GEOTECHNICAL INVESTIGATION REPORT
TRILLIUM AT DOUGLAS RANCH – PHASE 1, VILLAGE 3
SUN VALLEY PARKWAY AND CACTUS ROAD
BUCKEYE, ARIZONA

Prepared for:
JF Purchase LLC &
TW Purchase LLC
8501 North Scottsdale Road, Suite 120
Scottsdale, Arizona 85253

Prepared by:
Alpha Geotechnical & Materials, Inc.
2504 West Southern Avenue
Tempe, Arizona 85282

Alpha Project No. 20-G-11044
July 13, 2021

Alpha
Geotechnical & Materials, Inc.

July 13, 2021
Alpha Project No. 20-G-11044

JF Purchase LLC &
TW Purchase LLC
8501 North Scottsdale Road, Suite 120
Scottsdale, Arizona 85253

Attention: Linda Cheney

Re: Geotechnical Investigation Report
Trillium at Douglas Ranch – Phase 1, Village 3
Sun Valley Parkway and Cactus Road
Buckeye, Arizona

In accordance with your request and authorization, Alpha Geotechnical & Materials, Inc. (Alpha) has performed a geotechnical investigation for the site located west of Sun Valley Parkway and north of the Cactus Road alignment in Buckeye, Arizona. The purpose of this report is to provide recommendations relative to the geotechnical aspects of the design and construction. The purpose of this revision is to include additional laboratory test results and provide additional flexible pavement recommendations.

Based on our findings, the site is considered suitable for the proposed construction, provided foundation systems are properly designed, specified site grading recommendations are used, and foundation bearing soils are not exposed to moisture infiltration or moisture content fluctuation. Specific recommendations regarding the geotechnical aspects of project design and construction are presented in the following report. The recommendations contained within this report are dependent on the provisions provided in the Limitations and Recommended Additional Services sections of this report.

We appreciate the opportunity to provide our services for this project. If you have questions regarding this report or if we may be of further assistance, please contact the undersigned.

Sincerely,

ALPHA GEOTECHNICAL & MATERIALS, INC.

Asim Almujaddidi
Geotechnical Staff Professional

Reviewed By:

Garrett Clatanoff, PE
Geotechnical Engineer

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1.0 EXECUTIVE SUMMARY

July 13, 2021
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Scottsdale, Arizona 85253

Attention: Linda Cheney

Re: Geotechnical Investigation Report
Trillium at Douglas Ranch – Phase 1, Village 3
Sun Valley Parkway and Cactus Road
Buckeye, Arizona

The purpose of this investigation was to evaluate the general surface and subsurface conditions at the referenced site, and to present geotechnical design recommendations for foundations, slab-on-grade, and on-site pavements for the proposed development.

Project Description

The project site is located within approximately 320 acres of the proposed Trillium at Douglas Ranch – Phase 1, Village 3 development, which will include Parcels 32, 33, 35, 37 through 49, 50 and 51. The site is located west of Sun Valley Parkway and north of the Cactus Road alignment in Buckeye, Arizona. The proposed construction will include single- and two-story structures to be used as single-family residences without basements, a water campus, fire station, recreation center, community park, and left turn lanes along Sun Valley Parkway at Wintersburg Parkway and Rosewood Avenue. The structures will be supported on shallow spread-type footings, post tension and/or other conventional shallow foundation systems. Alpha has not been provided with structural loads. However, based on our previous experience with similar structures, we estimate the maximum column and wall loads for the structures will be about 20 kips and 1.5 kips per linear foot, respectively.

Surface Conditions

The project site is primarily undeveloped native desert land. It appears that some earthwork construction consisting of clearing, grubbing and minor grading was previously completed on the eastern portion of the site. There are multiple washes that run east to west through the site and drain into the Hassayampa River on the west boundary of the site. The washes are up to 15 feet deep in some locations. Desert vegetation consisting of large native bushes and trees are spread across the site. The vegetation is denser near the washes. The site is surrounded by native desert land. The site is accessed from Sun Valley Parkway east of the site. Sun Valley Parkway is paved with asphaltic concrete and is a divided roadway with two lanes in the northbound and southbound direction. The site slopes slightly downwards to the southwest.

Subsurface Conditions

The subsurface soils encountered during the exploration consisted primarily of clayey sand (SC), silty sand (SM), silty clayey sand (SC-SM), sandy silt (ML), and mixtures thereof. The tested soils contain between 4.5 and 61 percent fines (material passing the No. 200 sieve), and between 3 and 52 percent gravel based on laboratory testing. Some cobbles up to inches in diameter were encountered. The soils were typically weakly to moderately cemented and ranged from nonplastic to medium plasticity. The soils in the upper 6 feet were typically characterized as soft to firm with blow counts between 3 and refusal (i.e., 50 blows for less than 6 inches) and a median blow count of 13. The soils between 6 feet and 25 feet below ground surface (bgs) were typically characterized as firm to hard with blow counts between 10 and refusal (i.e., 50 blows for less than 6 inches) and a median blow count of 49. Backhoe refusal on moderately cemented material was encountered in nine test pits near the middle of site at depths between 7 feet bgs and 10 feet bgs.

Site Drainage

Positive drainage is essential to the successful performance of any foundation or slab-on-grade. Good surface and subsurface drainage should be established during and after construction to prevent the soils below or adjacent to the building areas from becoming wet. Desert-type landscaping is advisable near buildings and pavement areas. Plants, which require more water, should be located and drained away from the structural and pavement areas.

Foundations

Laboratory testing has determined the site soils have expansion indices that ranged between 0 and 10. Soils with expansion indices less than or equal to 20 are considered to have very low expansion potential per ASTM D4829. The collapse potential for the site soils is moderate. However, the potential for damage due to the collapse of the site soils is considered negligible provided that the soil improvement measures are implemented in accordance with the recommendations presented in this report. The site is considered to be **Non-Active** given the expansion potential. Spread type footings, conventional slabs and/or post-tensioned slabs bearing on properly compacted engineered fills may be used to support the structures. We anticipate that total and differential settlements for foundations designed in accordance with the recommendations provided in the attached report, will be within generally acceptable tolerance as presented in the attached report. Additional foundation movements could occur if water from any source infiltrates the foundation soils.

Land Subsidence and Earth Fissures

The project site is located 13 miles west of documented earth fissures located within the Luke Study Area based on information accessed at the Arizona Geologic Survey (AZGS) website (2021). The project site is not in an area with a measured land subsidence based on information accessed at from the Arizona Department of Water Resources (ADWR) e-Library (2021).

Conclusion

Based on our findings, the site is considered suitable for the proposed construction, provided foundation systems are properly designed, specified site grading recommendations are used, and foundation bearing soils are not exposed to moisture infiltration or moisture content fluctuation.

Should you have any questions concerning the contents of this report or any other matter, please do not hesitate to contact our office at (602) 453-3265 x122.

Respectfully submitted,

Alpha Geotechnical & Materials, Inc.

Garrett Clatanoff, PE
Geotechnical Engineer

2.0 INTRODUCTION

2.1 General

The purpose of this geotechnical investigation was to evaluate the general surface and subsurface conditions at the referenced site, and to present recommendations related to geotechnical aspects of design and construction of the project for foundations and on-site pavement sections. Results of our investigation are presented within this report. Our scope of services was in general accordance with our proposal 20-G-11044, dated January 21, 2020. This geotechnical report is based on available project information and our experience with similar construction and soil conditions.

