TERRADYNE
Engineers, Geologists & Environmental Scientists

Subsurface Exploration, Pavement Recommendations, And Preliminary Foundation Recommendations
Westover Village
SEC of Cable Ranch Road & Vista W Drive
San Antonio, Bexar County, Texas

Terradyne Project No.: A251216

Ms. Tonda Alexander – Director of Land Development
Meritage Homes
2722 West Bitters Road
Suite 200
San Antonio, Texas 78248

November 14, 2025

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2021 ENR Texas & Louisiana TOP DESIGN FIRMS

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Meritage Homes
2722 West Bitters Road
Suite 200
San Antonio, Texas 78248

Attn: Ms. Tonda Alexnader – Director of Land Development

Re: **Subsurface Exploration, Pavement Recommendations, and Preliminary Foundation Recommendations**
Westover Village
SEC of Cable Ranch Road & Vista W Drive
San Antonio, Bexar County, Texas
Terradyne Project No.: A251216

Dear Ms. Alexander:

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.
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EXECUTIVE SUMMARY

The soil conditions at the site of the proposed residential structures and roadways for Westover Village located southeast corner of Cable Ranch Road and Vista W Drive in San Antonio, Bexar County, Texas were explored by drilling six (6) borings to a maximum depth of approximately 20 feet below the existing ground surface elevation. Boring B5 was terminated prior to its proposed depth due to very hard clay. 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 high 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-B. A potential vertical movement on the order of four and one half (4½) inches was estimated at the existing grade level.
2) The Design Plasticity Index value is 41.
3) The borings generally encountered Fat Clay, Fat Clay with Sand (CH) and Lean Clay (CL).
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 Westover Village in San Antonio, Bexar County, Texas. The services of Terradyne, were authorized on October 24, 2025 by Ms. Tonda Alexander, Vice President of Land Development of Meritage Homes by approving Terradyne proposal No: AP251255 dated October 24, 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 six (6) borings to a maximum depth of approximately 20 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 to the southeast corner of Cable Ranch Road and Vista W Drive intersection in San Antonio, Bexar County, Texas. The subject site slopes moderately down towards the east with grass-covered ground. Borings B-1 through B-6 were drilled at/near the following

GPS location (Lat. 29.433101°, Long. -98.653726°). 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 six (6) borings were drilled to a maximum depth of 20 feet at the project site. Borings B-5 was terminated prior to its proposed depth due to very hard clay.

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 three-inch O.D. Shelby tube sample (D1587). 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: Standard penetration tests were performed on the Shelby tube samples in conjunction with pocket penetrometer (ASTM 1558). The standard penetration value is defined as the effort, in tons per square-foot (tsf) required to advance the probe into the sample ¼ inch. The sampler is lowered to the bottom of the drill hole and the Shelby tube is pushed into the soil at the bottom of the bore hole. When the relatively-undisturbed sample is extracted from the tube the soil is tested with the pocket penetrometer. The results of the penetration tests indicate the relative density and comparative consistency of the soils.

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 7 in the Illustration Section. A key to classification terms and symbols used on the logs is presented on Figure 8.

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
Proctor Compaction Test	ASTM D698
California Bearing Ratio (CBR)	ASTM D-1883
PI Lime Series	Tex-112-E

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 *Geological Atlas of Texas, San Antonio Sheet*[1], indicates that this site is naturally underlain with the soils and rock of the Leona (Qle) formation. The Leona (Qle) formation generally consists of sand, clay and gravel. The fine calcareous silt grades down into coarse gravel.

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

The soils underlying this site may be grouped into two (2) 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 8.

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 high expansiveness in character. Structures supported at shallow depths will be subjected to potential vertical movement of four and one half (4½) 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 twelve (12) to fifteen (15) feet 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 four and one half (4½) 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.

Moisture Conditioning

The installation of a minimum of ten (10) feet of moisture conditioned clay should lower the potential vertical movements to two (2 inches. It is recommended that moisture conditioning be extended beyond the building line to include entrances and other flatwork areas sensitive to movement. A vapor barrier needs to be placed over the pad immediately after moisture conditioning to reduce moisture loss prior to construction.

Moisture conditioning involves excavating the soils as required to provide ten (10) feet of reworked material beneath each building pad. The exposed clay subgrade shall be scarified to a minimum depth of eight (8) inches and recompacted to a minimum of 92 percent of Standard Proctor (ASTM D698), at a minimum of five (5) percentage points above the soil's optimum moisture content and achieving a minimum of 45 percent of the liquid limit. The excavated soils shall be moisture conditioned to water content at a minimum of five (5) percentage points above optimum and achieving minimum of 45 percent of the liquid limit and cured. The moisture conditioned soils can then be placed in 8-inch maximum thick loose lifts, and uniformly compacted to the same criteria. Care shall be taken that a lift is not allowed to desiccate prior to placing a subsequent lift.

Water Injection

The potential vertical movements can also be lowered by a) injecting water to a depth of about ten (10) feet and b) by preparing a building pad immediately below the floor slab. The compacted select fill will help the water injected soil mass retain its' moisture and provide a uniform support for the slab. The injection of water into expansive clay is a method of pre-swelling the clay mass. This pre-swelling processes requires that the moisture content of the injected soils be maintained throughout the construction process and after construction has completed. If pre-swelled clays are allowed to dry, it is likely that much of the benefit achieved by the injection process will be lost. Buildings supported on ten (10) feet of water-injected clays are expected to move on the order of two (2) inches.

Limits of Injection: Injection shall be performed under the building, at 12-inches on-center, and shall be extended a minimum of five (5) feet beyond the general building lines. The injection shall be extended 10-feet beyond the building at entrances to limit the potential for differential movement between structures, sidewalks, and entrance pavement. ***Quality control inspections and tests shall be performed by Terradyne at the time of water injection.***

Multiple Injections: The number of injection passes required will be dependent upon soil moisture conditions at the time of construction. Even with the best of techniques, average moisture increases of more than two (2) to three (3) percent are difficult to achieve with a single injection. When the clay soils are dry and dense, multiple injections will be necessary. For estimating purposes, a minimum of four (4) passes shall be anticipated. Multiple injections will help the clays to achieve the desired final moisture content and the corresponding swell abatement.

