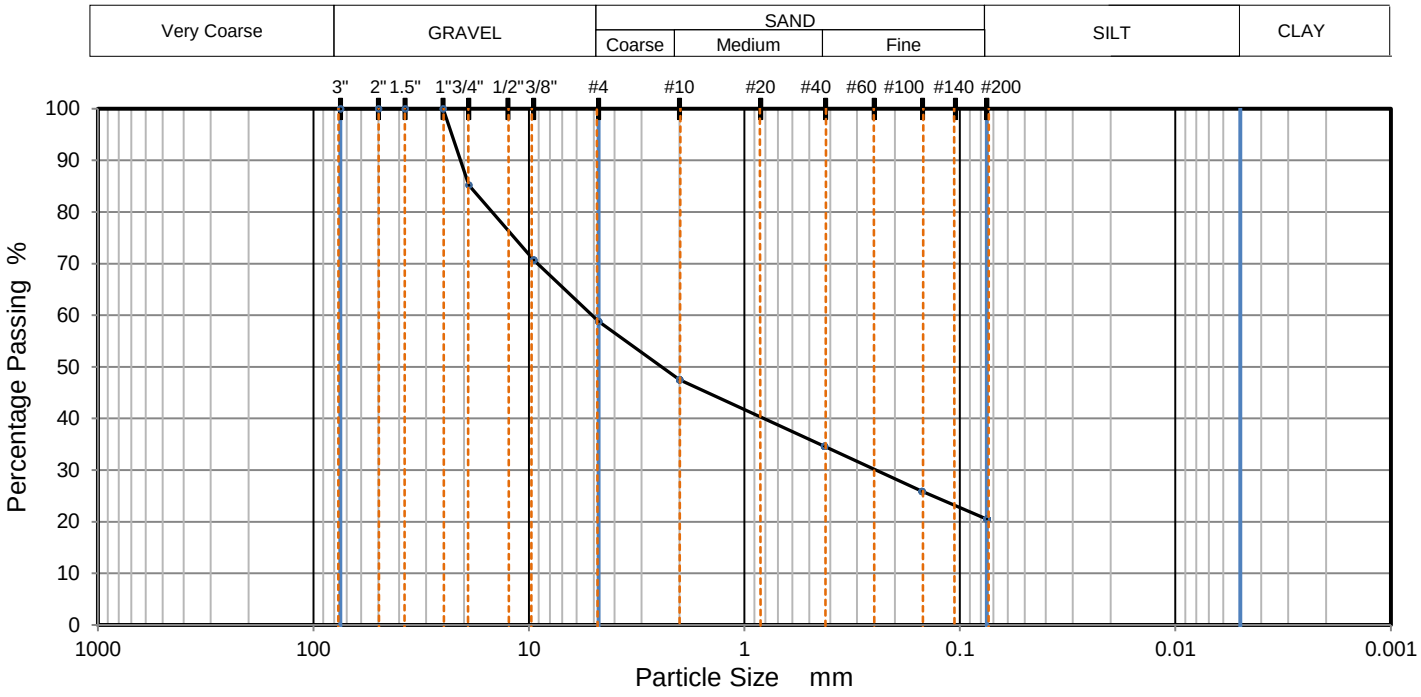
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received	Remarks
JJCastro		JJCastro		

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	85		
3/8"	71		
#4	59		
#10	48		
#40	35		
#100	26		
#200	21		

Dry Mass of sample, g	235.4

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	41
Coarse Sand, #4 to #10 sieve	11
Medium Sand, #10 to #40	13
Fine Sand, #40 to #200	14
Fines <#200	21

USCS		Liquid Limit		D90	20.770	D50	2.422	D10	
AASHTO	A-1-b	Plastic Limit		D85	18.820	D30	0.245	Cu	
USCS Group Name		Plasticity Index		D60	5.094	D15		Cc	

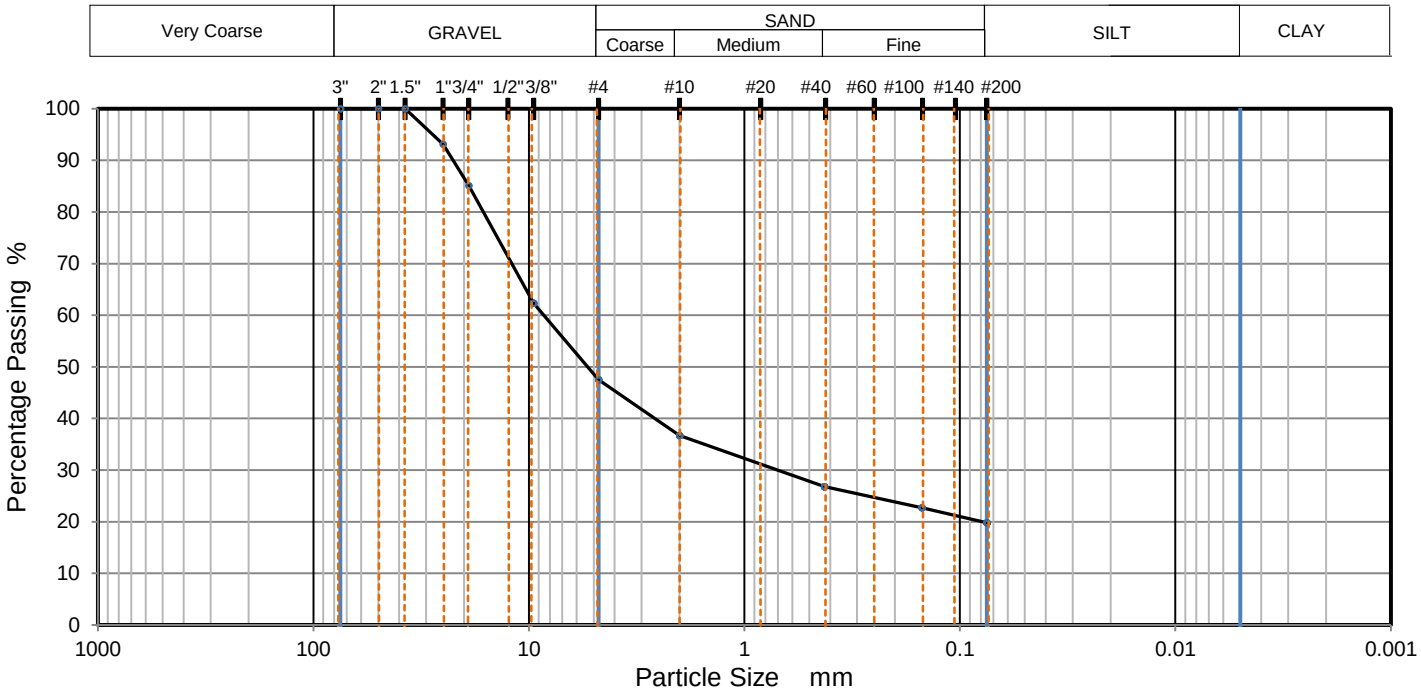
Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-18

Project No.: 20:1609
Depth (ft): 0 - 0.83
Sample No.: S-1
Date Reported: 2/23/2023

Office / Lab	Address	Office Number / Fax
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received	Remarks
JJCastro		JJCastro		

PARTICLE SIZE DISTRIBUTION



TEST RESULTS (ASTM D6913M-17-METHOD A)

Sieving		Hydrometer Sedimentation	
Particle Size	% Passing	Particle Size mm	% Passing
3"	100		
2"	100		
1 1/2"	100		
1"	93		
3/4"	85		
3/8"	62		
#4	48		
#10	37		
#40	27		
#100	23		
#200	20		

Dry Mass of sample, g: 278.2

Sample Proportions	% dry mass
Very coarse, >3" sieve	0
Gravel, 3" to # 4 sieve	53
Coarse Sand, #4 to #10 sieve	11
Medium Sand, #10 to #40	10
Fine Sand, #40 to #200	7
Fines <#200	20

USCS	GM	Liquid Limit	55	D90	22.480	D50	5.340	D10	
AASHTO	A-2-7	Plastic Limit	33	D85	18.940	D30	0.701	Cu	
USCS Group Name	Silty gravel with sand	Plasticity Index	22	D60	8.530	D15		Cc	

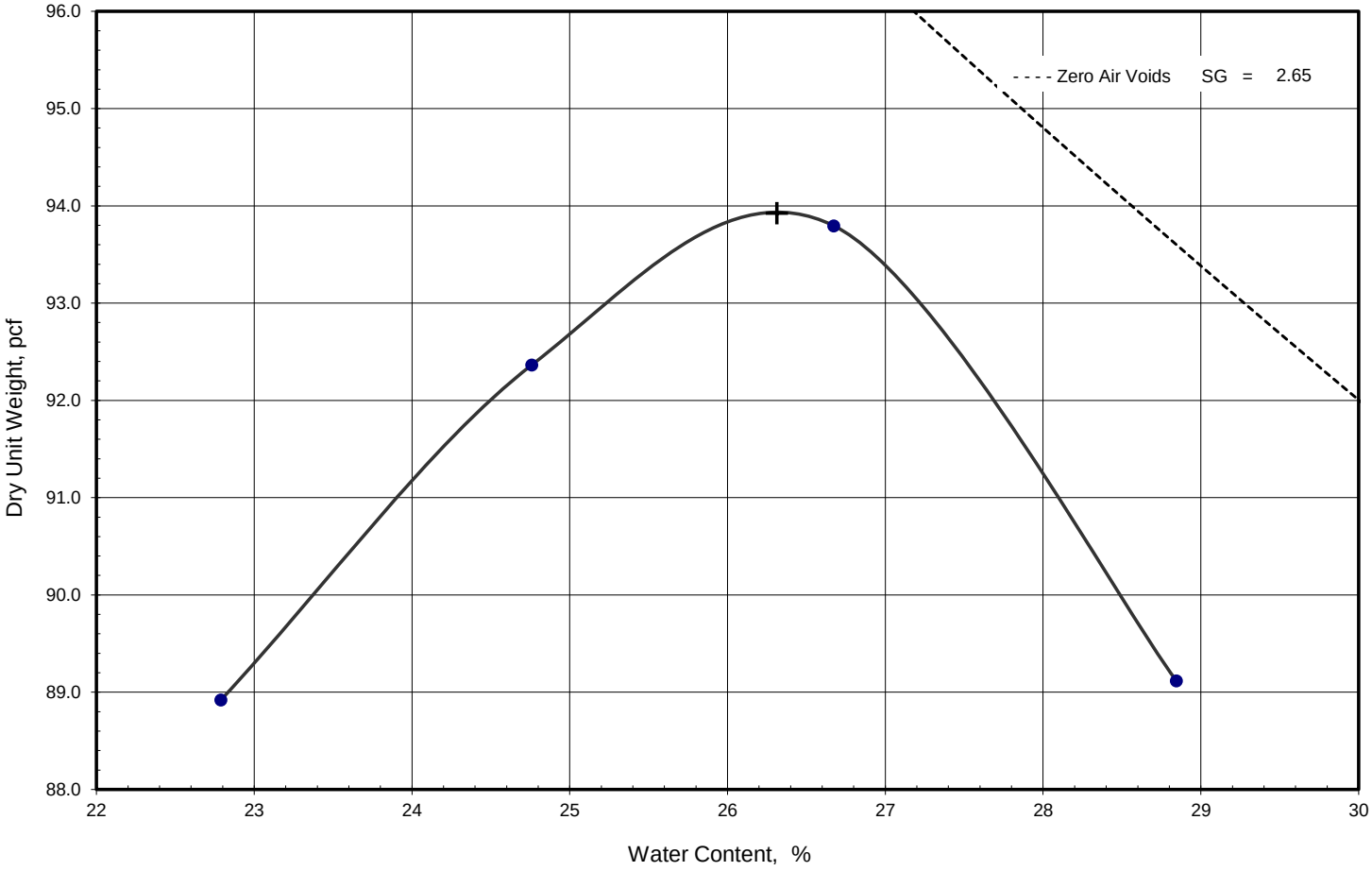
Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample Description:
Sample Source: B-19