Our study included a discussion of previous data, site reconnaissance, subsurface exploration, soil sampling, laboratory testing, engineering analyses, and preparation of this report. This report presents recommendations for design of suitable foundation types, site grading and engineered fill placement, moisture protection, and construction considerations. The recommendations contained in this report are subject to the limitations presented herein. Attention is directed to the "Limitations" section of this report.

2.2 Project Description

The project site is located within approximately 320 acres of the proposed Trillium at Douglas Ranch – Phase 1, Village 3 development, which will include Parcels 32, 33, 35, 37 through 49, 50 and 51. The site is located west of Sun Valley Parkway and north of the Cactus Road alignment in Buckeye, Arizona. The proposed construction will include single- and two-story structures to be used as single-family residences without basements, a water campus, fire station, recreation center, community park, and left turn lanes along Sun Valley Parkway at Wintersburg Parkway and Rosewood Avenue. The structures will be supported on shallow spread-type footings, post tension and/or other conventional shallow foundation systems. Alpha has not been provided with structural loads. However, based on our previous experience with similar structures, we estimate the maximum column and wall loads for the structures will be about 20 kips and 1.5 kips per linear foot, respectively.

3.0 INVESTIGATION

3.1 Subsurface Investigation

The subsurface investigation consisted of soil borings and test pits. Details of the subsurface investigation are provided in the following sections.

3.1.1 Soil Borings

The soil borings were performed on January 11, 12, and 13, 2021, at 43 locations within the proposed development. Forty-three soils borings (B-01 through B-43) were advanced beneath the surface to depths between 5 feet and 25 feet for total drill footage of approximately 645 feet. Locations of the soil borings are shown on **Figure 1**.

Wildcat Drilling, Inc (Wildcat) was subcontracted to complete drilling services. Wildcat utilized a truck-mounted CME-45 drill rig to complete the soil borings. An 8-inch outside diameter, hollow-stem auger was used to complete the soil borings.

Soil samples, using standard penetration testing (SPT) or undisturbed ring sampling methods, were obtained at intervals between 2.5 feet and 5 feet. Representative bulk samples of native material were collected from each boring. Completed borings were backfilled with auger cuttings.

Encountered soils were visually inspected, labeled and classified in the field, and logged in general accordance with ASTM D2488. Field direction and borehole logging were performed by Asim Almujaddidi of Alpha. Logs of all borings are presented in **Appendix A**, which also includes a description of drilling and sampling procedures.

3.1.2 Test Pits

The test pits were excavated on January 8, and 14, 2021, at 27 locations within the proposed development. Twenty-seven test pits (TP-01 through TP-27) were excavated beneath the surface to depths between 3 feet and 12 feet for total excavation footage of approximately 274 feet. Locations of the test pits are shown on **Figure 1**.

JKI Solutions LLC (JKI) was subcontracted to complete excavation services. JKI utilized a John Deer 310 backhoe to excavate the test pits. A 2-foot-wide bucket was used to excavate the test pits.

Representative bulk samples of subgrade material were collected at a maximum of 5-foot intervals. Completed test pits were backfilled with the excavated material.

Encountered soils were visually inspected, labeled and classified in the field, and logged in general accordance with ASTM D2488. Field direction and test pit logging were performed by Asim Almujaddidi of Alpha. Logs of all test pits are presented in **Appendix A**, which also includes a description of excavating and sampling procedures.

3.2 Laboratory Testing

Selected soil samples from the soil borings and test pits were tested in the laboratory for classification purposes and to evaluate their engineering properties. The laboratory tests included:

- Sieve analysis and plasticity index (Atterberg limits) – Soil classification. (ASTM C117/C136) (ASTM D4318);
- Consolidation – Assessment of compressibility of near-surface soils under embankment fills or structure loads (ASTM D2435);
- Expansion Index – Assessment of expansion potential of near-surface soils under embankment fills or structural loads (ASTM D4829);
- In-Place Density – Determination of in-place density and moisture at depth (ASTM 2937);
- One-Dimensional Swell – Assessment of swell potential of near-surface soils under the pavement (ASTM D4546);
- Moisture-Density Relationship (Proctor) – Determination of the maximum dry density and optimum moisture content for earthwork factors. (ASTM D698);
- pH and Resistivity – Assessment of the impact of the existing soils on steel. (Arizona Test Method 236).
- Total soluble sulfates and chlorides – Assessment of the impact of the existing soils on concrete. Used to determine which type of concrete should be used. (Arizona Test Method 733 and 736); and,

A brief description of each test preformed on the soil samples and the results are presented in **Appendix B**. Laboratory test results are summarized in **Table B-1** along with individual laboratory sheets.

4.0 SITE CONDITIONS

4.1 Surface Conditions

The project site is primarily undeveloped native desert land. It appears that some earthwork construction consisting of clearing, grubbing and minor grading was previously completed on the eastern portion of the site. There are multiple washes that run east to west through the site and drain into the Hassayampa River on the west boundary of the site. The washes are up to 15 feet deep in some locations. Desert vegetation consisting of large native bushes and trees are spread across the site. The vegetation is denser near the washes. The site is surrounded by native desert land. The site is accessed from Sun Valley Parkway east of the site. Sun Valley Parkway is paved with asphaltic concrete and is a divided roadway with two lanes in the northbound and southbound direction. The site slopes slightly downwards to the southwest.

4.2 Regional Geology

The southwest region of Arizona is referred to as the Basin and Range Geologic Province. This province consists primarily of a low dry desert environment with a mixture of long faults, fractured rock and wide alluvial basins. The mountain ranges within the province consist of Precambrian plutonic, volcanic and metamorphic rock.

The project is located within the seismic zone referred to as the Salton Periphery Zone which comprises of several seismic source zones (i.e. San Jacinto, South San Andreas, Imperial, Whittier-Elsinore, Perris, Cerro Prieto, Axial Cortez and the Salton Periphery). The seismic zone, as described by Euge and others (1992), are considered discrete seismic sources with limited potential for producing earthquakes.

4.3 Subsurface Conditions

The subsurface soils encountered during the exploration consisted primarily of clayey sand (SC), silty sand (SM), silty clayey sand (SC-SM), sandy silt (ML), and mixtures thereof. The tested soils contain between 4.5 and 61 percent fines (material passing the No. 200 sieve), and between 3 and 52 percent gravel based on laboratory testing. Some cobbles up to inches in diameter were encountered. The soils were typically weakly to moderately cemented and ranged from nonplastic to medium plasticity. The soils in the upper 6 feet were typically characterized as soft to firm with blow counts between 3 and refusal (i.e., 50 blows for less than 6 inches) and a median blow count of 13. The soils between 6 feet and 25 feet below ground surface (bgs) were typically characterized as firm to hard with blow counts between 10 and refusal (i.e., 50 blows for less than 6 inches) and a median blow count of 49. Backhoe refusal on moderately cemented material was encountered in nine test pits near the middle of site at depths between 7 feet bgs and 10 feet bgs.

4.4 Groundwater Conditions

Groundwater was not encountered during the investigation. Several well sites are located within the vicinity of the project. However, many of these wells are not actively monitored. Readings collected within the last year from well sites within two miles of the site estimate the regional depth to groundwater in the area to be greater than 184 feet below existing grades. This information is available from the ADWR Groundwater Site Inventory database (2021). Seasonal variations could cause fluctuations in the surrounding groundwater depths. In addition, perched water tables may be encountered, especially after flood events.