Final Acceptance Criteria: Satisfactory completion of the injection and conditioning process is achieved when the desired moisture content and abatement of swell in the injected or conditioned clays are reached. Preliminary laboratory tests indicate the desired final water content will be about 45 percent of the Liquid Limit of the soil. Under the applied floor slab loads and sustained final overburden pressure, the free swell shall not exceed one (1) percent. Post injection swell and moisture content test results shall be reviewed; these test results shall be used for the final acceptance or rejection of the injection process. Additional passes of water injection and further sampling and testing will be required, in the case of first rejection.

Chemical Injection

Chemical injection has been used on similar sites like this across Texas. Provided herein are design parameters based on a ten (10) feet injection depth and the contractors achieving a swell of one (1) percent or less. Lots with design PI of 41 are estimated to need one (1) or two (2) passes of chemical injection depending on chemical concentration during injection. This will result in a PVR of approximately two (2) inches. The chemical injection contractor should review the logs to confirm the injection equipment can penetrate the subsurface materials prior to mobilizing to the site.

A minimum of one (1) boring to the full injection depth should be performed for collection of undisturbed tube samples. A minimum of two (2) swell tests should be performed and no swell shall exceed two (2) percent and the average swell shall not exceed one (1) percent.

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 2,000 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 2,500 pounds per square foot should be used for beams bearing on a minimum of 12 inches of compacted select structural fill. 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 Indices

Westover Ridge		
Boring	**PVR (inches)**	**Design Plasticity Index**
B1	**4½**	**41**
B2	**4½**	**41**
B3	**4½**	**41**
B4	**4½**	**41**
B5	**4½**	**41**

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

Soil Conditioning Method		Minimum Grade Beam Depth (Inches)	PVR (Inches)	Design Plasticity Index	Differential Vertical Movement, (Y_m) Inches		Edge Moisture Variation Distance, (E_m) feet	
Type	Depth				Center Lift	Edge Lift	Center Lift	Edge Lift
Dry to Wet Condition	----	12	4½*	41	2.0	2.2	7.5	3.4
Moisture Conditioning/ Water Injection	10-ft	12	2	30	1.4	1.6	7.5	3.4
Chemical Injection	10-ft	12	2	41	1.4	1.6	7.5	3.4

**Terradyne does not recommend designing the foundation utilizing a design PVR of four and one-half (4½) inches or greater. The level of risk associated with this movement should be discussed with the Structural Engineer and owner.*

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 1,500 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.

6.6 Detention Pond Recommendations

Table 5 below indicates typical Clay Liner Specifications. Terradyne should be on site during all construction activities. Based on the encountered soils in borings B-6, further testing by Teradyne will need to be performed during construction activities to determine if on-site construction materials follow the mentioned specifications.

Table No. 5: Typical Clay Liner Specifications

Property	Test Method	Unit	Specification
Permeability	ASTM D2434	Cm/sec	1×10^{-6}
Plasticity Index of Clay	ASTM D423 & D242	%	Not less than 15
Liquid Limit of Clay	ASTM D2216	%	Not less than 30
Clay Particles Passing	ASTM D422	%	Not less than 30
Clay Compaction	ASTM D2216	%	95% of Standard Proctor Density

It is important that any existing organic and compressible soils (the upper soils which contain organic materials such as leaves, roots, etc.) be removed and the exposed subgrade be properly prepared prior to placing structural fill for the detention pond areas. The subgrade shall be scarified to a depth of 8 inches and compacted prior to placement of structural fill.

Vegetation and all loose or organic material shall be stripped and removed from the site. Subsequent to stripping operations, the subgrade shall be proofrolled to identify soft zones. Any soft zone detected shall be removed to a firm subgrade soil and replaced with compacted satisfactory soils to reach design subgrade level. Upon the acceptance of proofrolling operations, the subgrade should be scarified to a minimum depth of 8 inches, moisture conditioned and compacted to a minimum of 95 percent of maximum dry density as determined by ASTM D 698, the Standard Proctor, between optimum and 4 percentage points above optimum moisture content. The exposed subgrade shall not be allowed to dry out prior to placing structural fill.

Suitability of Structural Fill for Detention Pond

The soil used as structural fill for the detention basin shall have a plasticity index ranging between 20 to 40, with a minimum of 60 percent passing the No. 200 Sieve, and classified either a Lean Clay (CL) or Fat Clay (CH) . Detailed descriptions and laboratory test results of the soils are found in the boring logs in the Appendix.

Structural fill for the detention pond shall be placed in horizontal lifts a maximum of eight (8) inches in loose thickness, moisture conditioned between optimum and 4 percentage points above optimum moisture content, and mechanically compacted to a minimum of 95 percent of maximum dry density as determined by ASTM D 698, the Standard Proctor.

Slope Protection

In order to protect the slope from erosion and to minimize groundwater influx during flooding, it is recommended that a good grass cover or sodding be established and maintained.

Detention Pond Slope

Based on the subsurface conditions in the detention pond areas and general local nearby requirements, the side slope of the detention pond be maintained no steeper than 3H:1V (3 Horizontal:1 Vertical). The depth of detention ponds was not known at the time of the soil's investigation.

Detention Pond Maintenance

Slope protection is important for the performance of the proposed detention ponds. Large trees and shrubs shall not be planted in the immediate vicinity of the detention pond since root systems can cause a substantial reduction in soil volume in the vicinity of the trees during dry periods. Normal maintenance shall include inspection of erosion control in order to protect the slope.

7.0 PAVEMENT GUIDELINES

7.1 General

Terradyne understand current plans are that the roadways will likely consist of flexible pavements. Therefore, we have prepared the following recommendations for the design and construction of flexible pavement systems. Terradyne understand the proposed pavements for these subdivision units will be designed and constructed in general accordance with the City of San Antonio design standards. These guidelines require that streets be designed using the American Association of State Highway and Transportation Officials (AASHTO) "Guide for Design of Pavement Structures".