Project No.: 20:1609
Depth (ft): 0 - 0.67
Sample No.: S-1
Date Reported: 2/23/2023

Office / Lab	Address	Office Number / Fax
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received	Remarks
JJCastro		JJCastro		

Laboratory Compaction Characteristics of Soil
Using Standard Effort



Optimum Moisture Content	**26.3**	%
Maximum Dry Unit Weight	**93.9**	pcf

Preparation	ASTM moist preparation
Type of rammer	Mechanical - circular face
Test Specfication / Method	ASTM D698-12e2-method A

Soil Description	Nat. Moist. %	Liquid Limit	Plasticity Index	%< #200	USCS	AASHTO
	9.0	57	18	69.9	MH	A-7-5

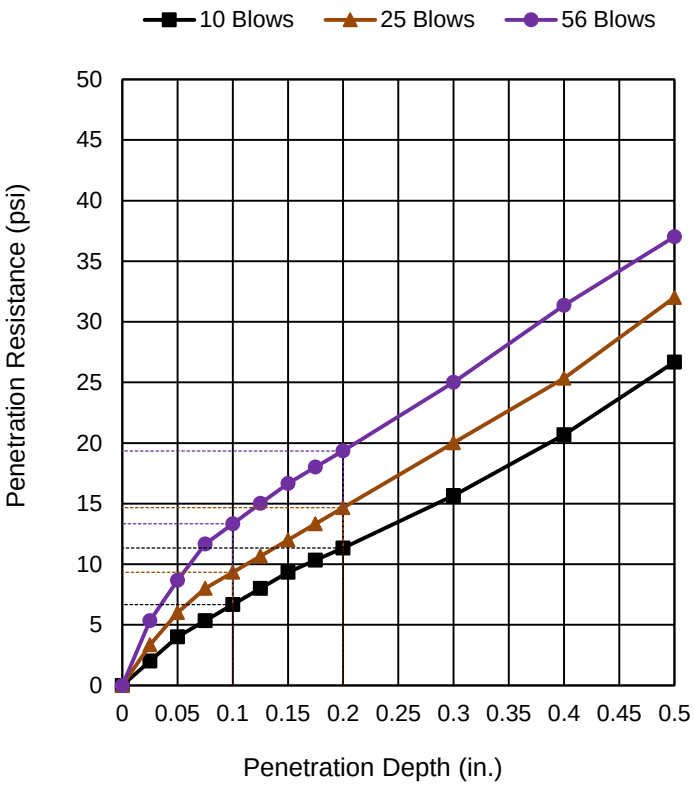
Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample / Source: B-11

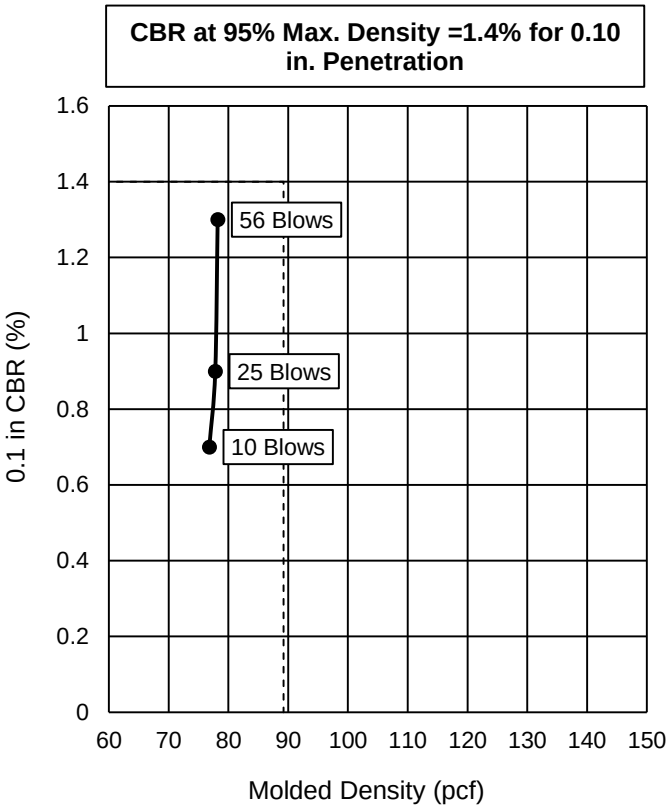
Project No.: 20:1609
Depth (ft.): 0 - 1
Sample No.: S-1
Date Reported: 3/2/2023

Office / Lab	Address	Office Number / Fax
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received	Remarks
fzuniga	fzuniga	fzuniga		

California Bearing Ratios (CBR) of Laboratory-Compacted Soils





TEST RESULTS (ASTM D-1883)

	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.1 in.	0.2 in.			
1	76.8	81.8	36.7	75.3	80.2	38.5	0.7	0.8	0.00	10	0.59
2	77.8	82.8	36.7	75.5	80.4	40.3	0.9	1.0	0.00	10	0.44
3	78.2	83.3	36.7	76.5	81.5	39.4	1.3	1.3	0.00	10	0.15

Material Description	AASHTO	USCS	MAX. Dens. (pcf)	Optimum Moisture (%)	LL	PI	% Fines	% Gravel
	A-7-5	MH	93.9	26.3			69.9	0.0

Project: Flying W, Units 1 thru 4 & 6
Client: TriOak Development, LLC
Sample / Source B-11
Test Reference/No.: 1

Project No.: 20:1609
Depth (ft.): 0 - 1
Sample No.: S-1
Date Reported: 3/2/2023

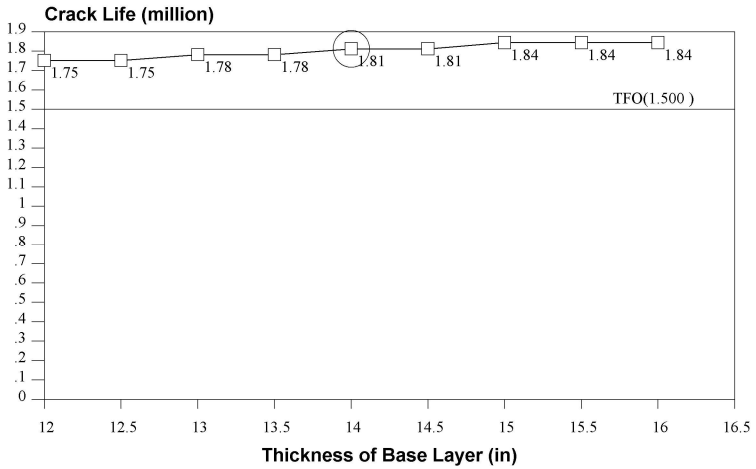
Office / Lab	Address	Office Number / Fax
ECS Southwest LLP - San Antonio	431 Isom Road Suite 114 San Antonio, TX 78216	(210)528-1430 (214)483-9684

Tested by	Checked by	Approved by	Date Received	Remarks
fzuniga	fzuniga	fzuniga		

APPENDIX D – Pavement Design Software

Texas Flexible Pavement Design System FPS21 Results

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
AC	4.00	500.00	0.35	ASPH CONC PVMT
Base	14.00	50.00	0.35	FLEXIBLE BASE
Subbase	8.00	27.00	0.30	STABILIZED SUBGR
Subgrade	200.00	9.00	0.40	SUBGRADE(200)



Fatigue Crack Model:

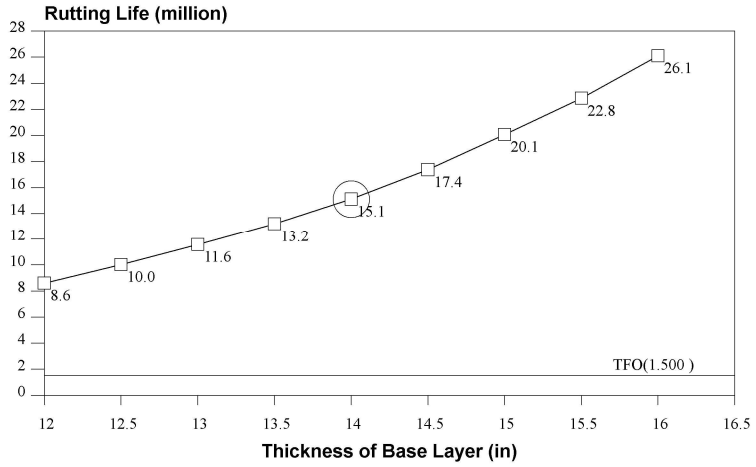
$$N_f = f_1 (\varepsilon_t)^{-f_2} (E_1)^{-f_3}$$

f_1 =7.96E-02
f_2 = 3.291
f_3 = .854

Rutting Model:

$$N_d = f_4 (\varepsilon_v)^{-f_5}$$

f_4 =1.37E-09
f_5 = 4.477



TFO(Traffic to 1st Overlay): 1.50 (million)

Crack Life: 1.81 (million) ε_τ = 193.00 (με)

Rut Life: 15.12 (million) ε_v = -261.00 (με)

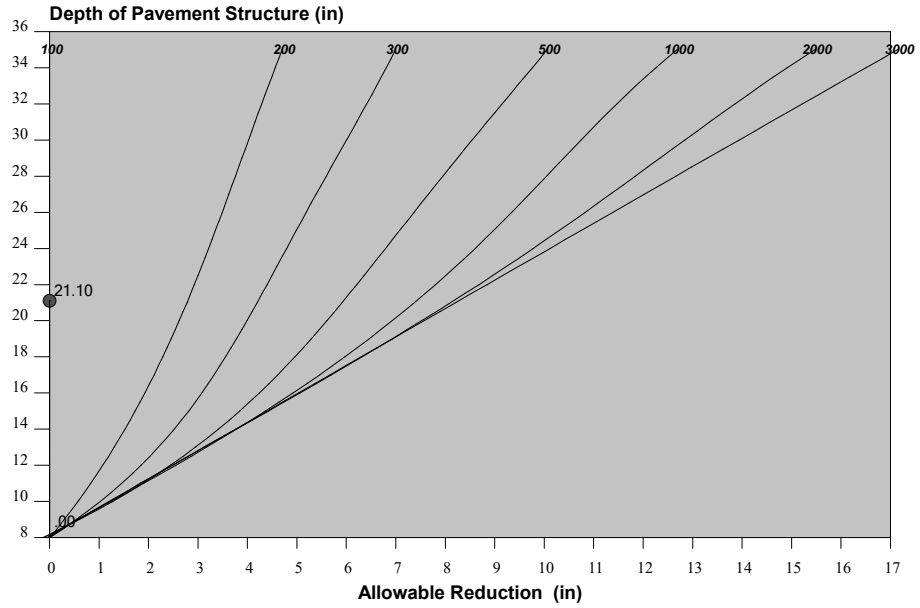
Traffic to 1st Overlay is calculated by analysis period: 20years and 18 kips:1.50millions.
Also the start ADT:7550.0 and ending ADT:15000.0

Mechanistic Check Conclusion:

The design is OK !