4.5 Geologic Hazards

4.5.1 Liquefaction Potential

Based on the soil types and soil densities encountered during this investigation along with groundwater not being encountered at the depth explored, the potential for soil liquefaction is considered to be negligible.

4.5.2 Collapsible Soils

Collapsible soils are soils with the potential for a decrease in volume with an increase of external load or moisture. These soils are typically found in areas of alluvial deports within semi-arid to arid climates. Based on the information collected during our field investigation and subsequent laboratory testing, we anticipate collapse-susceptible soils will be encountered during

construction. The collapse potential for the site soils is moderate. However, the potential for damage due to the collapse of the site soils is considered negligible provided that the soil improvement measures are implemented in accordance with the recommendations presented in Section 5.0 of this report.

4.5.3 Land Subsidence and Earth Fissures

The project site is located 13 miles west of documented earth fissures located within the Luke Study Area based on information accessed at the Arizona Geologic Survey (AZGS) website (2021). The project site is not in an area with a measured land subsidence based on information accessed at from the ADWR e-Library (2021).

4.6 Seismic Considerations

The project site is located in south-central Arizona which is an area of low seismic activity. The soil properties in the upper 100 feet of the site are not known in sufficient detail to justify selecting a Site Class C or better. Therefore, the default Site Class D should be used for this site. For structural design based on the 2018 IBC and ASCE7-16 the following seismic parameters should be used:

Table 4.1: Seismic Design Parameters

Site Location: Latitude 33.601240° N, Longitude 112.701459° W	
Parameter	**Value**
Site Class Definition	D
Site Coefficient F_a	1.6
Site Coefficient F_v	2.4
Spectral Acceleration S_{DS}	0.195 g
Spectral Acceleration S_{D1}	0.128 g

5.0 ENGINEERING ANALYSES AND RECOMMENDATIONS

5.1 General Excavation

The near surface soils described in Section 4.3 can be found across the site and can be excavated using conventional excavation equipment. The soils encountered below 5 feet may require heavier equipment to excavate due cobbles up to 8 inches in diameter, strongly cemented materials, and dense material. However, construction techniques and sequencing should drive the sizing of this equipment.

Prior to excavation, clearing and grubbing of the area may be necessary to remove trees, brush, stockpiles and other vegetation. If excavated materials are intended to be used for engineered fill as described in Section 5.4.1, special care should be taken to remove as much of the root system as possible to allow for the maximum amount of material to be used as fill. In addition, it may be

necessary to waste material between the surface and approximately one foot below the surface due to vegetation.

5.2 Excavation and Temporary Slopes

Temporary excavation slopes should conform to Occupational Safety and Health Administration and Arizona Division of Occupational Safety and Health regulations. Within this system, the classification of the on-site soils is Type C. It is recommended that unsupported temporary cut slopes in these soils be made no steeper than 1.5H:1V (Horizontal:Vertical) for excavations less than 20 feet.

Spoil piles should be located no closer than 6 feet from the crest of the slopes. Large particles, including large clods, should be kept away from the crest of the slopes. Moisture increases in the soils will weaken them and could cause slope failures. Some localized raveling could occur as the exposed soils dry. The excavations should be protected from storm water runoff or other sources of moisture. Small berms may be necessary to protect the excavations from storm runoff. If the soils are subjected to moisture increases, the stability of the slopes should be reevaluated.

Heavy construction equipment, building materials and vehicular traffic should not be allowed within one-third of the slope height from the top of any excavation. Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning may be required to provide structural stability and to protect personnel working within the excavation. Shoring, bracing, or underpinning required for the project (if any) should be designed by a professional engineer registered in the State of Arizona.

Under no circumstances should the information provided in this Section be interpreted to mean that Alpha is assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and should not be inferred.

5.3 Site Grading and Drainage

Areas where improvements will be made should be cleared of all structure remnants, debris, undocumented fill, vegetation, top soil and other deleterious materials prior to excavation or ground improvements for foundations and slabs or subgrade preparation for pavements per Sections 5.7, 5.8 and 5.11. Areas where existing utilities are removed, undocumented fill encountered, or other voids caused by removals may be backfilled and compacted in accordance with Sections 5.4 and 5.5. Compaction is necessary to prevent water settling which leads to future ponding.

Positive site drainage should be provided during construction and maintained thereafter. The final ground surface should be sloped away from the perimeter of any structures at a minimum grade of 5 percent for a minimum distance of 10 feet. Infiltration of water into utility or foundation excavations must be prevented during construction. The drainage design must route all storm

and sprinkler water away from the buildings in a positive manner. All water should be diverted away from areas where it could penetrate the ground surface near the buildings and sidewalks. Where lot lines, walls, slopes or other physical barriers prohibit 6 inches of fall within 10 feet, drains or swales should be provided to ensure drainage away from the structure.

Watering of plants should be avoided adjacent to the buildings. Desert-type landscaping is advisable near the building. Plants, which require more water, should be located and drained away from the building areas.

Roof runoff should be carried away from structures at the ground surface or piped to an underground storm drain system, and in no case should long-term ponding of water be allowed near the structures during or after construction.

Permanent slopes should be no steeper than 3H:1V (Horizontal:Vertical) to promote positive drainage and mitigate erosion. The embankment slope should consist of native cut or compacted fill per Sections 5.4.1 and 5.4.2. To reduce the potential for surface erosion, a berm or "V" ditch may be located at the top of slopes subject to significant overland water flows in order to intercept and redirect surface runoff.

Fill placed on slopes steeper than 5H:1V (Horizontal:Vertical) should be benched into the existing slope. It is recommended that the slope face be compacted per Section 5.5.1.

5.3.1 Earthwork Factors

Based on the laboratory testing and Alpha's experience with similar site conditions, an earthwork factor of 15 percent shrink is recommended when native soils are compacted to 95 percent of the maximum dry density as determined by ASTM D698. Compaction greater than 95 percent of the maximum dry density will increase the total shrink. In addition, ground compaction for the native desert land is anticipated to be moderate. Alpha recommends a ground compaction factor of 0.2 feet be utilized in areas where new embankments are to be constructed or haul roads are anticipated.

5.4 Fill Materials

5.4.1 Engineered Fill

Alpha completed 14 expansion index tests on samples collected from the site. All the tests had an expansion index less than 20. Soils with indices of 20 or less should be considered **Non-Active** with respect to their expansion characteristics when being considered for use as engineered fill. Engineered fill may be required beneath footings or other foundation systems, used to establish grades for slabs-on-grade, used beneath minor structures, backfill voids created during clearing operations, raise site grades, construct pads and as subgrade for pavements. Native soils in the upper 5 feet may be utilized as engineered fill as long as the appropriate compaction and moisture requirements are met based on their expansion characteristics (see Table 5.2 in Section 5.5.1).

Import material may also be used as engineered fill if it meets the requirements presented in Table 5.1.

Table 5.1: Import Material Requirements

Sieve Size	Percent Passing	Required Test
3-inch	100	ASTM C117/136
No. 200	Less than 50	ASTM C117/136
Other Requirements		
Expansion Index	20 or Less	ASTM D4829
Plasticity Index	Less than 15	ASTM D4318
Sulfates Content	1,000 ppm or Less	ARIZ 733
Chloride Content	500 ppm or Less	ARIZ 736

Engineered fill should be free of vegetation and other deleterious material and placed in accordance with Section 5.5.1.