7.2 Subgrade Design Considerations

Based on the subsurface information obtained at the soil borings drilled along the alignment of the proposed streets, the pavement subgrade soil profile generally consists of hard FAT CLAY or FAT CLAY with SAND (CH). As a part of any pavement design, the strength of the underlying subgrade must be taken into consideration. This is often accomplished by performing a laboratory California Bearing Ratio (CBR) test to approximate a soil resilient modulus which is utilized in the design. Based upon the findings of the exploratory borings and results of laboratory testing, Terradyne's experience with similar soils in nearby subdivision units, Terradyne have used a design CBR of approximately 3.0 for the pavements within this development. Per the FPDC, Local A Streets are designed for a minimum traffic application of 1,000,000 18-kip ESALs. Local B Streets and Collector Streets are designed for a minimum traffic application of 2,000,000 18-kip ESALs. The following pavement design parameters are required by the FPDC:

Table No. 6

Flexible Pavement Design Parameters	
Reliability, Local A Streets, percent	70
Reliability, Local B & Collector Streets, percent	90
Initial Serviceability Index	4.2
Terminal Serviceability Index, Local	2.0
Terminal Serviceability Index, Collector	2.5
Standard Deviation	0.45

The Plasticity Index (PI) of the soils underlying the proposed street alignment were tested up to a value of 41. The above referenced City document states that roadbed soil having a PI greater than twenty (20) shall be chemically stabilized with lime.

7.3 Pavement Sections

Based on the data provided to Terradyne, the results of the field and laboratory testing, and the City of San Antonio guidelines, Terradyne have developed the following minimum structural numbers and structural design values for the pavement sections planned for this project.

Required Structural Number (SN) - Local A Streets	= 3.53
Required Structural Number (SN) - Local B Streets	= 4.37
Required Structural Number (SN) - Collector Streets	= 4.67
Design CBR Value	= 3.0
Item 340, Asphaltic Concrete Layer Coefficient	= 0.44
Item 247, Type A, Grade 1 or 2 Base Layer Coefficient	= 0.14
Item 260, Lime Stabilized Subgrade Layer Coefficient	= 0.08

Using the above information, the AASHTO design method, and Terradyne's understanding of the City of San Antonio Flexible Pavement Design Criteria, the following engineered flexible pavement sections are recommended. Options with and without geogrid subgrade reinforcement are presented.

Table No. 7
Recommended Flexible Pavement Sections- Local A Streets
Design ESALs: 100,000

Flexible Pavement Section	Thickness in Inches		
	Alt 1	Alt 2	Alt 3
Hot Mix Asphaltic Concrete, Type D	3.0	3.0	3.0
Aggregate Base	12.0	12.0	16.0
Lime Stabilized Subgrade	--	8.0	--
Tensar HX5.5 Geogrid	Yes	--	--
Compacted Subgrade	8.0	--	8.0

Table No. 8
Recommended Flexible Pavement Sections- Local B
Design ESALs: 2,000,000

Flexible Pavement Section	Thickness in Inches		
	Alt 1	Alt 2	Alt 3
Hot Mix Asphaltic Concrete, Type D	2.0	2.0	2.0
Hot Mix Asphaltic Concrete, Type C	2.0	2.0	2.0
Aggregate Base	16.0	16.0	20.0
Lime Stabilized Subgrade	--	8.0	--
Tensar HX5.5 Geogrid	Yes	--	--
Compacted Subgrade	8.0	--	8.0

Table No. 9
Recommended Flexible Pavement Sections- Collector Streets
Design ESALs: 2,000,000

Flexible Pavement Section	Thickness in Inches		
	Alt 1	Alt 2	Alt 3
Hot Mix Asphaltic Concrete, Type D	2.0	2.0	2.0
Hot Mix Asphaltic Concrete, Type C	2.0	2.0	2.0
Aggregate Base	18.0	18.0	22.0
Lime Stabilized Subgrade	--	8.0	--
Tensar HX5.5 Geogrid	Yes	--	--
Compacted Subgrade	8.0	--	8.0

The pavement sections containing geogrid are considered to meet the indicated structural capacity. However, if these options will be considered, the City should first be consulted to determine their acceptance of the structural contribution of the geogrid in the pavement sections.

In any areas where pavements 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 with heavy sheep's-foot roller compactor a minimum of **three (3)-passes** to identify soft zones. Any soft zone detected should be removed to a firm subgrade soils and replaced with compacted suitable soils to reach subgrade level. Upon the acceptance of proof-rolling operations the subgrade should be scarified to a depth of six (6) inches, moisture conditioned and compacted to a 95 percent of maximum dry density as determined by ASTM D 698, between optimum and three (3) percentage points above of optimum moisture content. The exposed subgrade should not be allowed to dry out prior to placing structural fill.

7.4 Base Course

Based on the survey of available materials in the area, a base course of crushed limestone aggregate or gravel appears to be the most practical material for asphalt pavement project. The base course should conform to Texas State Department of Highways and Public Transportation Standard Specification, Item 247, Type A, Grade 1 – 2. The overbuild of the base should be extended three (3) feet beyond the curb.

The base course should be moisture conditioned within ±2 percentage points of optimum moisture content placed in lifts not exceeding 8-inches loose measure and compacted to at least 95 percent of maximum dry density as determined by test method TXDOT-113-E.

7.5 Asphaltic Concrete

The asphaltic concrete surface course should conform to Texas Department of Transportation (TxDOT) Standard Specifications, Item 340, Type D the secondary asphalt course should consist of

TxDOT Item 340, Type C. The asphaltic concrete should be compacted to between 92 and 97 percent of the theoretical density as determined by ASTM D 2041.

7.6 Lime Stabilized Subgrade

The lime stabilization of the subgrade should meet the performance standards found in TxDOT Item 260. In addition, graduation requirements outlined in Item 260, the lime stabilized clay should also have a minimum of 60 percent, on a weight basis, of the stabilized soil passing the No. 4 sieve at moisture content at or above optimum. The lime stabilized clay soil should have a **plasticity index equal to or less than 20** based on a dry method of sample preparation, ASTM D 421. The lime stabilized subgrade should be compacted to at least 95 percent of the standard Proctor maximum dry density ASTM D 698 between optimum and two (2) percentage points of optimum moisture content. Lime content of **four (4) percent** of the dry unit weight of the clays to be stabilized may be used for planning purposes (it should be verified by performing a lime series test at the time of construction). Using a value of 98 pcf for dry unit weight of clays, **23 lbs per square yard for eight (8) inches** depth stabilization is required. **Prior to the use of lime, the exposed subgrade should be tested for sulfate contents to determine the levels of sulfates are low enough for the use of lime.**

7.7 Perimeter Drainage

Perimeter protection must be provided so that water will not infiltrate into the pavement's flexible base or immediate subgrade. Typically, this is accomplished by providing impermeable cover by way of sidewalks abutting the pavement curb. As an alternative, a clay layer may be placed behind the curb to act as a clay cap. The clay cap should consist of a fat or lean clay (CH/CL) with a minimum of 85% passing a 200 sieve. The clay should be compacted to a minimum of 95 percent of the maximum dry density (Proctor) and a moisture within three (3) percentage points of the optimum moisture content.