FPS 21 Mechanistic Design Check Output (FPS21-1.5Release:12-12-2018)			
Highway	FM1102	Problem	006
C-S-J	1234 - 1 - 123	Date	3/10/2023
District	San Antonio	County	COMAL
Design Type:Asphalt concrete + Flexible Base + Stabilized Subgrade over Subgrade			

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
ASPH CONC PVMT	4.00	500.00	0.35	ASPH CONC PVMT
FLEXIBLE BASE	14.00	50.00	0.35	FLEXIBLE BASE
STABILIZED SUBGR	8.00	27.00	0.30	STABILIZED SUBGR
SUBGRADE(200)	200.00	9.00	0.40	SUBGRADE(200)
Bed Rock		900.00	0.15	Bed Rock



Thickness Reduction Chart for Stabilized Layers

INPUT PARAMETERS:

The Heaviest Wheel Loads Daily (ATHWLD)	12000.0 (lb)
Percentage of TandemAxles	50.0 (%)
Modified Cohesionmeter Value	100.0
Design Wheel Load	15600.0 (lb)
Subgrade Texas Triaxial Class Number (TTC) Calculated TTC based on input soil PI	4.83
User Input Sub-Grade Plasticity Index (PI)	22.00

RESULT:

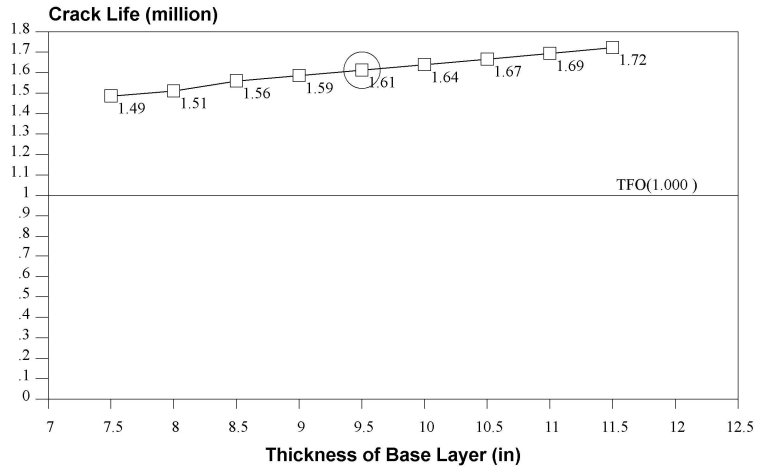
Triaxial Thickness Required	21.1 (in)
The FPS Design Thickness	26.0 (in)
Allowable Thickness Reduction	0.0 (in)
Modified Triaxial Thickness	21.1 (in)

TRIAXIAL CHECK CONCLUSION:

The Design OK !

FPS 21 Triaxial Design Check Output		**(FPS21-1.5Release:12-12-2018)**	
Highway	FM1102	Problem	006
C-S-J	1234 - 1 - 123	Date	3/10/2023
District	San Antonio	County	COMAL
Design Type:Asphalt concrete + Flexible Base + Stabilized Subgrade over Subgrade			

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
AC	4.00	500.00	0.35	ASPH CONC PVMT
Base	9.50	50.00	0.35	FLEXIBLE BASE
Subbase	8.00	27.00	0.30	STABILIZED SUBGR
Subgrade	200.00	9.00	0.40	SUBGRADE(200)



Fatigue Crack Model:

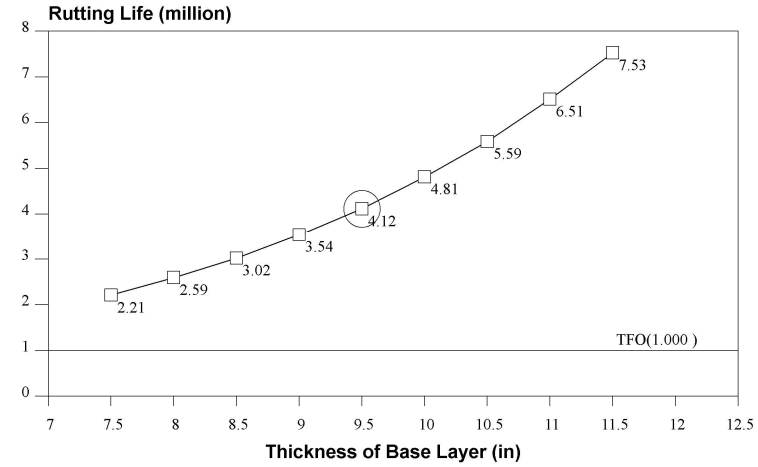
$$N_f = f_1 (\varepsilon_t)^{-f_2} (E_1)^{-f_3}$$

f_1 =7.96E-02
f_2 = 3.291
f_3 = .854

Rutting Model:

$$N_d = f_4 (\varepsilon_v)^{-f_5}$$

f_4 =1.37E-09
f_5 = 4.477



TFO(Traffic to 1st Overlay): 1.00 (million)

Crack Life: 1.61 (million) ε_τ = 200.00 (με)

Rut Life: 4.12 (million) ε_v = -349.00 (με)

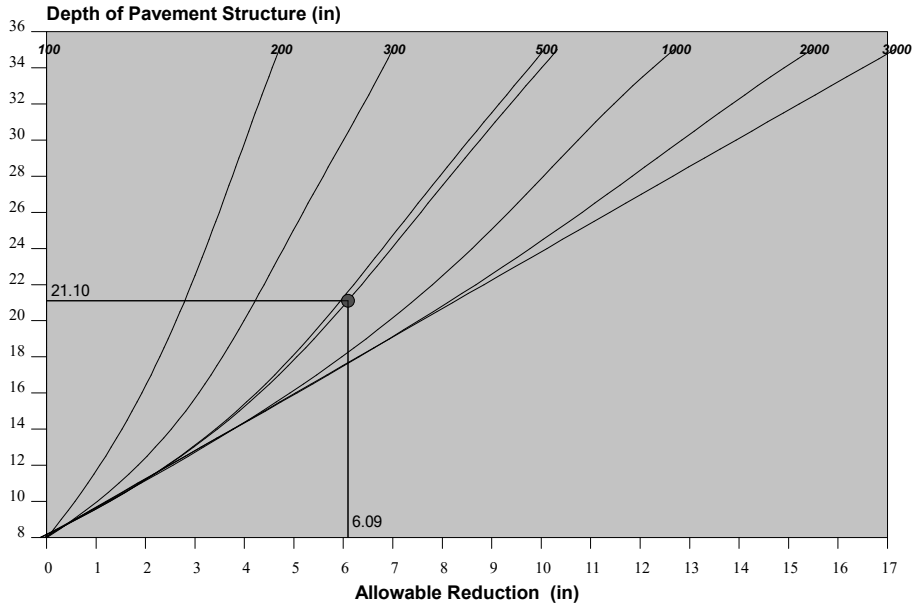
Traffic to 1st Overlay is calculated by analysis period: 20years and 18 kips:1.00millions.
Also the start ADT:5000.0 and ending ADT:10000.0

Mechanistic Check Conclusion:

The design is OK !

FPS 21 Mechanistic Design Check Output (FPS21-1.5Release:12-12-2018)			
Highway	FM1102	Problem	006
C-S-J	1234 - 1 - 123	Date	3/10/2023
District	San Antonio	County	COMAL
Design Type:Asphalt concrete + Flexible Base + Stabilized Subgrade over Subgrade			

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
ASPH CONC PVMT	4.00	500.00	0.35	ASPH CONC PVMT
FLEXIBLE BASE	9.50	50.00	0.35	FLEXIBLE BASE
STABILIZED SUBGR	8.00	27.00	0.30	STABILIZED SUBGR
SUBGRADE(200)	200.00	9.00	0.40	SUBGRADE(200)
Bed Rock		900.00	0.15	Bed Rock



Thickness Reduction Chart for Stabilized Layers

INPUT PARAMETERS:

The Heaviest Wheel Loads Daily (ATHWLD)	12000.0 (lb)
Percentage of TandemAxles	50.0 (%)
Modified Cohesionmeter Value	550.0
Design Wheel Load	15600.0 (lb)
Subgrade Texas Triaxial Class Number (TTC) Calculated TTC based on input soil PI	4.83
User Input Sub-Grade Plasticity Index (PI)	22.00

RESULT:

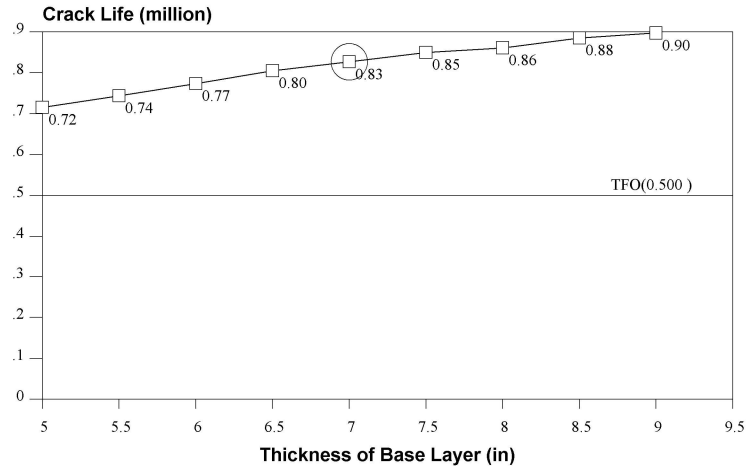
Triaxial Thickness Required	21.1 (in)
The FPS Design Thickness	21.5 (in)
Allowable Thickness Reduction	6.1 (in)
Modified Triaxial Thickness	15.0 (in)

TRIAXIAL CHECK CONCLUSION:

The Design OK !

FPS 21 Triaxial Design Check Output		**(FPS21-1.5Release:12-12-2018)**	
Highway	FM1102	Problem	006
C-S-J	1234 - 1 - 123	Date	3/10/2023
District	San Antonio	County	COMAL
Design Type:Asphalt concrete + Flexible Base + Stabilized Subgrade over Subgrade			

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
AC	3.00	500.00	0.35	ASPH CONC PVMT
Base	7.00	50.00	0.35	FLEXIBLE BASE
Subbase	8.00	27.00	0.30	STABILIZED SUBGR
Subgrade	200.00	9.00	0.40	SUBGRADE(200)



Fatigue Crack Model:

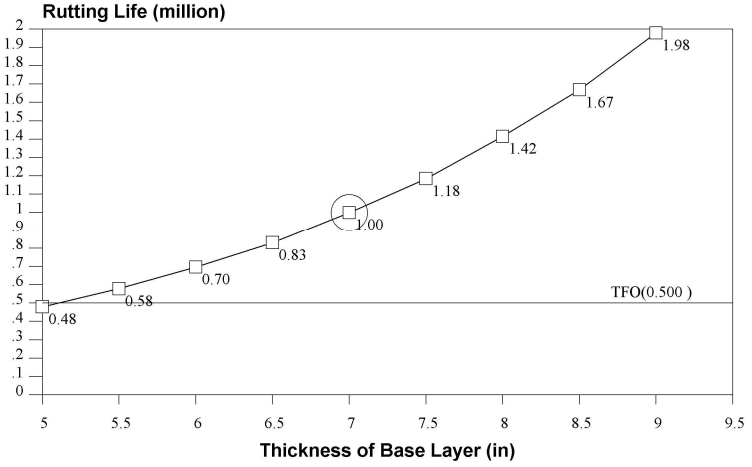
$$N_f = f_1 (\varepsilon_t)^{-f_2} (E_1)^{-f_3}$$

f_1 =7.96E-02
f_2 = 3.291
f_3 = .854

Rutting Model:

$$N_d = f_4 (\varepsilon_v)^{-f_5}$$

f_4 =1.37E-09
f_5 = 4.477



TFO(Traffic to 1st Overlay): 0.50 (million)