Materials greater than 3 inches in largest dimension should not be placed within 2 feet from finished grade (top of engineered fill) beneath footings, slabs, or pavement. Nesting is not permitted and larger materials greater than 3 inches in the largest dimension should be completely encapsulated with finer materials.

5.4.2 Aggregate Base

Aggregate base may be needed beneath slabs, roadways and as bedding material for utilities. The material should meet the requirements of aggregate base material as listed in Maricopa Association of Governments (MAG) *Uniform Standard Specifications and Details for Public Works Constructions* Section 702 (2021).

5.5 Fill Construction

5.5.1 Engineered Fill Placement

Engineered fill material should be utilized as backfill beneath footings, to establish grades for slabs-on-grade, construct pads, and as subgrade for roadways. Engineered fill should meet the requirements of Section 5.4.1. Areas to receive engineered fill should be scarified a minimum of 8 inches, moisture conditioned and compacted to no less than 95 percent of the maximum dry density and within the range of plus 2 percent to minus 2 percent of the optimum moisture content as determined by ASTM D698.

Prior to placement of engineered fill, the material should be moisture conditioned and placed in lifts not to exceed 8 inches thick when compacted with heavy equipment. When using smaller, walk behind compaction equipment, compacted lifts should not exceed 4 inches. Engineered fill should be compacted per Table 5.2.

Table 5.2: Compaction Requirements

Material Type	Design Element or Site Improvements[1]	Required Compaction[2]	Required Moisture Content[2]
Engineered Fill - Consisting of native soils with an expansion index less than or equal to 20 or import soils. **(Non-Active)**	Below Slabs and Post-Tensioned Slabs	Minimum 95% of the maximum dry density	+2% to -2% of the optimum moisture content
	Below Spread-Type Footings		
	Below Flexible and Rigid Pavements		
	General Site and Embankment Fill[3]		
Engineered Fill - Consisting of native soils with an expansion index greater than 20. **(Active)**	Below Slabs and Post-Tensioned Slabs	Between 90% and 95% the maximum dry density	0% to +4% of the optimum moisture content
	Below Spread-Type Footings	Minimum 95% of the maximum dry density	+2% to -2% of the optimum moisture content
	Below Flexible and Rigid Pavements		
	General Site and Embankment Fill[3]		

1 - Depth of soil improvement or lift thicknesses should follow the recommendation in this report for the given design element. General site fill should refer to fill not directly beneath design elements or within the limits of other soil improvements as recommended in this report.
2 - Compaction percentage and moisture content requirements should be based on the maximum dry density and optimum moisture content as determined by ASTM D698.
3 - In areas where fill will exceed 5 feet in height the geotechnical engineer should be consulted to determine adequate foundation preparation and embankment compaction requirements.

5.5.2 Aggregate Base Placement

Aggregate base may be needed beneath slabs, roadways and as bedding material for utilities. Aggregate base should meet the requirements of Section 5.4.2. Areas to receive aggregate base should be free of vegetation. Aggregate base should be placed on compacted engineered fill per Table 5.2 in Section 5.5.1. Aggregate based shall be compacted per MAG Section 310 (2021).

5.6 Pipe Backfill and Bedding

Pipes should be placed on pipe bedding material meeting the requirements of aggregate base as discussed in Sections 5.4.2 and 5.5.2 of this report. Pipe bedding should be placed from the bottom of the trench to approximately springline.

On-site soils may be utilized as backfill for non-metallic pipes where applicable, provided the soil is free from broken concrete, broken pavement, wood, or other deleterious material and with no piece/clods larger than 2 inches.

Metal pipes should be backfilled with material that meets the manufactures requirements. In the absence of any manufacture's recommendations, Alpha recommends have a pH between 5.0 and 9.0, and a resistivity greater that 2,000 ohm-cm when tested in accordance with Arizona Method 236.

As an alternative to backfill directly above the pipe, Alpha recommends that all utility trenches may be backfilled with ½-sack Controlled Low-Strength Material (CLSM) meeting the requirements of MAG Section 604 (2021). The CLSM should extend from springline to 12 inches above the pipe.

The remainder of the trench should be backfilled with engineered fill material, meeting the requirements of Section 5.4.1, compacted in lifts not to exceed 8 inches when compacted. Each lift should be compacted per Table 5.2 in Section 5.5.1.

5.7 Foundations

Lightly loaded structures may be supported on spread or continuous footings. Geotechnical recommendations for footing foundations, based on anticipated sizes and shapes, are provided in Section 5.7.1.

5.7.1 Isolated Spread or Continuous-Type Footings

Small, isolated spread-type footings should have no single dimensions measuring more than 5 feet, a length to width ratio less than three and be used for supporting columns or other concentrated loads.

Continuous footings should have a length to width ratio greater than three, a width of less than 5 feet and are to be used for supporting walls or other strip type loading. Footings should be designed with the following recommendations:

1. Footings should bear at a minimum depth of 1.5 feet below the lowest adjacent or existing grade, whichever is lower. Footings shall bear on a minimum of 2 feet of engineered fill as outlined in item 4.

2. Soils beneath footings should be excavated to a minimum depth of 2 feet below the bottom of the footing and laterally beyond the footing edges at a ratio of 1H:1V (Horizontal:Vertical).
3. The bottom of the footing excavation should be scarified to a depth of 8 inches and then compacted to a minimum of 95 percent of the maximum dry density and within a range of plus 2 percent to minus 2 percent of the optimum moisture content as determined by ASTM D698 prior to the placement of any additional materials.
4. Backfill material between the bottom of the footing and bottom of the excavation should consist of engineered fill, as described in Sections 5.4.1 and 5.5.1, in order to provide uniform bearing below the structure.
5. Footings should be designed for an allowable bearing pressure of **2,000 pounds per square foot** for dead plus normal live loads. The allowable bearing pressure may be increased by one-third when considering transient wind or seismic loading.
6. Spread and continuous-type footings should have minimum widths of 2 feet and 1.5 feet, respectively.
7. The structural engineer should place resultant pressure on the foundation base in the middle third of the footing. The maximum loading for spread and continuous-type footings should not exceed 50 kips and 10 kips per linear foot, respectively.
8. A representative of Alpha should observe the foundation excavations prior to placement of the fill and reinforcing steel.

5.7.2 Settlement

Alpha estimates settlement of footings designed and constructed in accordance with the recommendations provided in Section 5.7.1 will not exceed 3/4 inch. However, a representative of Alpha should observe the foundation excavations and surface preparation prior to placement of any fill material or reinforcing steel. When bearing and uplift values are increased by one-third to consider transient wind or seismic loading, settlement may increase to 1 inch.

5.7.3 Lateral Resistance

Lateral loads may be resisted by soil friction and by the passive resistance of the soils acting on the sides of the footing. A coefficient of friction of 0.38 may be used between the footings and the supporting soils. The passive resistance of the properly-compacted structural fill or undisturbed native soils against spread footings may be calculated assuming an allowable equivalent fluid unit weight of 150 pounds per cubic foot (pcf). A one-third increase in the passive value may be used for wind or seismic loads. The frictional resistance and the passive resistance of the soils may be combined without reduction in determining the total lateral resistance.