8.0 CONSTRUCTION CONSIDERATIONS

8.1 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.

8.2 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.

8.3 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.

8.4 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.

9.0 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.

10.0 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.

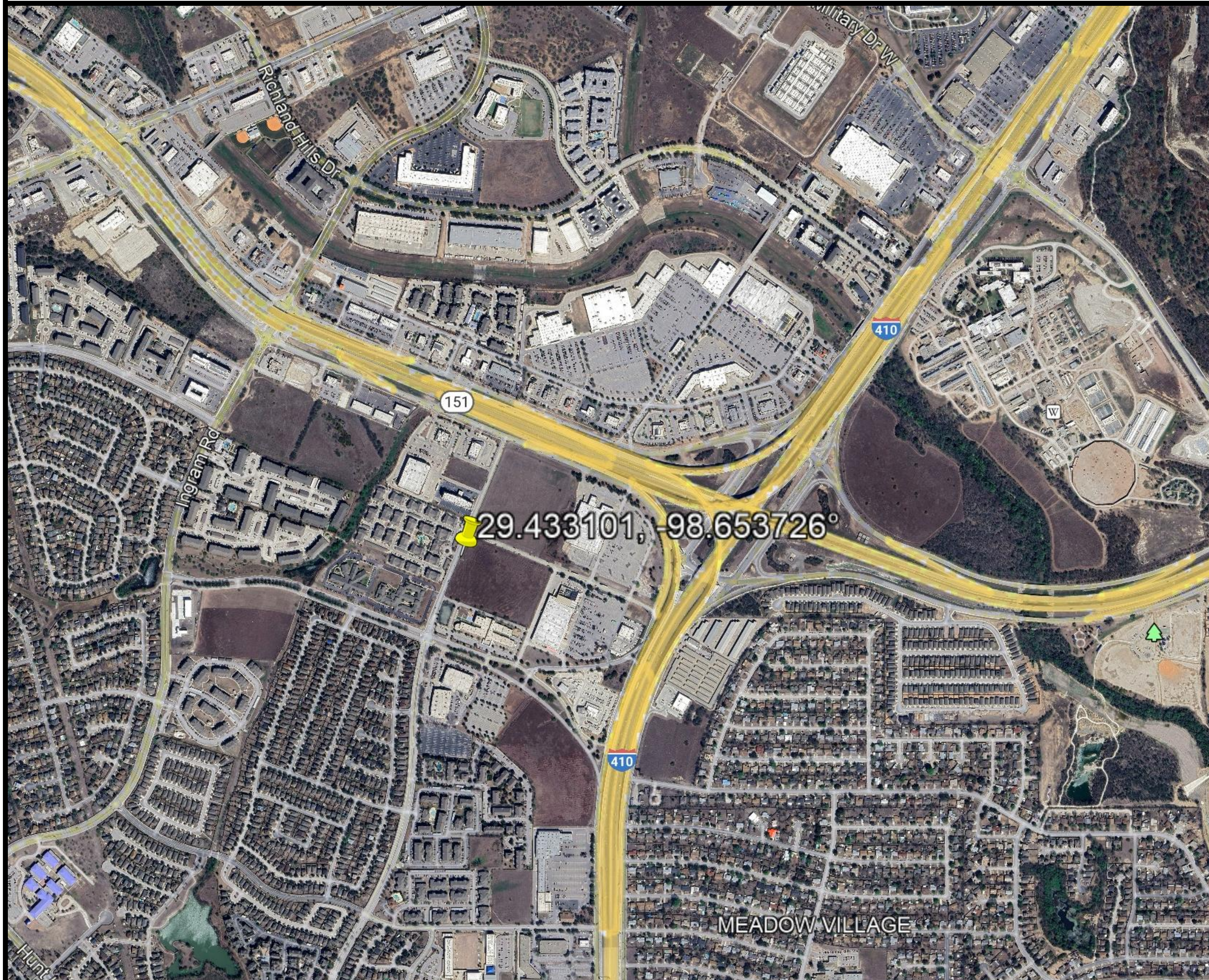
11.0 LIMITATIONS

The analysis and recommendations submitted in this report are based upon the data obtained from the six (6) 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 Meritage Homes for the specific application of the proposed residential structures and roadways for Westover Village in San Antonio, Bexar County, Texas.