Crack Life: 0.83 (million) ε_τ = 245.00 (με)

Rut Life: 1.00 (million) ε_v = -479.00 (με)

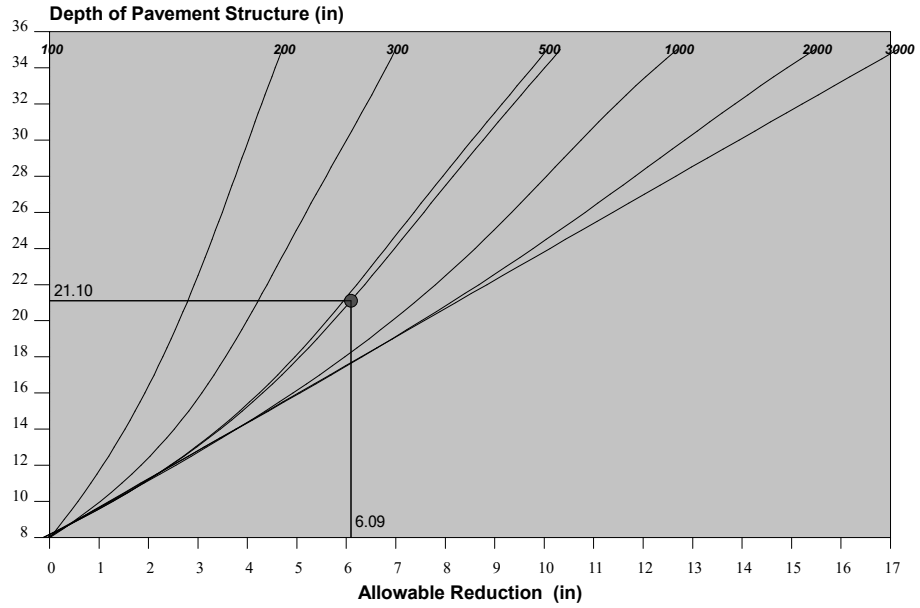
Traffic to 1st Overlay is calculated by analysis period: 20years and 18 kips:.50millions.
Also the start ADT:1650.0 and ending ADT:3000.0

Mechanistic Check Conclusion:

The design is OK !

FPS 21 Mechanistic Design Check Output (FPS21-1.5Release:12-12-2018)			
Highway	FM1102	Problem	006
C-S-J	1234 - 1 - 123	Date	3/10/2023
District	San Antonio	County	COMAL
Design Type:Asphalt concrete + Flexible Base + Stabilized Subgrade over Subgrade			

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
ASPH CONC PVMT	3.00	500.00	0.35	ASPH CONC PVMT
FLEXIBLE BASE	7.00	50.00	0.35	FLEXIBLE BASE
STABILIZED SUBGR	8.00	27.00	0.30	STABILIZED SUBGR
SUBGRADE(200)	200.00	9.00	0.40	SUBGRADE(200)
Bed Rock		900.00	0.15	Bed Rock



Thickness Reduction Chart for Stabilized Layers

INPUT PARAMETERS:

The Heaviest Wheel Loads Daily (ATHWLD)	12000.0 (lb)
Percentage of TandemAxles	50.0 (%)
Modified Cohesionmeter Value	550.0
Design Wheel Load	15600.0 (lb)
Subgrade Texas Triaxial Class Number (TTC) Calculated TTC based on input soil PI	4.83
User Input Sub-Grade Plasticity Index (PI)	22.00

RESULT:

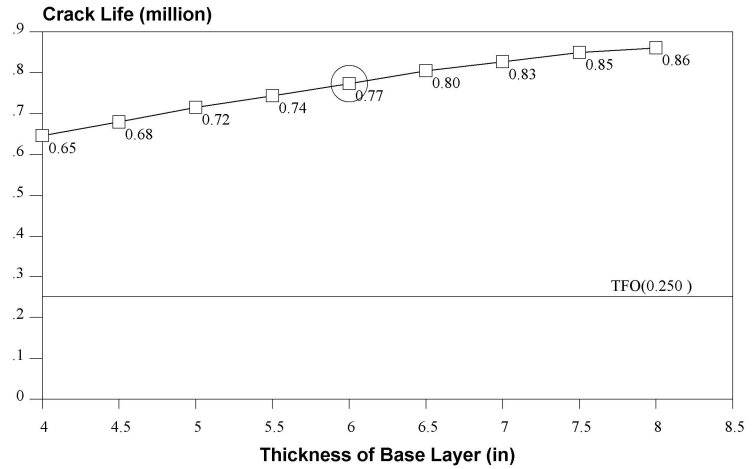
Triaxial Thickness Required	21.1 (in)
The FPS Design Thickness	18.0 (in)
Allowable Thickness Reduction	6.1 (in)
Modified Triaxial Thickness	15.0 (in)

TRIAXIAL CHECK CONCLUSION:

The Design OK !

FPS 21 Triaxial Design Check Output	**(FPS21-1.5Release:12-12-2018)**		
Highway	FM1102	Problem	006
C-S-J	1234 - 1 - 123	Date	3/10/2023
District	San Antonio	County	COMAL
Design Type:Asphalt concrete + Flexible Base + Stabilized Subgrade over Subgrade			

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
AC	3.00	500.00	0.35	ASPH CONC PVMT
Base	6.00	50.00	0.35	FLEXIBLE BASE
Subbase	8.00	27.00	0.30	STABILIZED SUBGR
Subgrade	200.00	9.00	0.40	SUBGRADE(200)



Fatigue Crack Model:

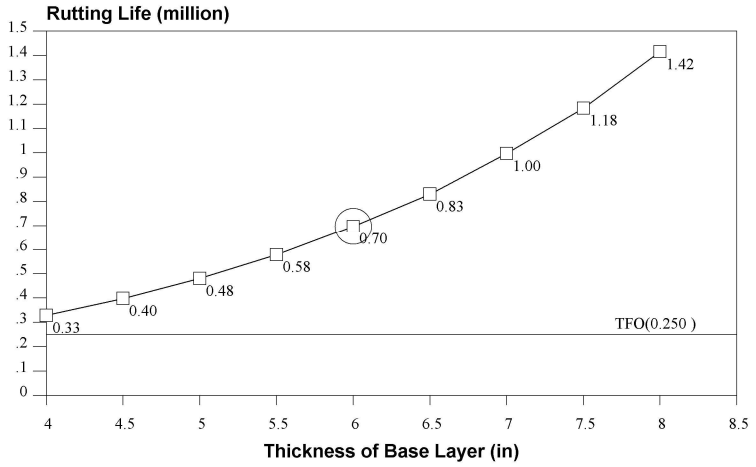
$$N_f = f_1 (\varepsilon_t)^{-f_2} (E_1)^{-f_3}$$

f_1 =7.96E-02
f_2 = 3.291
f_3 = .854

Rutting Model:

$$N_d = f_4 (\varepsilon_v)^{-f_5}$$

f_4 =1.37E-09
f_5 = 4.477



TFO(Traffic to 1st Overlay): 0.25 (million)

Crack Life: 0.77 (million) ε_τ = 250.00 (με)

Rut Life: 0.70 (million) ε_v = -519.00 (με)

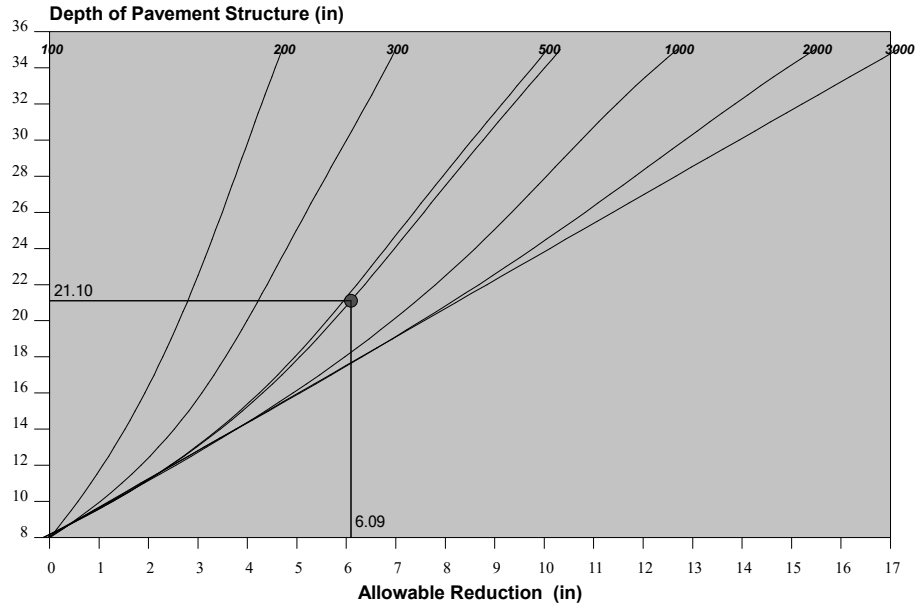
Traffic to 1st Overlay is calculated by analysis period: 20years and 18 kips:.25millions.
Also the start ADT:550.0 and ending ADT:1000.0

Mechanistic Check Conclusion:

The design is OK !

FPS 21 Mechanistic Design Check Output (FPS21-1.5Release:12-12-2018)			
Highway	FM1102	Problem	006
C-S-J	1234 - 1 - 123	Date	3/10/2023
District	San Antonio	County	COMAL
Design Type:Asphalt concrete + Flexible Base + Stabilized Subgrade over Subgrade			

	Thickness (inches)	Modulus (ksi)	Poisson's Ratio	Material Name
ASPH CONC PVMT	3.00	500.00	0.35	ASPH CONC PVMT
FLEXIBLE BASE	6.00	50.00	0.35	FLEXIBLE BASE
STABILIZED SUBGR	8.00	27.00	0.30	STABILIZED SUBGR
SUBGRADE(200)	200.00	9.00	0.40	SUBGRADE(200)
Bed Rock		900.00	0.15	Bed Rock



Thickness Reduction Chart for Stabilized Layers

INPUT PARAMETERS:

The Heaviest Wheel Loads Daily (ATHWLD)	12000.0 (lb)
Percentage of TandemAxles	50.0 (%)
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User Input Sub-Grade Plasticity Index (PI)	22.00

RESULT:

Triaxial Thickness Required	21.1 (in)
The FPS Design Thickness	17.0 (in)
Allowable Thickness Reduction	6.1 (in)
Modified Triaxial Thickness	15.0 (in)

TRIAXIAL CHECK CONCLUSION:

The Design OK !

FPS 21 Triaxial Design Check Output		**(FPS21-1.5Release:12-12-2018)**	
Highway	FM1102	Problem	006
C-S-J	1234 - 1 - 123	Date	3/10/2023
District	San Antonio	County	COMAL
Design Type:Asphalt concrete + Flexible Base + Stabilized Subgrade over Subgrade			

TERRADYNE
Engineers, Geologists & Environmental Scientists

TERRADYNE ENGINEERING, INC.
1608 Royston Lane, Building 2
Round Rock, Texas 78664
Phone: 512.252.1218
www.terradyne.com

October 17, 2025

Pulte Group, Inc.
927 East Sonterra Boulevard
Suite 316
San Antonio, Texas 78258

Attn: Mr. Stephan Moreno

Re: **Soils Opinion Letter**
Subsurface Exploration and Preliminary Foundation
Flying W Tract
New Braunfels, Comal County, Texas
Terradyne Project No.: A251194-S1

To Whom It May Concern:

Terradyne Engineering, Inc. (Terradyne) completed a subsurface exploration and preliminary foundation report at the above referenced project site at Flying W Tract in New Braunfels, Comal County, Texas for Pulte Group, Inc. (Terradyne Project No. A251194 dated October 17, 2025).