5.8 Post-Tension Slabs

Post-tension slabs may be used to support the lightly loaded structures. Based on the design procedure outlined in the Post-Tensioning Institute's *Design and Construction of Post-Tensioned Slabs-on-Ground, 3rd Edition* (2008), the site soils are classified as **Non-Active,** and the following design parameters should be implemented.

Recommended design parameters (Non-Active Soils):

Maximum Allowable Bearing Pressure, q_a:	1,250 psf (at grade)
Coefficient of Subgrade Reaction, k:	250 pounds per cubic inch

Areas where post-tension slabs are to be constructed should be cleared in accordance with Section 5.3. The slabs should bear on a minimum of 12 inches of compacted engineered fill as measured from the bottom of the turndown. The compacted engineered fill should extend a minimum of 5 feet beyond the edges of the slab. Engineered fill shall meet the requirements provided in Section 5.4.1 and be compacted per Section 5.5.1. Excavation beneath the slab may be necessary to accommodate the 12 inches of engineered fill. The surface on which engineered fill will be placed should be scarified a minimum of 8 inches, moisture conditioned and compacted to 95 percent of the maximum dry density and within a range of plus 2 percent to minus 2 percent of the optimum moisture content as determined by ASTM D698 prior to the placement of any additional materials.

Structures bearing on prepared subgrade as presented in this Section may experience total settlement of approximately ½ -inch. Differential settlement is expected to be less than ¼-inch between similarly loaded areas. Additional foundation movements could occur if the supporting soils become wetted, please refer to Section 5.3 for drainage requirements.

5.9 Lateral Earth Pressures for Walls

Rigid, absolutely restrained walls that can tolerate little or no movement should be designed for the at-rest earth pressure represented by an equivalent-fluid unit weight of 60 pcf for level structure backfill. That value is based on a compacted moist unit weight of 120 pcf and an effective (drained) friction angle of 30 degrees for level, free-draining backfill. Walls that can tolerate rotation (movement of the top of the wall) or lateral translation equal to or greater than about 0.002 times the height of the wall (height, H, is defined as measured from bottom of footing to top of level backfill) should be designed for active earth pressure represented by an equivalent-fluid soil unit weight of 40 pcf for level structure backfill. Vertical surcharge loads and/or hydrostatic pressures will increase the recommended equivalent-fluid unit weight. The resultant lateral earth loads should be assumed to act at a distance of one-third H above the wall base, where H is as defined above.

If heavy mechanical compaction equipment will be operating within a distance of one-half the retained height (defined as being from the backfill grade at the back of the wall to the wall base), additional earth pressure induced by compaction should be used in wall design. The additional

earth pressure should be estimated using the procedure presented by Clough and Duncan (1991). If compaction equipment used adjacent to the walls is to consist of small rollers and tampers, the additional earth pressure should not be used.

The wall backfill should consist of free-draining backfill and backfill drainage provisions, such as weep holes. These provisions should be designed so that the effect of hydrostatic pressure on the wall should not require consideration.

5.10 Corrosion Potential

5.10.1 Sulfate and Chloride Content

Selected samples of the near-surface soils encountered at the site were subjected to chemical analysis for the purpose of corrosion assessment. The samples were tested for soluble sulfates, and soluble chlorides. The samples were tested in general accordance with Arizona Test Methods 733, and 736 for soluble sulfates, and soluble chlorides, respectively. The test results are provided in **Appendix B**.

Based on provisions of American Concrete Institute (ACI) 318 Section 4.3, Table 4.3.1, *Requirements for Concrete Exposed to Sulfate-Containing Solutions* a sulfate concentration below 0.10 percent by weight (1,000 ppm) is negligible. Based on the laboratory results, sulfate contents of the site soils tested indicate a negligible degradation potential to concrete which places no restrictions on and cement type.

Based on the available published data regarding chloride ion content in soils a concentration of 500 ppm or greater is considered corrosive and may require additional concrete cover over reinforcement. Based on the laboratory results of the sample collected for this project, chloride contents of the site soils tested indicate that the soil has potential for degradation of concrete and requires a minimum of 3 inches of concrete cover over reinforcement.

5.10.2 pH and Resistivity

Three samples of the near-surface soil were tested for corrosion potential testing. The testing performed consisted of pH and resistivity in accordance with Arizona Test Method 236. The laboratory pH values determined ranged from 8.2 to 8.6. The resistivity values determined ranged from 682 to 1,500 ohm-centimeters (ohm-cm). Soil where the pH is greater than 9.0 and/or the resistivity is less than 2,000 ohm-cm requires the use of special pipes and/or pipe coatings. Based on these results, there is potential for corrosion of buried steel pipes and other buried steel structures. Special consideration should be given to the design and use of corrosion protected steel piping and structures. It is recommended that the pipe type and/or coating be selected in accordance with manufacturer requirements.

5.11 Pavement Sections

5.11.1 Flexible Pavement

Alpha has completed a flexible pavement design in general accordance with the Maricopa County Department of Transportation (MCDOT) *Roadway Design Manual* (2020) for local streets, collector streets, arterial roadways, and Sun Valley Parkway. Traffic counts and percent trucks were not provided for local streets, collector streets or arterial roadways so Alpha made assumptions for each value. Traffic volumes were provided by the Maricopa County website and collected along Sun Valley Parkway, north of McDowell Road. The traffic design parameters for local and collector roadways are provided in Table 5.3.

Table 5.3: Traffic Design Parameters

Design Parameter	Local	Collector	Arterials	Sun Valley Parkway
Traffic Volume (Vehicles per Day)	1,000	2,500	7,500	7,748
Growth Rate	0.1%	0.1%	2%	2%
Percent Trucks	2%	2%	3%	3%
Car Load Equivalency Factor	0.0008	0.0008	0.0008	0.0008
Truck Load Equivalency Factor	1.2	1.2	1.2	1.2
Directional Distribution	50%	50%	50%	50%
Lane Distribution	100%	100%	90%	90%
Design Period	20 years	20 years	20 years	20 years
ESALs	82,194	155,771	1,168,129	1,206,755

The pavement design was done in accordance with the MCDOT *Roadway Design Manual* (2020). These calculations are provided in **Appendix C**. Based on these calculations and a correlated R-value of 26, the required structural numbers for local streets, collector streets, arterial streets, and Sun Valley Parkway are 1.58, 1.91, 2.82, and 2.85, respectively. The flexible pavement sections for these roadways are provided in Table 5.4.

Table 5.4: Flexible Pavement Section

Roadway Type	Asphaltic Concrete Thickness	Aggregate Base Thickness
Local Street	2 inches	7 inches
Collector Streets	3 inches	6 inches
Arterial Roadways	4 inches	10 inches
Sun Valley Parkway (Parkways)	4 inches	10 inches

The pavement section materials should be placed as described hereafter. Subgrade material should meet the engineered fill requirements presented in Section 5.4.1. The subgrade should be

scarified to a depth of 8 inches, moisture conditioned and compacted to 95 percent of the maximum dry density and within the range of plus 2 percent to minus 2 percent of the optimum moisture content as determined by ASTM D698.

Aggregate base materials should meet the requirement of Section 5.4.2 and compacted per Section 5.5.2.

Asphaltic concrete material should meet MAG Section 710 (2021) or local standards and should be placed in general accordance with MAG Section 321 (2021) or local standards.