APPENDIX

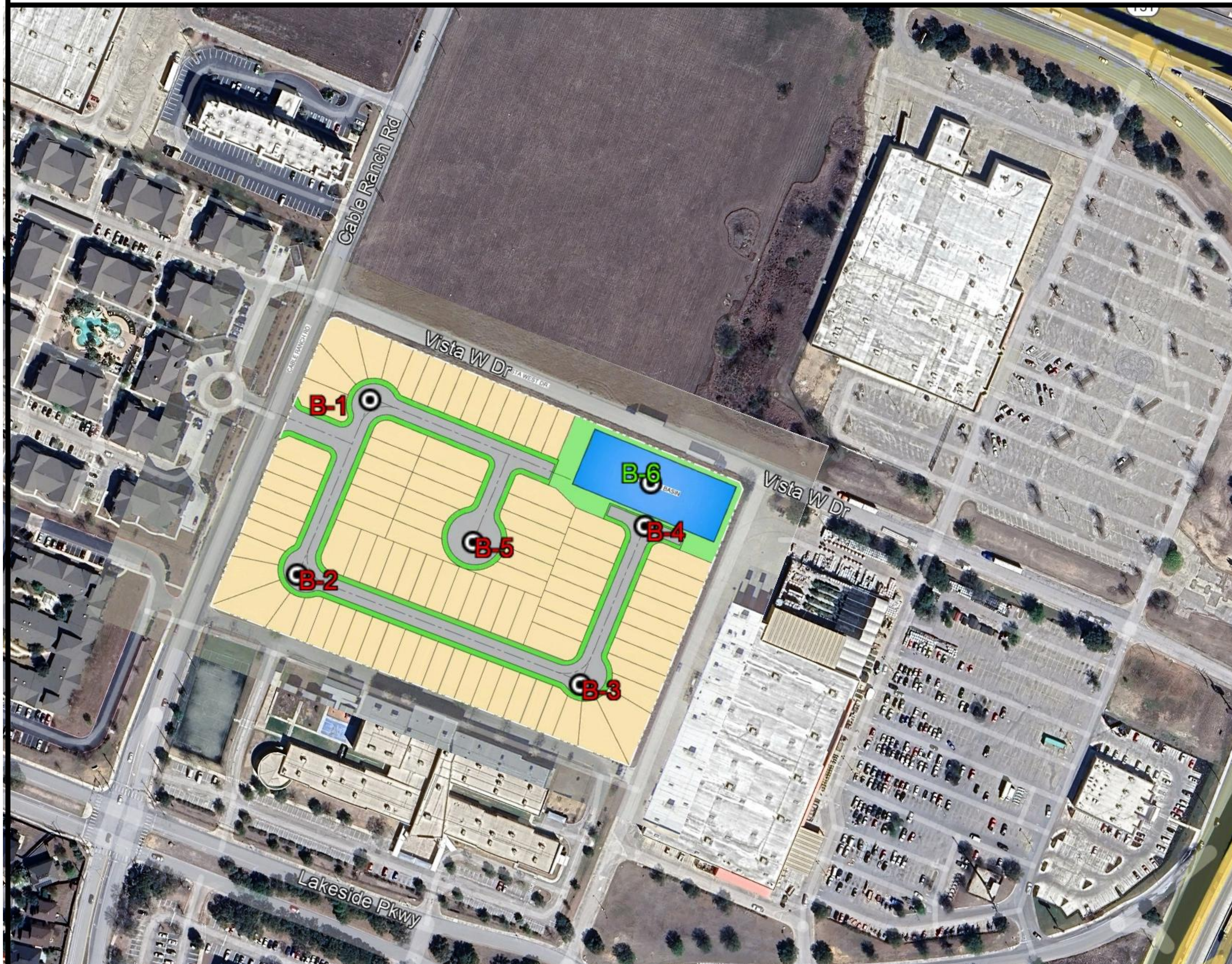


Site Latitude and Longitude

Proposed Preliminary and Final Pavement at Westover Village
San Antonio, Bexar County, Texas

TERRADYNE
AUSTIN, TEXAS

Prepared By: LD	Scale: Not to Scale	Project # A251216
Verified By: JAG	Date: November 2025	Figure # 1-A



Approximate Location of Exploratory Borings Proposed Preliminary and Final Pavement at Westover Village San Antonio, Bexar County, Texas	TERRADYNE Engineers, Geologists & Environmental Scientists	TERRADYNE AUSTIN, TEXAS	
	Prepared By: LD	Scale: Not to Scale	Project # A251216
	Base Plan By: Other	Date: November 2025	Figure # 1-B

Approximate Location of Bulk Sample

Proposed Preliminary and Final Pavement at Westover Village
San Antonio, Bexar County, Texas

TERRADYNE
Engineers, Geologists & Environmental Scientists

TERRADYNE
AUSTIN, TEXAS

Prepared By: LD	Scale: Not to Scale	Project # A251216
Base Plan By: Other	Date: November 2025	Figure # 1-B

Project: **Proposed Preliminary and Final Pavement**

Project Location: **Westover Village, SEC of Cable Ranch Road & Vista W. Drive, SA, Texas**

Terradyne Project Number: **A251216**

Log of Boring B1

Date(s) Drilled	**Novemember 10, 2025**		
Drilling Method	**Solid Stem Flight**	Total Depth of Borehole	**15 feet bgs**
Drill Rig Type	**B34**	Approximate Surface Elevation	**Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s)	**Tube**
Borehole Backfill	**Soil Cuttings**	Location	**SEE BLP**

TERRADYNE
Engineers, Geologists & Environmental Scientists

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (TCP)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, tsf	REMARKS AND OTHER TESTS
0					Fat Clay (CH) - hard, brown to light brown								
	Tube		4.5+			18		89	69	27	42		
	Tube		4.5+			15							
5	Tube		4.5+			17							
	Tube		4.5+			14							
	Tube		4.5+			15							
10													
	Tube		4.5+			18							
15					End of Borehole								
20													

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Figure 2

Project: **Proposed Preliminary and Final Pavement**	Log of Boring B2
Project Location: **Westover Village, SEC of Cable Ranch Road & Vista W. Drive, SA, Texas**	
Terradyne Project Number: **A251216**	

Date(s) Drilled	**Novemember 10, 2025**		
Drilling Method	**Solid Stem Flight**	Total Depth of Borehole	**15 feet bgs**
Drill Rig Type	**B34**	Approximate Surface Elevation	**Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s)	**Tube**
Borehole Backfill	**Soil Cuttings**	Location	**SEE BLP**

TERRADYNE Engineers, Geologists & Environmental Scientists

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (TCP)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, tsf	REMARKS AND OTHER TESTS
0					Fat Clay (CH) - brown, hard								
			4.0			23							
			4.5+			16		86	69	28	41		
5			4.5+			19							
			4.5+			17							
			4.5+			13							
10													
					Fat Clay with Sand (CH) - brown, hard								
			4.5+			13		74	53	22	31		
15					End of Borehole								
20													

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Figure 3

Project: **Proposed Preliminary and Final Pavement**	Log of Boring B3
Project Location: **Westover Village, SEC of Cable Ranch Road & Vista W. Drive, SA, Texas**	
Terradyne Project Number: **A251216**	

Date(s) Drilled **Novemember 10, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method **Solid Stem Flight**		Total Depth of Borehole **15 feet bgs**
Drill Rig Type **B34**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **Tube**	
Borehole Backfill **Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (TCP)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, tsf	REMARKS AND OTHER TESTS
0					Fat Clay with Sand (CH) - brown to light brown, hard								
	Tube		4.5+			22							
	Tube		4.5+			12							
5	Tube		4.5+			11		80	72	29	43		
	Tube		4.5+			17							
	Tube		4.5+			17							
10													
	Tube		4.5+			17							
15					End of Borehole								
20													

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Project: **Proposed Preliminary and Final Pavement**	Log of Boring B4
Project Location: **Westover Village, SEC of Cable Ranch Road & Vista W. Drive, SA, Texas**	
Terradyne Project Number: **A251216**	