Based on our preliminary Geotechnical report (Terradyne Project No. A251194 dated October 17, 2025) and per Terradyne's opinion, the current soil conditions do not require additional cost and mitigation to reduce the potential vertical rise.

The estimated potential vertical rise at this site ranges between one (1) inch to two (2) inches for dry to wet soil moisture conditions at the finish grade elevation. The PVR value is based on the current site grades. Per Terradyne's opinion, the soil condition at this subject site will not require any soil mitigation as per Terradyne's understanding that the design PVR for the slab-on-grade foundations is four and one-half (4½) inches. However, after grading, the PVR at some portion of the site may increase and may require mitigation once complete.

We appreciate and wish to thank you for the opportunity to be of service to you on this project. If we can be of additional assistance during the material testing-quality control phase of construction, please feel free to contact us.

Respectfully Submitted,
Terradyne Engineering, Inc.
Texas Firm Registration No. F-6799

STATE OF TEXAS
JOHN A. GUNTER
47957
REGISTERED
PROFESSIONAL ENGINEER

Lana AL Dulaimy, E.I.T.
Geotechnical Project Engineer

10/17/2025

John Gunter, M.S., P.E
Chief Engineer

TERRADYNE
Engineers, Geologists & Environmental Scientists

Subsurface Exploration,
And Preliminary Foundation Recommendations
Flying W. Tract
Near the Intersection of F.M. 1102 & Watson Lane West
New Braunfels, Comal County, Texas

Terradyne Project No.: A251194

Mr. Stephan Moreno
Pulte Group, Inc.
927 East Sonterra Boulevard, Suite 316
San Antonio, Texas 78258

October 17, 2025

1608 Royston Lane, Building 2 • Round Rock, Texas 78664
Ph 512-252-1218 • www.terradyne.com

2021 ENR Texas & Louisiana TOP DESIGN FIRMS

TERRADYNE
Engineers, Geologists & Environmental Scientists

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Round Rock, Texas 78664
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www.terradyne.com

October 17, 2025

Pulte Group, Inc.
927 East Sonterra Boulevard, Suite 316
San Antonio, Texas 78258

Attn: Mr. Stephan Moreno

Re: **Subsurface Exploration, and Preliminary Foundation Recommendations**
Flying W Tract
Near Intersection of F.M. 1102 & Watson Lane West
New Braunfels, Comal County, Texas
Terradyne Project No.: A251194

Dear Mr. Moreno:

Terradyne Engineering, Inc. Terradyne has completed a soil and foundation engineering report at the above referenced project site. The results of the exploration are presented in this report.

We appreciate and wish to thank you for the opportunity to service you on this project. Please do not hesitate to contact us if we can be of additional assistance during the Construction Materials Testing and Quality Control phases of construction.

Respectfully Submitted,

Terradyne Engineering, Inc.
Texas Firm Registration No. F-6799

STATE OF TEXAS
JOHN A. GUNTER
47957
REGISTERED
PROFESSIONAL ENGINEER

John A. Gunter, M.S., P.E. 10/17/2025
Chief Engineer

Lana AL Dulaimy, E.I.T.
Geotechnical Project Engineer

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EXECUTIVE SUMMARY

The soil conditions at the site of the proposed residential structures and roadways for Flying W Tract near the intersection of F.M. 1102 and Watson Lane West in New Braunfels, Comal County, Texas were explored by drilling (24) borings to a maximum depth of approximately 15 feet below the existing ground surface elevation. Borings B1 through B24 were terminated prior to their proposed depths due to limestone. Laboratory tests were performed on selected soil samples to evaluate the engineering characteristics of the soil strata encountered in the borings. This investigation is preliminary in nature and based on a very limited number of borings. The foundation design parameters presented in this report are for informational and comparative purposes only and should not be used for actual foundation design.

The results of the exploration, laboratory testing, and engineering evaluation indicate the soils underlying this site have low to moderate expansive characteristics. Following is a summary of the results:

1) The boring locations were selected by the geotechnical project manager and are shown on Figure 1-A. A potential vertical movement on the order of one (1) inch to two (2) inches was estimated at the existing grade level.
2) The Design Plasticity Index values are 10 to 14.
3) The borings generally encountered Clayey Sand with Gravel, Clayey Gravel (SC), Sandy Fat Clay with Gravel, Fat Clay, Fat Clay with Sand (CH) and limestone.
4) Groundwater seepage was not encountered in the borings at the time of the field exploration.

This report presents preliminary stiffened beam and slab foundation design parameters for the site prior to any cut and fill operations or soil modification procedures. Final design values after site work have occurred can be expected to vary.

Detailed descriptions of subsurface conditions, engineering analysis and design recommendations are included in this report.

This summary does not contain all the information that is included in the full report. The report should be read in its entirety to obtain a more complete understanding of the information provided. Any amendment and/or revisions per request **must** be issued in writing by Terradyne.

1.0 INTRODUCTION

This report presents the results of the preliminary subsurface exploration and foundation analysis for the proposed residential structures and roadways for Flying W Tract near the intersection of F.M. 1102 and Watson Lane West in New Braunfels, Comal County, Texas. The services of Terradyne, were authorized on October 3, 2025 by Mr. Stephan Moreno, Manager of Land Planning & Entitlement of Pulte Group, Inc. by approving Terradyne proposal No: AP251232 dated October 1, 2025.

2.0 PURPOSE AND SCOPE OF SERVICES

The purpose of the preliminary geotechnical investigation was to evaluate the subsurface materials and groundwater conditions of the site and provide geotechnical-engineering recommendations for the design and construction of new residential structures and roadways. The scope of services includes the following:

1) Drilling and sampling of (24) borings to a maximum depth of approximately 15 feet below the existing ground surface elevation;
2) Observation of the groundwater conditions during drilling operations;
3) Performing laboratory tests such as Atterberg limits and moisture content tests;
4) Review and evaluation of the field and laboratory test programs during their execution with modifications of these programs, when necessary, to adjust to subsurface conditions revealed by them;
5) Compilation, generalization and analysis of the field and laboratory data in relation to the project requirements;
6) Estimation of potential vertical movement;
7) Development of recommendations for the design, construction, and earthwork phases of project; and
8) Consultations with the Prime Professional and members of the design team on findings and recommendations; and preparation of a written geotechnical engineering report for use by the members of the design team in their preparation of design, contract documents, and specifications.

The Scope of Services did not include any environmental assessment for the presence or absence of wetlands and/or hazardous or toxic materials in the soil, surface water, groundwater, or air, in the proximity of this site. Any statements in this report or on the bore hole logs regarding odors, colors or unusual or suspicious items or conditions are strictly for the information of the client.

2.1 Site Description

The subject property is located on the west side of Watson Lane W. and F.M. 1102 intersection in New Braunfels, Comal County, Texas. The subject site slopes moderately down towards the southeast with small trees and grass covered ground. Borings B-1 through B-24 were drilled

at/near the following GPS location (Lat. 29.788579°, Long. -98.050300°). An aerial map of the GPS location is included in Figure 1-A.

3.0 GEOTECHNICAL INVESTIGATION

The field exploration to determine the engineering characteristics of the subsurface materials included a reconnaissance of the project site, drilling the borings, and recovering samples. A total of (24) borings were drilled to a maximum depth of 15 feet at the project site. Borings B-1 through B-24 were terminated early due to shallow limestone encountered.

The soil borings were performed with a drilling rig equipped with a rotary head. Conventional solid stem continuous augers were used to advance the hole and samples of the subsurface materials were sampled using a two-inch O.D. split barrel sampler (ASTM D 1586), TEX 132-E Texas Cone Penetration Test (TCP), and Hand Auger. The samples were identified according to depth, encased in polyethylene plastic wrapping to protect against moisture loss, and transported to the laboratory in special containers.

3.1 Field Tests and Measurements

Penetration Tests: During the sampling procedures, standard penetration tests were performed in the borings in conjunction with the split-barrel sampling. The standard penetration value (N) is defined as the number of blows of a 140-pound hammer, falling thirty inches, required to advance the split-spoon sampler one-foot into the soil. The sampler is lowered to the bottom of the drill hole and the number of blows recorded for each of the three successive increments of six inches penetration. The "N" value is obtained by adding the second and third incremental numbers. The results of the standard penetration test indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components. The results of the penetration tests indicate the relative density and comparative consistency of the soils. TEX 132-E Texas Cone Penetration Test (TCP) was also used on selected borings. The TCP values are either the total number of blows necessary to drive the cone 12 inches or the distance the cone advances, in inches, in 100 blows. The results of the tests indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components. The sampling type and results of each test are indicated on the boring logs in the Illustration Section.

Water Level Measurements: Water level observations were made during the excavation operations and the results are noted on the boring logs. In relatively pervious soils, such as sandy soils, the indicated elevations are considered reliable groundwater levels. In relatively impervious soils, an accurate determination of the groundwater elevation may not be possible even after several days of observation. Seasonal variations, temperature and recent rainfall conditions may influence the level of the groundwater table and the volume of water encountered will depend on the permeability of the soils.

3.2 Boring Logs

A field log was prepared for each boring. The logs include information concerning the samples attempted and recovered, indications of the presence of material (such as calcareous clays, sandy clay, etc.) and groundwater observations. It also includes an interpretation of the subsurface conditions between samples. Therefore, these logs include both factual and interpretive information.

The final logs represent the interpretation of the contents of the field logs for the purpose delineated by the client. The final logs are included on Figures 2 through 25 in the Illustration Section. A key to classification terms and symbols used on the logs is presented on Figure 26.

3.3 Laboratory Testing Program

In addition to field exploration, a supplemental laboratory-testing program was conducted to determine additional pertinent engineering characteristics of the subsurface materials necessary in evaluating the design parameters of the soil. All phases of the laboratory testing program were conducted in general accordance with the indicated applicable ASTM Specifications as presented in Table No. 1.

Table No. 1 – Laboratory Testing Summary

Laboratory Test	Applicable Test Standard
Liquid Limit, Plastic Limit, & Plasticity Index of Soil	ASTM D-4318
Moisture Content	ASTM D-2216
Material Finer than No. 200	ASTM D-1140

In the laboratory, each sample was examined and classified by a geotechnical engineer. As a part of this classification procedure, the natural water content of the soil samples was determined. Atterberg limit tests were performed on representative soil samples to determine the plasticity characteristics of the soil strata encountered. The results of these tests are presented on the appropriate boring logs and in the Illustrations.

3.4 General Subsurface Conditions

A review of the *Geologic Atlas of Texas, San Antonio Sheet*[1], indicates that this site is naturally underlain with the soils/rock of the Austin Chalk (Kau) formation and Edwards Limestone (Ked) formation at or near the surface. Austin Chalk (Kau) formation generally consists of chalk and

[1] Source: United States Geological Survey, Geologic Atlas of Texas [San Antonio Sheet], Bureau of Economic Geology, Texas Natural Resource Information System; http://txpub.usgs.gov/DSS/texasgeology/ (2007).\

marl. Chalk is mostly microgranular calcite with minor Foraminifera test and Inoceramus prisms. It alternates with medium gray marl a thickness of 325 to 420 feet. Edwards limestone (Ked) formation included Georgetown at top, fine to coarse grained abundant chert, that is medium gray to grayish brown, with fossils that are rudistids as reefs and individuals.