5.11.2 Rigid Pavement

In areas where rigid pavement may be necessary, a minimum of 6 inches of Portland cement concrete should be used. Portland cement concrete pavement should be placed over 4 inches of aggregate base and 8 inches of improved subgrade. In areas where heavier traffic will be encountered due to commercial or heavy residential activities, the Portland cement concrete section should be increased to a minimum of 8 inches. The rigid pavement sections are provided in Table 5.5.

Table 5.5: Rigid Pavement Sections

Roadway Type	Portland Cement Concrete Pavement Thickness	Aggregate Base Thickness
Light Residential	6 inches	4 inches
Heavy Residential	8 inches	4 inches

The pavement section materials should be placed as described hereafter. Subgrade material should meet the engineered fill requirements presented in Section 5.4.1. The subgrade should be scarified to a depth of 8 inches, moisture conditioned and compacted to 95 percent of the maximum dry density and within the range of plus 2 percent to minus 2 percent of the optimum moisture content as determined by ASTM D698.

Aggregate base materials should meet the requirement of Section 5.4.2 and compacted per Section 5.5.2.

Portland cement concrete material should meet MAG Class A, per Section 725 (2021) and should be placed in general accordance with MAG Section 324 (2021).

5.12 Sidewalks

Sidewalk sections should be constructed in accordance with MAG Section 340 (2021) and designed in general accordance with the MAG Standard Detail 230 (2021).

6.0 CLOSURE

6.1 Limitations

Our professional services have been performed using that degree and skill ordinarily exercised, under similar circumstances, by reputable Geotechnical Engineers practicing in this or similar localities. No warranty is expressed or implied.

The recommendations contained in this report are based on our field exploration, laboratory test results, and our understanding of the proposed construction. The subsurface data used in the preparation of this report was obtained from the test pits excavated during the field subsurface exploration. It is anticipated that some variations in the soil conditions will exist on-site. The nature and extent of variations may not be evident until construction occurs. If any conditions are encountered at this site that are different from those described in this report, we should be immediately notified so that we may make any necessary revisions to the recommendations contained in this report. In addition, if the scope of the proposed construction changes from that described in this report, our firm should also be notified.

It is the Client's responsibility to see that all parties to the project including the designer, contractor, subcontractor, etc. are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

This report is for the exclusive purpose of providing Geotechnical Engineering and/or testing information and recommendations. The scope of services for this project does not include, either specifically or by implication, any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken. This report has also not addressed the site geology and the possible presence of geologic hazards.

This report may be used only by the Client and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on and off-site), or other factors may change over time, and additional work may be required with the passage of time. Any party, other than the Client, who wishes to use this report, should notify Alpha of such intended use. Based on the intended use of this report, Alpha may require that additional work be performed and that an updated report be issued.

6.2 Recommended Additional Services

This report is a **geotechnical report** completed to characterize the proposed Trillium at Douglas Ranch – Phase 1, Village 3 Development.

The recommendations provided in this report are based on the assumption that an adequate program of tests and observations will be performed during the construction. These tests and observations should be performed by the Geotechnical Engineer's representative and should include, but are not necessarily be limited to the following:

- Observe and document that any existing surficial vegetation and other deleterious materials have been removed from the site as required in site preparation section.
- Approve any material used as engineered fill in building areas to document that it meets the requirements outlined above before placement.
- Monitor the scarification operations of the exposed subgrade.
- Monitor scarification operations to document those footings are bearing in soils as recommended above.
- Monitor the backfill procedures.
- Perform field density tests, as needed, to verify compaction compliance. The representative should monitor the progress of compaction and filling operations.
- Keep records of on-site activity and progress.

Observation of footing excavations should be performed prior to placement of reinforcing and concrete to confirm that satisfactory bearing materials are present. Construction testing, including field and laboratory evaluation of fill and backfill materials, concrete and steel should be performed to determine whether applicable project requirements have been met.

7.0 REFERENCES

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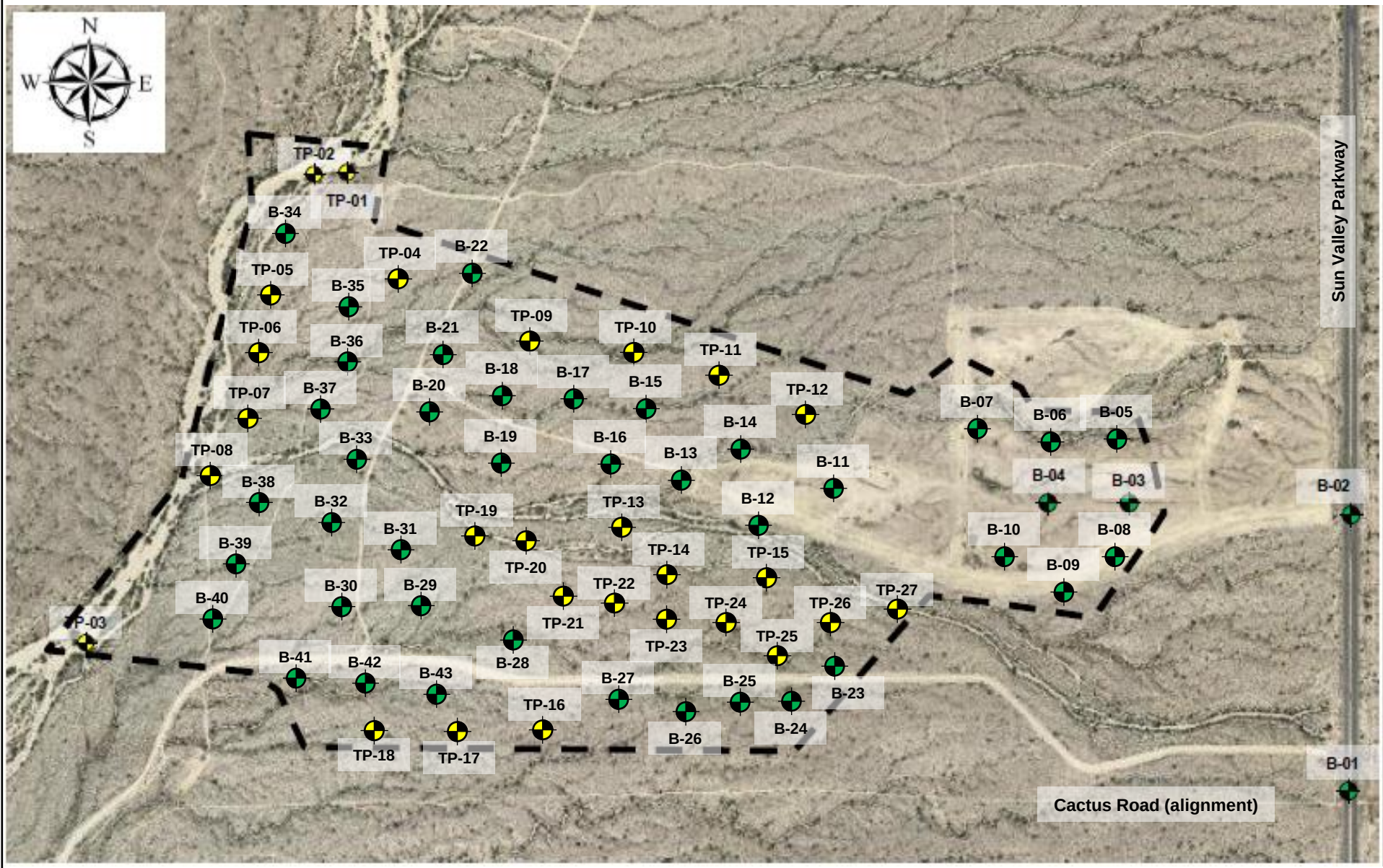
FIGURES



Trillium at Douglas Ranch – Phase I, Village 3
Sun Valley Parkway & Cactus Road
Buckeye, Arizona

Figure 1 – Overall Boring Map

Approximate Boring Location

Approximate Test Pits Location

www.maricopa.gov

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APPENDIX A
Field Investigation

FIELD INVESTIGATION

SOIL BORINGS AND TEST PITS

The subsurface conditions at the site were explored on January 8, 11, 12, 13, and 14, 2021 by excavating 27 soil test pits using John Deere 310 Backhoe and advancing 43soil test borings using a CME-45 truck-mounted drill rig. The locations of soil test pits and borings for this investigation are shown in Figure 1 of the report.