Date(s) Drilled **Novemember 10, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method **Solid Stem Flight**		Total Depth of Borehole **15 feet bgs**
Drill Rig Type **B34**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **Tube**	
Borehole Backfill **Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (TCP)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, tsf	REMARKS AND OTHER TESTS
0					Fat Clay (CH) - brown to light brown, very stiff to hard								
	Tube		3.75			29							
	Tube		4.5+			18							
5	Tube		4.5+			22							
	Tube		4.5+			18		92	79	30	49		
	Tube		4.5+			16							
10													
	Tube		4.5+			15							
15					End of Borehole								
20													

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Project: **Proposed Preliminary and Final Pavement**

Project Location: **Westover Village, SEC of Cable Ranch Road & Vista W. Drive, SA, Texas**

Terradyne Project Number: **A251216**

Log of Boring B5

Date(s) Drilled	**Novemember 10, 2025**		
Drilling Method	**Solid Stem Flight**	Total Depth of Borehole	**10 feet bgs**
Drill Rig Type	**B34**	Approximate Surface Elevation	**Existing Ground Level**
Groundwater Level and Date Measured	**Not Encountered**	Sampling Method(s)	**Tube**
Borehole Backfill	**Soil Cuttings**	Location	**SEE BLP**

TERRADYNE
Engineers, Geologists & Environmental Scientists

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (TCP)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, tsf	REMARKS AND OTHER TESTS
0					Fat Clay (CH) - brown, hard								
			4.5+			21							
			4.5+			15							
5			4.5+			16							
			4.5+			17							
			4.5+			17		88	64	27	37		
10					Auger Refusal @10-ft ;End of Borehole								
15													
20													

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Project: **Proposed Preliminary and Final Pavement**	Log of Boring B6
Project Location: **Westover Village, SEC of Cable Ranch Road & Vista W. Drive, SA, Texas**	
Terradyne Project Number: **A251216**	

Date(s) Drilled **Novemember 10, 2025**	TERRADYNE Engineers, Geologists & Environmental Scientists	
Drilling Method **Solid Stem Flight**		Total Depth of Borehole **20 feet bgs**
Drill Rig Type **B34**		Approximate Surface Elevation **Existing Ground Level**
Groundwater Level and Date Measured **Not Encountered**	Sampling Method(s) **Tube**	
Borehole Backfill **Soil Cuttings**	Location **SEE BLP**	

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (TCP)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Passing #200 Sieve, %	LL, %	PL, %	PI, %	UC, tsf	REMARKS AND OTHER TESTS
0	Tube				Fat Clay (CH) - brown, hard								
			4.5+			23							
	Tube		4.5+			15							
5	Tube		4.5+			16							
	Tube		4.5+			19							
	Tube		4.5+			19							
10													
13	Tube				Lean Clay (CL) - light brown, hard								
			4.5+			12		86	42	15	27		
15													
	Tube		4.25			17							
20					End of Borehole								

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Figure 7

TERRADYNE
Engineers, Geologists & Environmental Scientists

Depth (feet)	Sample Type	N=blows/ft (SPT) T=inches/100 blows (TCP)	PP (tsf)	Graphic Log	MATERIAL DESCRIPTION	Water Conte	Dry Unit We	Passing #20	LL, %	PL, %	PI, %	UC, tsf	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 (TCP) : 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, tsf: 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
TCP: 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)

Lean CLAY, CLAY w/SAND, SANDY CLAY (CL)

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.

Beyond Engineering & Testing, LLC
3801 Doris Lane, Suite B
Round Rock, TX 78664
(512) 358-6048

Client: Terradyne Engineering, Inc.

Beyond Project No.: LT2510116

Project: Westover Village Pavement/Prelim (PN: A251216)

Sample: B-5 0-2'- Bags 1-7

Lab Summary

Test Assigned	Lab Results
Atterberg (ASTM D4318)	LL=62, PL=25, PI=37
Sulfate Content (Tex-145-E)	< 100 ppm
pH of Soil (ASTM D4972)	pH = 7.2
Chloride Content (Tex-620-J)	61 ppm
Proctor (ASTM D698)	See Report
CBR (ASTM D1883)	See Report
Admixing Lime to Reduce Plasticity (Tex-112-E)	See Report

HuaMiao Cao, P.E., 11/12/25

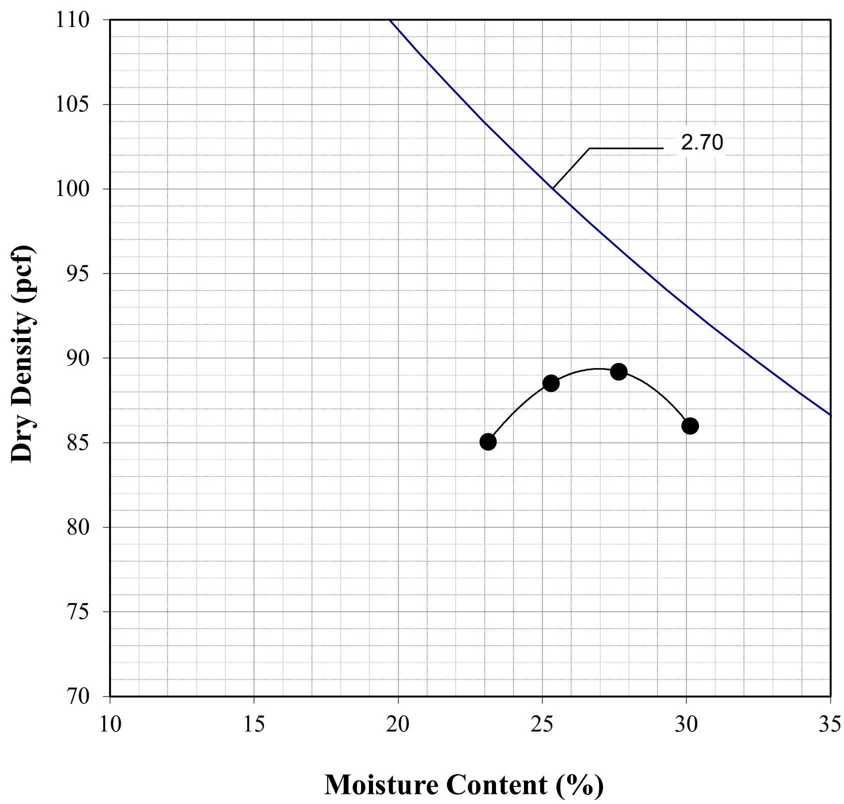
Quality Review/Date

Beyond Engineering & Testing, LLC
3801 Doris Lane, Suite B
Round Rock, TX 78664
(512) 358-6048

Proctor Compaction Test

Client: Terradyne Engineering, Inc.
Beyond Project No.: LT2510116
Project Name: Westover Village Pavement/Prelim (PN: A251216)
Test Method: ASTM D698, Method A
Sample I.D.: B-5 0-2'- Bags 1-7
Test Date: 11/05/25

Moisture-Density Relationship



Water Content (%)	Dry Density (pcf)
23.1	85.1
25.3	88.5
27.7	89.2
30.1	86.0

Curve Results	
Maximum Dry Density (pcf):	**89.4**
Optimum Water Content (%):	**27.0**

HuaMiao Cao, P.E., 11/12/25

Quality Review/Date

Tested by: A.S.