The soils underlying this site may be grouped into three (3) generalized strata. The soil stratigraphy information and the engineering properties of the underlying soils based Terradyne's professional engineering experience are presented on the Boring Logs, Figures 2 through 25.

During the field investigation, subsurface water was not encountered in the borings during drilling. In addition, the soil samples were considered moist. Based upon this information and past projects in the surrounding areas of the site, groundwater is not anticipated to be major concern during construction activities. However, groundwater condition can fluctuate due to seasonal and climatic variations and may be encountered at shallow depths during high precipitation seasons.

4.0 FOUNDATION DESIGN CONSIDERATIONS

Lot Drainage: How a lot is graded affects the accumulation of surface water around the slab. Most builders are aware of the importance of grading the soil away from structures so that rainwater does not collect and pond adjacent to the foundation. If allowed to accumulate next to the foundation, water may infiltrate the expansive soils underlying the foundation, which could cause the foundation to settle. Similarly, runoff from surface water drainage patterns and swales must not collect adjacent to foundation.

Topography: As it swells, soil heaves perpendicularly to the ground surface or slope, but as it shrinks, it recedes in the direction of gravity and gradually moves downslope in a sawtooth fashion over several shrink-swell cycles. In addition to this shrink-swell influence, soil will exhibit viscoelastic properties and creep downhill under the steady influence of the weight of the soil. Therefore, to avoid a structure constructed on a slope from moving downhill with the soil, it must be designed to compensate for this lateral soil influence.

Pre-Construction Vegetation: No vegetation was on a site prior to construction. Constructing over a desiccated soil can produce some dramatic instances of heave and associated structural distress and damage as it becomes wet.

Post-Construction Vegetation: The type, amount, and location of vegetation that has grown since construction can cause localized desiccation. Planting trees or large shrubs near a building can result in the loss of foundation support as the vegetation robs moisture from the foundation soil. Conversely, the opposite effect can occur if flowerbeds or shrubs are planted next to foundations

and these beds are kept well-watered or flooded. This practice can result in swelling of the soil around the perimeter where the soil remains wet.

Summation: It is beyond the scope of this investigation to do more than point out the factors that may influence the amount and type of swell a slab-on-grade foundation may be subjected to during its lifetime. The design engineer must be aware of these factors in developing his design, using his engineering experience and judgment as a guide.

5.0 DESIGN ENGINEERING ANALYSIS

Foundation Design Considerations: Review of the borings and test data indicates that the following factors will affect the foundation designs and construction at this site:

1) The site at shallow depths is underlain by subsurface soils of low to moderate expansiveness in character. Structures supported at shallow depths will be subjected to potential vertical movement of one (1) inch to two (2) inches.
2) The strengths of the underlying soils are adequate to support the proposed structures.
3) Groundwater seepage was not encountered in the borings during drilling.

Vertical Movements: The potential vertical movement (PVR) for slab-on grade construction at this site has been estimated using the general guidelines presented in a) the Texas Department of Transportation Test Method TXDOT-124-E and b) based on Terradyne's experience with the swelling characteristics of the clays that are like those at the project site. The Texas Department of Transportation method utilizes the liquid limits and plasticity indices for soils in the seasonally active zone, estimated to be about four (4) feet to ten (10) feet, limited by limestone in the project area.

The estimated PVR value provided is based on the proposed floor system applying a sustained surcharge load of approximately one pound per square inch on the subgrade materials. Potential vertical movement of one (1) inch to two (2) inches was estimated for dry to wet soil moisture conditions at the finish grade elevation. The PVR value is based on the current site grades. Higher PVR values than the above-mentioned value will occur in areas where water can pond for extended periods.

If the existing grade of the structures must be raised to attain finish grade elevation, select structural fill should be used, placed in lifts, and compacted as recommended under the section titled Select Structural Fill provided in this report.

6.0 FOUNDATION RECOMMENDATIONS

This investigation is a preliminary investigation and is based on a very limited number of borings. The design values provided in the report are for comparative purposes only and should not be used for actual design.

6.1 Stiffened Grid Type Beam and Slab Foundations

A stiffened grid type beam and slab foundation may be considered to support the proposed buildings provided the anticipated vertical movement will not impair the performance of the structures.

It is desirable to design the foundation systems using an assumption that the beams carry the loads. An allowable bearing pressure of 1,200 pounds per square foot should be used for beams founded at a minimum depth of 12 inches below the existing undisturbed soils. If the existing grade of the structure must be raised to achieve design grade, select structural fill should be placed, compacted, and tested. An allowable bearing pressure of 1,700 pounds per square foot should be used for beams bearing on a minimum of 12 inches of compacted select structural fill. If the beams bear directly onto limestone, the allowable bearing capacity may be increased to 5,000 pounds per square feet. Beams should be at least 12 inches deep and 10 inches wide to prevent local shear failure of the bearing soils. Design plasticity index values were evaluated at the boring locations and are presented below in Table No. 2.

Table No. 2 -Recommended Design Plasticity Indecies

Flying W Tract		
Boring	**PVR (inches)**	**Design Plasticity Index**
B1	**1**	**10**
B2	**1**	**10**
B3	**1**	**10**
B4	**1**	**10**
B5	**1**	**10**
B6	**1**	**10**
B7	**1**	**10**
B8	**1**	**10**
B9	**1**	**10**
B10	**1**	**10**
B11	**1**	**10**
B12	**1**	**10**
B13	**1½**	**11**
B14	**1½**	**11**
B15	**1½**	**11**
B16	**1**	**10**

Flying W Tract		
B17	**2**	**14**
B18	**2**	**14**
B19	**1½**	**11**
B20	**1**	**10**
B21	**1**	**10**
B22	**1½**	**11**
B23	**1**	**10**
B24	**1**	**10**

6.2 Post-Tensioned Beam and Slab Foundation

A post-tensioned slab-on-grade foundation may also be considered to support the structures provided the anticipated movement will not impair the performance of the structures. Pertinent design parameters were evaluated and are presented in the following paragraphs.

Differential vertical movements should be expected for shallow type foundations at this site due to the expansive soil conditions that were encountered. Differential vertical movements have been estimated for both the center lift and edge lift conditions for post-tensioned slab-on grade construction at this site. These movements were estimated using the procedures and criteria discussed in the Post-Tensioning Institute Manual entitled "Design and Construction of Post-Tensioned Slabs-on-Ground", 3rd Edition. This procedure uses the soils data obtained from both the field and laboratory tests performed on the soil samples.

Differential vertical movements have been estimated for the center lift and edge lift conditions. The PTI Design Parameters are presented in Table No. 3. Refer to the Stiffened Grid Type Beam and Slab Foundation section for allowable bearing capacities.

Table No. 3- PTI 3rd Edition

Design Plasticity Index/PVR (inches)	Differential Vertical Movement, y_m Inches		Edge Moisture Variation Distance, e_m Feet	
	Center Lift	Edge Lift	Center Lift	Edge Lift
14/2	1.4	1.6	7.5	3.4
11/1½	1.1	1.4	7.5	3.4
10/1	0.8	1.2	7.5	3.4

6.3 Utilities

Utilities, that project through slab-on-grade floors, should be designed with either some degree of flexibility or with sleeves to prevent damage to these lines should vertical movement occur.

6.4 Contraction, Control or Expansion Joints

Contraction, control and/or expansion joints should be designed and placed in various portions of the structure. Properly planned placement of these joints will assist in controlling the degree and location of material cracking that normally occurs due to soil movements, material shrinkage, thermal affects, and other related structural conditions.

6.5 Lateral Earth Pressure

Some retaining walls may be needed at the site. The equivalent fluid density values were evaluated for various backfill materials. These values are presented in Table No. 4.

Table No. 4 – Lateral Design Parameters

Backfill Material	Equivalent Fluid Density PCF		
	Active Condition	At Rest Condition	Passive Condition
a. Crushed Limestone	40	60	530
b. Clean Sand	40	60	360
c. Select Fill (PI ≤ 15)	65	85	265

These equivalent fluid densities do not include the effect of seepage pressures, surcharge loads such as construction equipment, vehicular loads, or future storage near the walls.

If the basement wall or cantilever retaining wall can tilt forward to generate "active earth pressure" condition, the values under active condition should be used. For rigid non-yielding walls which are part of the buildings, the values "at rest condition" should be used. The compactive effort should be controlled during backfill operations. Over compaction can produce lateral earth pressures more than at rest magnitudes. Compaction levels adjacent to below-grade walls should be maintained between 95 and 98 percent of standard Proctor (ASTM D698) maximum dry density.

The backfill behind the wall should be drained properly. The simplest drainage system consists of a drain located near the bottom of the wall. The drain collects the water that enters the backfill and this may be disposed of through outlets along the base of the wall. To ensure that the drains are not clogged by fine particles, they should be surrounded by a granular filter. Despite a well-constructed toe drain, substantial water pressure may develop behind the wall if the backfill consists of clays or silts. A more satisfactory drainage system, consisting of a back drain of 12 inches to 24 inches width gravel may be provided behind the wall to facilitate to drainage.

The maximum toe pressure for wall footings founded a minimum depth of 12 inches into the clay soils should not exceed 900 pounds per square foot. An adhesion value of 350 pounds per square foot should be used to check against sliding for wall footings bearing on clay and an adhesion value of 150 pounds per square foot should be used to check against sliding for wall footings bearing on clayey sand (SC). If the wall footings will be founded directly onto limestone, the maximum toe pressure for the wall footings should not exceed 5,000 pounds per square foot and adhesion value of 1,200 pounds per square foot should be used to check against sliding for wall bearing on limestone.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 Site Drainage

Terradyne recommend that an effective site drainage plan be devised by others prior to commencement of construction to provide positive drainage away from the foundation perimeters and off the site, both during and after construction.

7.2 Site Preparation

In any areas where soil-supported floor slabs are to be constructed, vegetation and all loose or organic material should be stripped and removed from the site. After stripping operations, the subgrade should be proof rolled to identify soft zones. Any soft zone detected should be removed to expose firm soil or rock and replaced with compacted suitable soils to reach subgrade level.

Select fill material used at this site should be clayey sand (SC), lean clay with gravel (CL) or clayey gravel (GC) with maximum liquid limit of 35 percent and plasticity index (PI) between five (5) and 20. The fill should be compacted to at least 95 percent of the maximum dry density as determined by TxDOT-113-E, within ± 2 percentage points of optimum moisture content.

7.3 Groundwater

In any areas where significant cuts (one foot or more) are made to establish final grades for building pads, attention should be given to possible seasonal water seepage that could occur through natural cracks and fissures in the newly exposed stratigraphy. Subsurface drains may be required to intercept seasonal groundwater seepage. The need for these, or other dewatering devices, on building pads should be carefully addressed during construction. Terradyne's office could be contacted to visually inspect final pads to evaluate the need for such drains.

Groundwater seepage may occur several years after construction if the rainfall rate or drainage changes in the vicinity of the project site. If seepage runoff occurs towards the residence, an engineer should be notified to evaluate its' effect and determine whether French Drains are required at the location.

7.4 Earthwork and Foundation Acceptance

Exposure to environment may weaken the soils at the foundation bearing level if the excavation remains open for long periods of time. Therefore, it is recommended that all foundation excavations are extended to final grade and the footings constructed as soon as possible to minimize potential damage to bearing soils or rock. The foundation bearing level should be free of loose soil; ponded water or debris and should be inspected and approved by the geotechnical engineer or his representative prior to concreting.