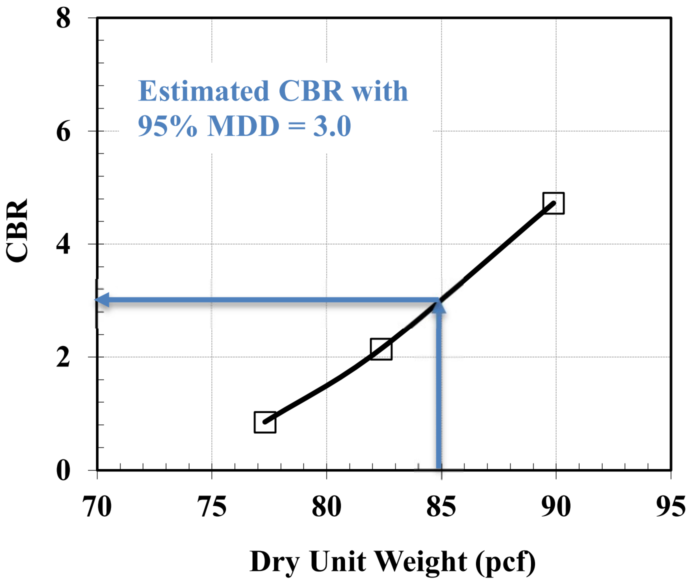
Beyond Engineering & Testing, LLC
3801 Doris Lane, Suite B
Round Rock, TX 78664
(512) 358-6048

CBR (California Bearing Ratio) Test

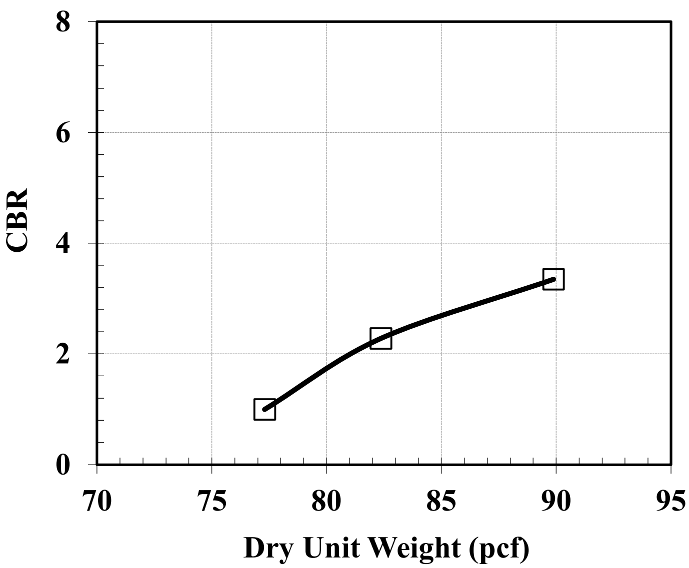
Client: Terradyne Engineering, Inc.
Project: Westover Village Pavement/Prelim (PN: A251216)
Sample No: B-5 0-2'- Bags 1-7

Beyond Project No.: LT2510116
Test Method: ASTM D1883
Test Date: 11/11/2025
Rate of Penetration: 0.05 in/min

CBR for 0.100-in Penetration



CBR for 0.200-in Penetration



Initial Conditions			
Specimen No.	1	2	3
Blows per Layer	15	30	60
Surcharge Weight (lbs)	10	10	10
Water Content (%)	27.0	27.6	26.8
Dry Unit Weight (pcf)	77.3	82.4	89.9
Percent Compaction (%)	86.5	92.1	100.5
Final Conditions (soaked)			
Water Content (%) at top 1-in layer after soaking	44.7	40.2	34.8
Swell (% of initial height)	4.6	3.1	1.6
Bearing Ratio of Sample at 0.100 in penetration	0.9	2.1	4.7
Bearing Ratio of Sample at 0.200 in penetration	1.0	2.3	3.3

Note: Soil specimens were molded to a range of densities using 15, 30 and 60 blows at optimum moisture content as per ASTM D 1883 to develop the CBR versus dry density curve. It was allowed the specimens to soak for 96 hrs prior bearing test. Removed the free water and allow the specimens to drain out for 15 min. The 10-lbs surcharge load was placed during bearing test.

HuaMiao Cao, P.E., 11/12/25

Analysis & Quality Review/Date
Specimens prepared and tested by: A.S.

Beyond Engineering & Testing, LLC
3801 Doris Lane, Suite B
Round Rock, TX 78664
(512) 358-6048

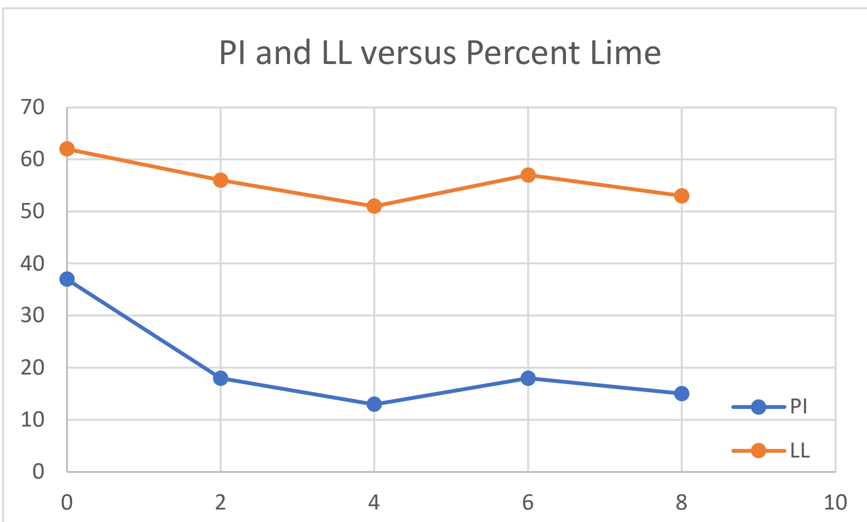
PI Lime Series

Admixing Lime to Reduce Plasticity Index of Soils

Client: Terradyne Engineering, Inc.
Project: Westover Village Pavement/Prelim (PN: A251216)
Sample: B-5 0-2'- Bags 1-7

Beyond Project No.: LT2510116
Test Method: Tex-112-E
Test Date: 11/11/2025

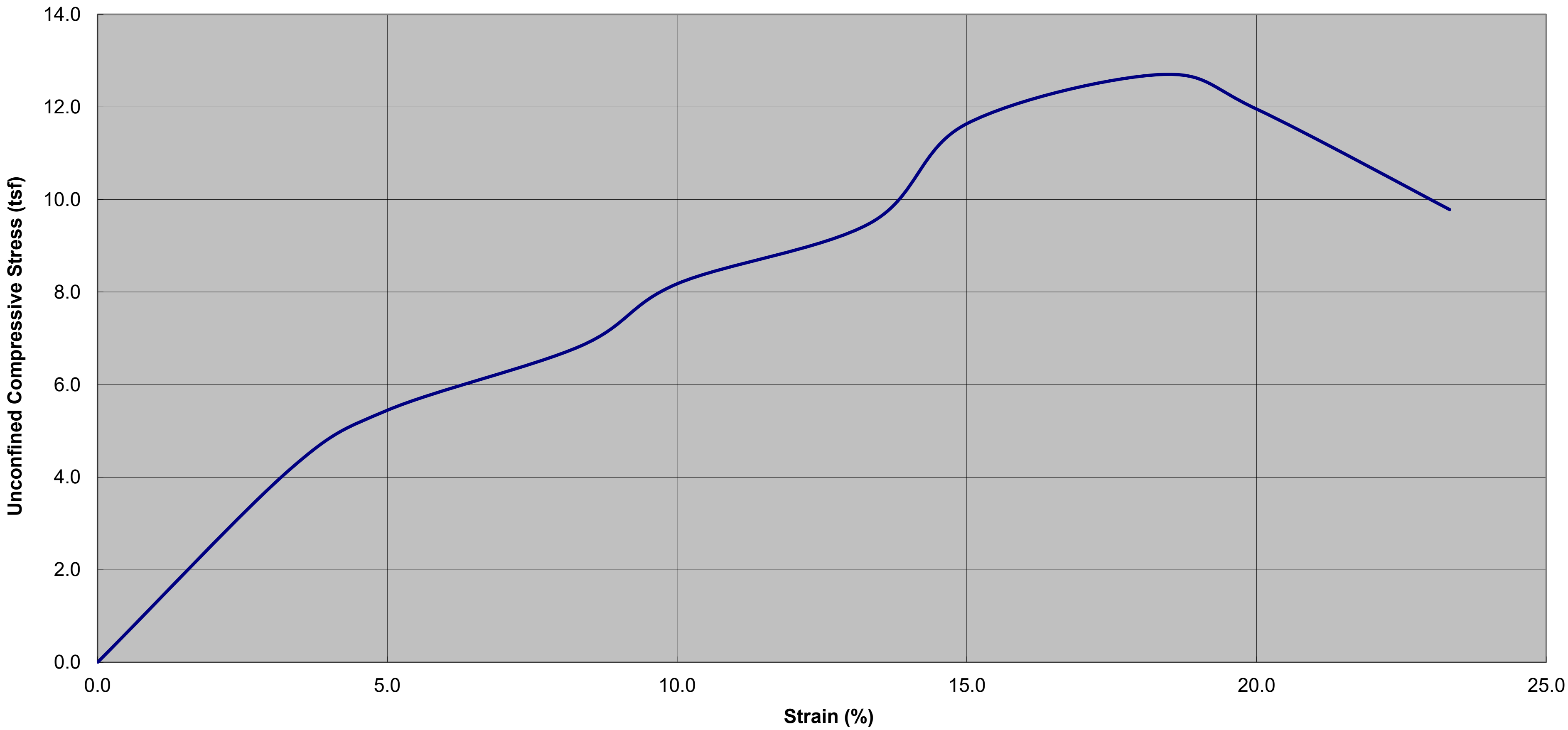
Soil = 50 g					
Series	% Lime	Lime Weight (g)	LL	PL	PI
1	0	0	62	25	37
2	2	1	56	38	18
3	4	2	51	38	13
4	6	3	57	39	18
5	8	4	53	38	15



Note: Hydrated Lime was used.

HuaMiao Cao, P.E., 11/12/25
Analysis & Quality Review/Date
Specimen prepared by: J.L.

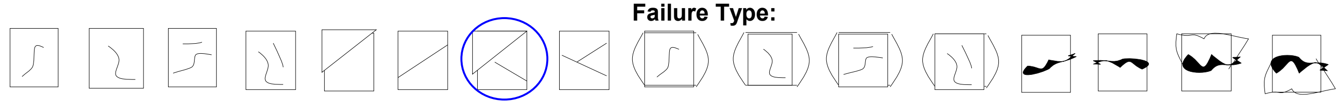
Standard Test Method for Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)



Oven ID: OVEN 1			**Scale ID**: PS 4500.R1	**Calipers**: Mitutoyo 500		**Load Frame**: HM2000		**Load Cell:** TS 810-10k	
Boring Information		**Average Initial Length (in)**	**Average Initial Diameter (in)**	**Sample Mass (g)**	**Water Content (%)**	**Compressive Strength (psi)**	**Compressive Strength (tsf)**	**Dry Unit Weight (pcf)**	**Shear Strength (tsf)**
Boring / Sample	**Depth (ft)**								
Bulk Sample	0 - 2	5.602	2.762	999.8	20.00	**166.0**	11.95	94.6	5.98

Material Description:	Lime Stabilized Clay

Failure Type:



Project Information	**Date**	**Terradyne Project No.**
Westover Village Bexar County San Antonio, Texas	November 2025	A251216

Terradyne Engineering, Inc.