Foundation concrete should not be placed on soils that have been disturbed by rainfall or seepage. If the bearing soils are softened by surface water intrusion during exposure or by desiccation, the unsuitable soils must be removed from the foundation excavation and replaced prior to placement of concrete.

Subgrade preparation and fill placement operations should be monitored by the soils engineer or his representative. As a guideline, at least one in-place density test should be performed for each 2,500 square feet of compacted surface per lift. Any areas not meeting the required compaction should be re-compacted and retested until compliance is met.

8.0 DRAINAGE AND MAINTENANCE

Final drainage is very important for the performance of the structure. Landscaping, plumbing, and downspout drainage is also very important. It is vital that all roof drainage be transported away from the building so that no water ponds around the building which can result in soil volume change under the building. Plumbing leaks should be repaired as soon as possible to minimize the magnitude of moisture change under the slab. Large trees and shrubs should not be planted in the immediate vicinity of the structures, since root systems can cause a substantial reduction in soil volume in the vicinity of the trees during dry periods.

Adequate drainage should be provided to reduce seasonal variations in moisture content of foundation soils. All pavement and sidewalks within 10-feet of the structure should be sloped away from the structure to prevent ponding of water around the foundation. Final grades within 10-feet of the structure should be adjusted to slope away from structures preferably at a minimum slope of three (3) percent. Maintaining positive surface drainage throughout the life of the structure is essential.

In areas with pavement or sidewalks adjacent to the new structure, a positive seal must be provided and maintained between the structure and the pavement or sidewalk to minimize seepage of water into the underlain supporting soils. Post-construction movement of pavement and flat work is not uncommon. Maximum grades practical should be used for paving and flatwork to prevent areas where water can pond. In addition, allowances in final grades should take into consideration post construction movement of flatwork particularly if such movement would be critical. Normal

maintenance should include inspection of all joints in paving and sidewalks, etc. as well as re-sealing where necessary.

There are several factors, which relate to civil and architectural design and/or maintenance that can significantly affect future movements of the foundation and floor slab systems:

1) Where positive surface drainage cannot be achieved by sloping the ground surface adjacent to the building, a complete system of gutters and downspouts should carry runoff water a minimum of 10-feet from the completed structure;
2) Planters located adjacent to the structure should preferably be self-contained. Sprinkler mains should be located a minimum of five (5) feet from the building line;
3) Planter box structures placed adjacent to buildings should be provided with a means to assure concentrations of water are not available to the subsoil stratigraphy;
4) Large trees and shrubs should not be allowed closer to the foundation than a horizontal distance equal to roughly their mature height due to their significant moisture demand upon maturing;
5) Moisture conditions should be maintained "constant" around the edge of the slabs. Ponding of water in planters, in unpaved areas, and around joints in paving and sidewalks can cause slab movements beyond those predicted in this report; and
6) Roof drains should discharge on pavement or be extended away from the structures. Ideally, roof drains should discharge to storm sewers by closed pipe.

Trenches backfill for utilities should be properly places and compacted as outlined in this report and in accordance with requirements of local City Standards. Since granular bedding backfill is used for most utility lines, the backfilled trench should be prevented from becoming a conduit and allowing an 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 traveling in the trench backfill and entering beneath the structure.

The PVR values estimated and stated under "Vertical Movements" are based on the provision that positive drainage shall be maintained to divert water away from the building. If this drainage is not maintained, the wetted front may occur below the assumed fifteen feet depth, and the resulting PVR may be two (2) to three (3) times greater than the stated values shown in this report. Utility leaks may also cause similar high movements to occur.

9.0 SHORING

Shoring of excavations and design of shoring systems are governed by federal, state, and local regulations. The design of shoring systems on this project is beyond the scope of Terradyne's services. The owner or the contractor should retain a shoring design professional to design shoring systems for excavations on this site.

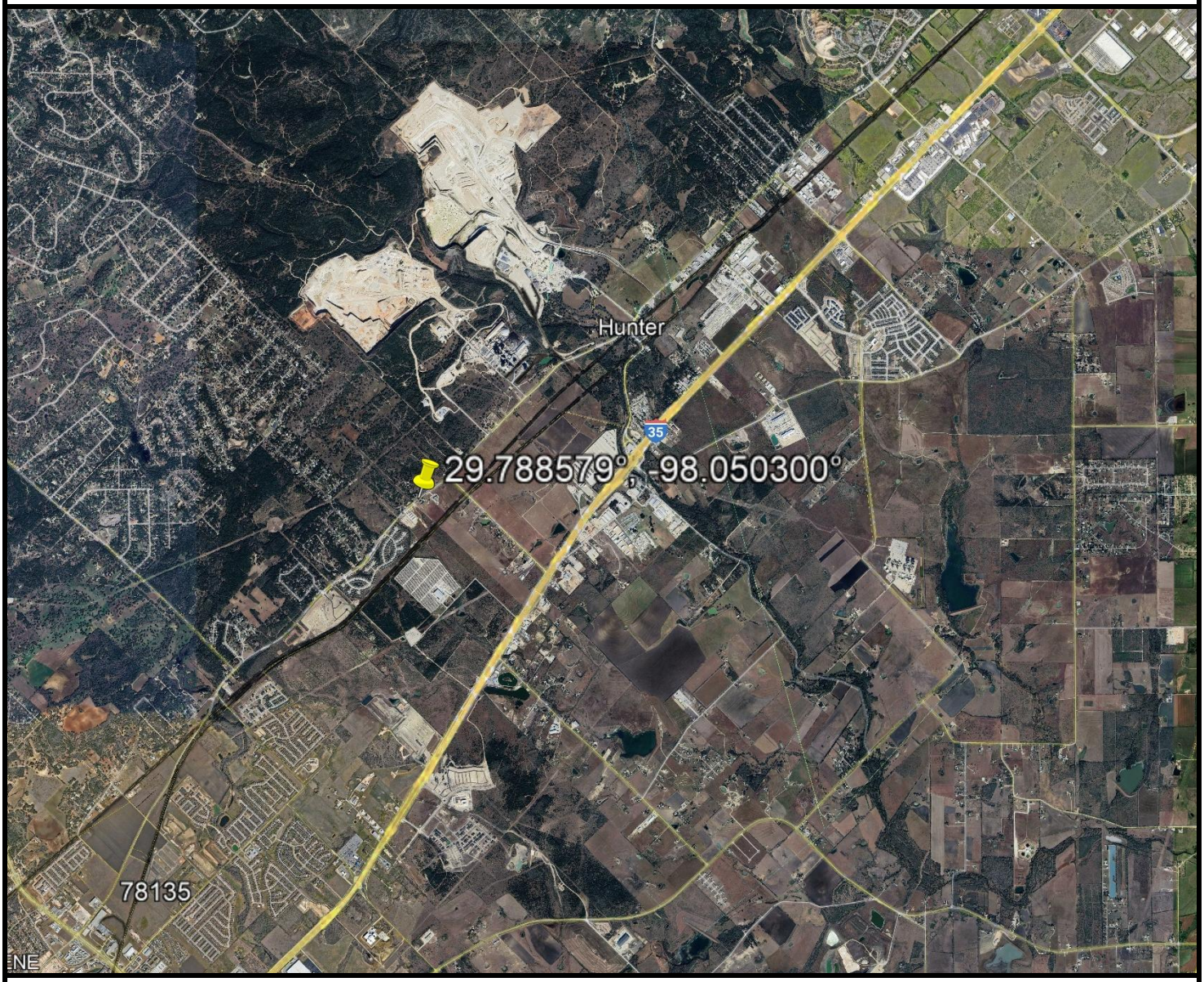
10.0 LIMITATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the (24) borings drilled at the site. This report is preliminary, and the values presented are for planning purposes only and should not be used for design. This report may not reflect the exact variations of the soil conditions across the site. The nature and extent of variations across the site may not become evident until construction commences. If variations appear evident, it will be necessary to re-evaluate Terradyne's recommendations after performing on-site observations and tests to establish the engineering significance of any variations. The project geotechnical engineer should review the final plan for the proposed building so that he may determine if changes in the foundation recommendations are required. The project geotechnical engineer declares that the findings, recommendations, or professional advice contained herein have been made and this report prepared in accordance with generally accepted professional engineering practice in the fields of geotechnical engineering and engineering geology. No other warranties are implied or expressed.

This report is valid until site conditions change due to disturbance (cut and fill grading) or changes to nearby drainage conditions or for three (3) years from the date of this report, whichever occurs first. Beyond this expiration date, Terradyne shall not accept any liability associated with the engineering recommendations in the report, particularly if the site conditions have changed. If this report is desired for use for design purposes beyond this expiration date, Terradyne highly recommend drilling additional borings so that Terradyne can verify the subsurface conditions and validate the recommendations in this report.

This report has been prepared for the exclusive use of Pulte Group, Inc. for the specific application of the proposed residential structures and roadways for Flying W Tract near intersection of FM 1102 & Watson Lane West in New Braunfels, Comal County, Texas.

APPENDIX



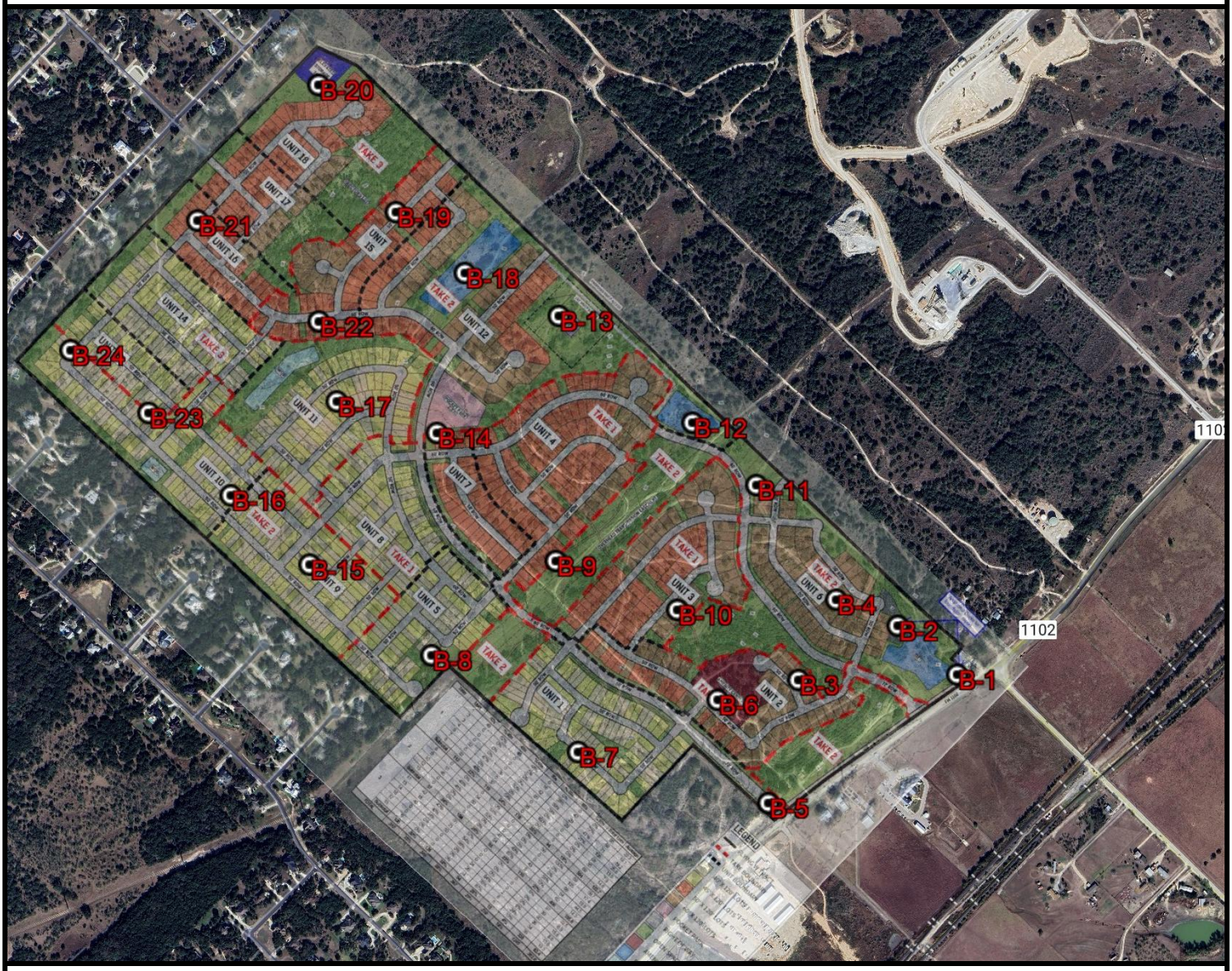
Site Latitude and Longitude

Proposed Preliminary at
Flying W. Tract Near Intersection of
F.M. 1102 & Watson Lane West
New Braunfels, Comal County, Texas

TERRADYNE
Engineers, Geologists & Environmental Scientists

TERRADYNE
AUSTIN, TEXAS

Prepared By: LD	Scale: Not to Scale	Project # A251194
Verified By: JAG	Date: October 2025	Figure # 1-A



Approximate Location of Exploratory Borings

Proposed Preliminary at
Flying W. Tract Near Intersection of
F.M. 1102 & Watson Lane West
New Braunfels, Comal County, Texas

TERRADYNE
Engineers, Geologists & Environmental Scientists

TERRADYNE
AUSTIN, TEXAS

Prepared By:	Scale:	Project #
LD	Not to Scale	A251194
Base Plan By:	Date:	Figure #
Other	October 2025	1-B

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B1

Date(s) Drilled **October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method **Solid Stem Flight**		Total Depth of Borehole **7 feet bgs**
Drill Rig Type **SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill **Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		60			Clayey Sand with Gravel (SC) - black, very dense	7		38	61	29	31		
		T=1"			Limestone	4							
5		T=0.5"				4							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 11

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B2

Date(s) Drilled **October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method **Solid Stem Flight**		Total Depth of Borehole **7 feet bgs**
Drill Rig Type **SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill **Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		27			Sandy Fat Clay with Gravel (CH) - black, very stiff	8							
					Limestone								
		T=0.5"				3							
5		T=0"				3							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 3

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B3

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **5.5 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		63			Sandy Fat Clay with Gravel (CH) - black, hard	9		52	51	26	25		
		T=0.5"			Limestone	3							
5		T=0"				4							
					Auger Refusal @5.5-ft; End of Borehole								
10													
15													
20													

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Figure 4

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B4

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **5.5 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0					Sandy Fat Clay (CH) - black, hard, with roots								
		49, 50/5"				9		54	52	26	26		
					Limestone								
		T=0"				3							
5		T=0"				3							
					Auger Refusal @5.5-ft; End of Borehole								
10													
15													
20													

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Figure 5

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B5

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **5.5 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		48			Clayey Sand with Gravel (SC) - black, dense	7		47	54	27	27		
					Limestone								
		T=0.5"				4							
5		T=0"				3							
					Auger Refusal @5.5-ft; End of Borehole								
10													
15													
20													

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Figure 6

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B6

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **7 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		20, 50/5"			Clayey Sand with Gravel (SC) - black, very dense	6		40	45	28	17		
					Limestone								
		T=0.5"				3							
5		T=0"				3							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 7

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B7

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **7 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		19, 50/4"			Clayey Sand with Gravel (SC) - black, very dense	5							
		T=1"			Limestone	2							
5		T=0"				3							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 8

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B8

Date(s) Drilled **October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method **Solid Stem Flight**		Total Depth of Borehole **7 feet bgs**
Drill Rig Type **SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill **Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		49, 50/4"			Clayey Sand with Gravel (SC) - black, very dense	3							
					Limestone								
		T=0.5"				3							
5		T=0"				2							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 9

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B9

Date(s) Drilled: **October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method: **Solid Stem Flight**		Total Depth of Borehole: **7 feet bgs**
Drill Rig Type: **SIMCO 2**		Approximate Surface Elevation: **Existing Ground Level**
Groundwater Level and Date Measured: **Not Encountered**	Sampling Method(s): **SPT, TCP**	
Borehole Backfill: **Soil Cuttings**	Location: **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		61			Clayey Sand with Gravel (SC) - black, very dense, with roots	3		49	44	24	20		
		T=0.5"			Limestone	3							
5		T=0"				3							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 10

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B10

Date(s) Drilled **October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method **Solid Stem Flight**		Total Depth of Borehole **10 feet bgs**
Drill Rig Type **SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **Auger, SPT, TCP**	
Borehole Backfill **Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		55			Clayey Sand with Gravel (SC) - black, very dense	7							
		T=0.5"			Limestone	4							
5						3							
		T=0.5"											
10					Auger Refusal @10-ft; End of Borehole								
15													
20													

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Figure 11

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B11

Date(s) Drilled **October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method **Solid Stem Flight**		Total Depth of Borehole **7 feet bgs**
Drill Rig Type **SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill **Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		55			Clayey Sand (SC) - black, very dense, with roots	3		49	51	35	16		
		T=0.5"			Limestone	3							
5		T=0"				3							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 12

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B12

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **4 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		T=0"			Limestone								
		T=0"			Auger Refusal @4-ft; End of Borehole								
5													
10													
15													
20													

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Figure 13

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B13

Date(s) Drilled **October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method **Solid Stem Flight**		Total Depth of Borehole **7 feet bgs**
Drill Rig Type **SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill **Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		40, 50/3"			Fat Clay with Sand (CH) - black, hard, with roots	11							
					Limestone								
		T=0"				3							
5		T=0"				3							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 14

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B14

Date(s) Drilled **October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method **Solid Stem Flight**		Total Depth of Borehole **7 feet bgs**
Drill Rig Type **SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill **Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		30, 50/3"			Fat Clay with Sand (CH) - black, hard, with roots	4							
					Limestone								
		T=0.5"				3							
5		T=0"				3							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 15

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B15

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **5.5 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		85			Fat Clay with Sand (CH) - black, hard	5							
					Limestone								
		T=0"				3							
5		T=0"				3							
					Auger Refusal @5.5-ft; End of Borehole								
10													
15													
20													

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Figure 16

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B16

Date(s) Drilled **October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method **Solid Stem Flight**		Total Depth of Borehole **7 feet bgs**
Drill Rig Type **SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill **Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		77			Fat Clay with Sand (CH) - black, hard	5							
					Limestone								
		T=0.5"				3							
5		T=0.5"				3							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 17

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B17

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **7 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		16			Fat Clay with Sand (CH) - brown, very stiff, with roots	12		84	79	38	41		
		T=1"			Limestone	10							
5		T=0.5"				11							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 18

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B18

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **7 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		39			Fat Clay with Sand (CH) - brown, hard	8							
		T=1"			Limestone	6							
5		T=0"				5							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 19

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B19

Date(s) Drilled **October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method **Solid Stem Flight**		Total Depth of Borehole **7 feet bgs**
Drill Rig Type **SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill **Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		20			Fat Clay (CH) - brown, very stiff	22		89	85	39	46		
		T=0.5"			Limestone	13							
5		T=0.5"				11							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 20

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B20

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **4 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		T=0"			Limestone								
		T=0"			Auger Refusal @4-ft; End of Borehole								
5													
10													
15													
20													

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Figure 21

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B21

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **4 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		T=0"			Limestone								
		T=0"			Auger Refusal @4-ft; End of Borehole								
5													
10													
15													
20													

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Figure 22

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B22

Date(s) Drilled: **October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method: **Solid Stem Flight**		Total Depth of Borehole: **7 feet bgs**
Drill Rig Type: **SIMCO 2**		Approximate Surface Elevation: **Existing Ground Level**
Groundwater Level and Date Measured: **Not Encountered**	Sampling Method(s): **SPT, TCP**	
Borehole Backfill: **Soil Cuttings**	Location: **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		37			Fat Clay (CH)- brown, hard, with roots	13		86	59	29	30		
		T=0"			Limestone	6							
5		T=0"				5							
					Auger Refusal @7-ft; End of Borehole								
10													
15													
20													

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Figure 23

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B23

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **5.5 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		13, 50/5"			Fat Clay (CH) - brown, hard	5							
					Limestone								
		T=0"				3							
5		T=0"				2							
					Auger Refusal @5.5-ft; End of Borehole								
10													
15													
20													

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Figure 24

Project: **Proposed Preliminary at**

Project Location: **Near the Intersection of F.M. 1102 & Watson Lane West, New Braunfels, Comal County, Texas**

Terradyne Project Number: **A251194**

Log of Boring B24

Date(s) Drilled	**October 11, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method	**Solid Stem Flight**		Total Depth of Borehole **5.5 feet bgs**
Drill Rig Type	**SIMCO 2**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s) **SPT, TCP**	
Borehole Backfill	**Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
0		76			Clayey Sand (SC) - black, very dense, with roots	3		47	51	26	25		
					Limestone								
		T=1"				2							
5		T=0.5"				2							
					Auger Refusal @5.5-ft; End of Borehole								
10													
15													
20													

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Figure 25

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (THD)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Conte	Dry Unit We	Passing #2C	LL, %	PL, %	PI, %	UC, ksf	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8	9	10	11	12	13	14

COLUMN DESCRIPTIONS

1 Depth (feet): Depth in feet below the ground surface.
2 Sample Type: Type of soil sample collected at the depth interval shown.
3 N=blows/ft (SPT) T=inches/100 blows (THD) : N: Number of blows to advance SPT sampler 12 inches or distance shown, OR T: Penetration in inches of THD Cone for 100 blows
4 PP (tsf): The Relative Consistency of the soil, measured by Pocket Penetrometer in tons/square foot
5 Graphic Log: Graphic depiction of the subsurface material encountered.
6 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
7 Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
8 Dry Unit Weight, pcf: Dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.
9 Passing #200 Sieve, %: The percent fines (soil passing the No. 200 Sieve) in the sample.
10 LL, %: Liquid Limit, expressed as a water content
11 PL, %: Plastic Limit, expressed as a water content.
12 PI, %: Plasticity Index, expressed as a water content.
13 UC, ksf: Unconfined compressive strength.
14 REMARKS AND OTHER TESTS: Comments and observations regarding drilling or sampling made by driller or field personnel.

FIELD AND LABORATORY TEST ABBREVIATIONS

SPT: Standard Penetration Test
THD: Texas Dept. of Transportation Cone Penetrometer Test
LL: Liquid Limit, percent
PL: Plastic Limit, percent
PI: Plasticity Index, percent
PP: Pocket Penetrometer
UC: Unconfined compressive strength test, Qu, in ksf

TYPICAL MATERIAL GRAPHIC SYMBOLS

Fat CLAY, CLAY w/SAND, SANDY CLAY (CH)
Limestone
Clayey SAND (SC)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
Rock Core
2-inch-OD unlined split spoon (SPT)
Texas Cone Penetrometer
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting, AW)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.