Our engineer maintained a log of the excavations and borings; visually classified soils encountered according to the Unified Soil Classification System (USCS) (see USCS Table) and obtained samples of the subsurface materials.

SAMPLING PROCEDURES

Bulk samples were taken from the borings and test pits at selected intervals. Soil samples were packaged and sealed in the field to reduce moisture loss and returned to our laboratory for further testing. The soil borings and test pits were backfilled with excavated materials at the completion of each boring and test pit.

Dynamically driven tube samples are obtained at selected intervals in the borings. Two-inch outside diameter, 1 3/8-inch inside diameter samples are used to obtain the standard penetration resistance in accordance with ASTM D1586. “Undisturbed” samples are obtained with 3-inch outside diameter samples lined with 2.42-inch inside diameter brass rings in accordance with ASTM D3550. The driving energy is generally recorded as the number of blows of a 140-pound, 30-inch free gall drop above ground hammer required to advance the samples in 6-inch increments. The values are expressed in blows per 6 inches on the boring logs.

LIST OF ATTACHMENTS

The following exhibits are attached and complete this appendix.

Unified Soil Classification System
Boring Logs
Test Pit Logs

UNIFIED SOIL CLASSIFICATION SYSTEM					CONSISTENCY OR RELATIVE DENSITY		
Major Divisions			Group Symbols	Typical Names	CRITERIA		
Coarse-Grained Soils (More than 50% retained on No. 200 sieve)	Gravels (50% or more of coarse fraction retained on No. 4 sieve)	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	**Standard Penetration Test** Density of Granular Soils		
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines	Penetration Resistance N (blows/ft)	Relative Density	
		Gravels With Fines	GM	Silty gravels, gravel-sand-silt mixtures			
			GC	Clayey gravels, gravel-sand-clay mixtures	0-4	Very Loose	
	Sands (More than 50% of coarse fraction passes No. 4 sieve)	Clean Sands	SW	Well-graded sands and sand-gravel mixtures, little or no fines	5-10	Loose	
			SP	Poorly graded sands and sand-gravel mixtures, little or no fines	11-30	Medium Dense	
		Sands With Fines	SM	Silty sands, sand-gravel-silt mixtures	31-50	Dense	
			SC	Clayey sands, sand-gravel-clay mixtures	>50	Very Dense	
Fine-Grained Soils (50% or more passes No. 200 sieve)	Silts and Clays (Liquid Limit 50% or less)		ML	inorganic silts, very fine sands, silty or clayey fine sands, clayey silts with slight plasticity	**Standard Penetration Test** Consistency of Cohesive Soils		
			CL	Inorganic clays of low to medium plasticity, gravelly clays, silty clays, sandy clays lean clays	Penetration Resistance N (blows/ft)	Consistency	Unconfined Compressive Strength (Tons/ft2)
			OL	Organic silts and organic silty clays of low plasticity	0-4	Very Soft	<0.25
	Silts and Clays (Liquid Limit greater than 50%)		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts	5-8	Soft	0.25-0.50
			CH	Inorganic clays of high plasticity, fat clays	9-15	Moderately Firm	0.50-1.00
			OH	Organic clays and organic silts of medium to high plasticity	16-30	Firm	1.00-2.00
Highly Organic Soils			PT	Peat, humus, and swamp soils with high organic content	31-50	Very Firm	2.00-4.00
					>50	Hard	>4.0

		3"		3/4"	#4	#10	#40	#200 U.S. Standard Sieve
Unified Soil Classification	Cobbles	Gravel			Sand			Silt or Clay
		coarse		fine	coarse	medium	fine	

MOISTURE CONDITIONS

Slightly Moist	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water; usually is below water table

MATERIAL QUANTITY

rare	<2%
occasional	<5%
trace	10%
some	20%
considerable	30%

OTHER SYMBOLS

U	Undisturbed Sample
S	SPT Sample
A	Auger Sample
D	Disturbed Bulk Sample

BASIC LOG FORMAT:
USCS Soil Type, Other Soil Types Present (Modifiers, Gradation, Angularity), Gradation/Angularity of Main Soil Type Modifier, Fradation/Angularity of Main Soil Type, Structure, Cementation, Plasticity, Color, Moisture, Firmness/Density, Dry Strength, Odor, Additional Descriptions

UNIFIED SOIL CLASSIFICATION SYSTEM

Alpha Engineering | Testing | Solutions

Alpha Project Number:	20-G-11044	**Boring No.**	B-01
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks
0									
								SC	slightly moist moderately firm
5		S	4	5	5				

Field and Drilling Notes:

Visual Classification

CLAYEY SAND WITH GRAVEL
some fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, medium plasticity, light brown

Stopped auger at 4'6"
Stopped sampler at 6'
Backfilled with drill cutting

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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2504 West Southern Avenue
Tempe, Arizona 85282

GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-02
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
								SC-SM	slightly moist moderately firm	**SILTY CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, medium plasticity, brown
5		S	3	4	3					
										Stopped auger at 4'6" **Stopped sampler at 6'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-03
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	5 5 7			**SM**	slightly moist moderately firm to hard	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly medium grained, subangular to subrounded sand, weakly cemented, medium plasticity, brown
		S	7 25 28					
5		S	14 50/5"					
10		S	31 50/5"					note: incraese in fines content below 10'
15		S	50/5"					
20		S	27 50/4"					

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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Tempe, Arizona 85282

GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-03
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
20										**Visual Classification**
	X	S						**SC**	slightly moist hard	note: increase in garvel content below 20'
25	X	S	19	39	50/4"					note: increase in sand content below 25'
										Stopped auger at 24'6" **Sampler refused at 25'10"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-04
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
	X	S	3 4 6			SM	slightly moist moderately firm to hard	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, medium plasticity, brown
	X	S	6 8 12					
5	X	S	19 33 50/4"					note: increase in fines content below 5' note: weakly cemented below 5'
10	X	S	50/5"					note: fine to medium grained, subangular to subrounded sand below 5' note: light brown color
15	X	S	50/3"					
20	X	S	31 50/4"					

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-04
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
20										**Visual Classification**
	X	S						**SC**	slightly moist hard	note: increase in garvel content below 20' note: increase in fines content below 20'
25	X	S	13	39	50/3"					
										Stopped auger at 24'6" **Sampler refused at 25'9"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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Tempe, Arizona 85282

GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-05
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
	X	S	2 2 3			SM	slightly moist soft to hard	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, medium plasticity, brown
	X	S	12 16 23					
5	X	S	13 14 16					
10	X	S	29 29 13					note: increase in gravel content below 10'
15	X	S	50/3"					note: weakly cemented below 15'
								Stopped auger at 14'6" **Sampler refused at 14'9"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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Tempe, Arizona 85282

GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-06
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	3 4 7			**SM**	slightly moist moderately firm to firm	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained sand, medium plasticity, brown
		S	7 8 14					
5		S	10 11 13					note: increase in gravel content below 5'
10		S	28 50/4"			**SC**	slightly moist hard	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented, low medium plasticity, brown
15		S	34 50/3"					
								Stopped auger at 14'6" **Sampler refused at 15'3"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-07
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	3 5 6			**SM**	slightly moist soft to hard	**SILTY SAND WITH GRAVEL** considerable fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, medium plasticity, brown
		S	8 8 8					
5		S	6 8 14					note: weakly cemented below 5'
10		S	50/5"					note: increase in gravel content below 10'
15		S	18 50/5"					
								Stopped auger at 14'6" **Sampler refused at 15'5"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-08
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes: / Visual Classification
0										**Visual Classification**
		S	7	10	11			**SC**	slightly moist firm to hard	**CLAYEY SAND** occasional trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented, medium plasticity, brown
		S	26	34	50/5"					
5		S	50/5"							
10		S	13	19	27					note: increase in gravel content below 10' note: increase in sand content below 10'
15		S	28	50/4"						
										Stopped auger at 14'6" **Sampler refused at 15'4"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-09
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	10 10 11			SC	slightly moist firm to hard	**CLAYEY SAND WITH GRAVEL** considerable some fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, weakly cemented, medium plasticity, brown
		U	42					
5		S	28 50/5"					
10		S	27 50/4"					note: decrease in gravel content below 10' note: increase in fines content below 10'
15		S	38 50/4"					
								Stopped auger at 14'6" **Sampler refused at 15'4"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-10
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes: / Visual Classification
0								**Visual Classification**
		S	9 11 13			**SC**	slightly moist firm to hard	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented, medium plasticity, brown
		S	20 27 23					
5		S	18 20 21					note: fine grained sand below 5'
10		S	25 34 50/3"					
15		S	39 50/4"					note: increase in gravel content below 15'
								Stopped auger at 14'6" **Sampler refused at 15'4"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-11
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	3 3 4			SM	slightly moist soft to hard	**SILTY SAND WITH GRAVEL** some fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, medium plasticity, light brown
		S	4 6 7					
5		S	11 16 21					note: weakly cemented below 5'
								note: brown color below 8'
10		S	27 50/5"					
15		S	50/5"					
								Stopped auger at 14'6" **Sampler refused at 14'11"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-12
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
	X	S	3 4 5			SC	slightly moist moderately firm to hard	**CLAYEY SAND** occasional fine grained, subangular to subrounded gravel, predominantly fine grained sand, low medium plasticity, brown
	X	S	5 7 7					
5	X	S	23 27 32					note: weakly cemented below 5'
10	X	S	50/5"					note: incraese in gravel content below 10'
15	X	S	50/5"					
								Stopped auger at 14'6" **Sampler refused at 14'11"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-13
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	9 13 14			**SM**	slightly moist firm to hard	**SILTY SAND WITH GRAVEL** some fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, weakly cemented, medium plasticity, brown
		U	50/5"					
5		S	28 25 28					
								note: increase in gravel content below 8'
10		S	31 50/4"					
15		S	38 50/5"					
								Stopped auger at 14'6" **Sampler refused at 15'5"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	Boring No.	B-14
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	Rig Type:	CME-45
Project Location:	Buckeye, Arizona	Boring Type:	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	Boring Location:	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	4 5 7			SC	slightly moist moderately firm to hard	**CLAYEY SAND** occasional fine grained, subangular to subrounded gravel, predominantly fine grained sand, low to medium plasticity, brown
		S	7 7 11					
5		S	19 28 33					note: weakly cemented below 5'
10		S	23 50/5"					note: increase in gravel content below 10'
15		S	50/5"					**Stopped auger at 14'6"** **Sampler refused at 14'11"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-15
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	7 8 10			**SC**	slightly moist firm to hard	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, low to medium plasticity, brown
		S	11 12 12					
5		S	38 50/4"					note: weakly cemented below 5' note: fine grained sand below 5'
10		S	13 18 25					note: increase in gravel content below 10'
15		S	37 50/3"					
								Stopped auger at 14'6" **Sampler refused at 15'3"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-16
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	2 3 3			**SM**	slightly moist soft to hard	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, medium plasticity, brown
		S	8 13 15					
5		S	8 23 42					note: weakly cemented below 5'
10		S	27 50/4"					note: increase in gravel content below 10'
15		S	50/5"					
								Stopped auger at 14'6" **Sampler refused at 14'11"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-17
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/11/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes: / Visual Classification
0										**Visual Classification**
		S	3	2	2			**SM**	slightly moist soft to moderately firm	**SILTY SAND** rare fine grained, subangular to subrounded gravel, predominantly fine grained sand, low plasticity, brown
		S	2	2	2					
5		S	6	7	7					
								SC	slightly moist firm to very firm	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, medium plasticity, brown
10		S	8	12	16					
15		S	8	22	23					note: increase in gravel content below 15'
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-18
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	7 9 10			**SC**	slightly moist firm to very firm	**CLAYEY SAND** rare fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, low to medium plasticity, brown
		S	11 18 26					
5		S	13 17 18					
10		S	16 9 7					note: increase in gravel content below 10'
15		S	13 10 11					
								Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-19
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	6	8	11			SC	slightly moist moderately firm to very firm	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, medium plasticity, brown
		U		55						
5		S	15	16	18					
										note: increase in gravel content below 7'
10		S	14	9	5					
15		S	14	9	7					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-20
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	1	2	2			**SM**	slightly moist soft to firm	**SILTY SAND** occasional fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
		S	4	5	6					
5		S	7	8	8					note: increase in gravel content below 5' note: increase in sand content below 5'
10		S	8	9	11					
15		S	8	12	13					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-21
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes: / Visual Classification
0										**Visual Classification**
		S	1	1	2			**ML**	slightly moist very soft to moderately firm	**SANDY SILT** occasional fine grained, subangular to subrounded gravel, considerable fine to medium grained, subangular to subrounded sand, low plasticity, brown
		U		11						
5		S	4	5	6					note: increase in sand and gravel content below 5'
10		S	6	6	7					
								SP-SM	slightly moist medium dense	**SAND WITH SILT** trace fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, nonplastic, brown
15		S	8	10	11					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-22
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	3	3	4			**SM**	slightly moist soft to moderately firm	**SILTY SAND** rare fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
		S	11	7	8					
5		S	6	6	5					
								SC	slightly moist hard	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented medium plasticity, brown
10		S	13	32	50/5"					
15		S	18	27	50/3"					
										Stopped auger at 14'6" **Sampler refused at 15'9"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-23
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	4 6 7			**SM**	slightly moist moderately firm to hard	**SILTY SAND WITH GRAVEL** some fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
		S	4 4 6					
5		S	11 21 36					note: increase in gravel content below 5'
10		S	21 15 14					note: increase in sand content below 10'
15		S	22 50/5"					
								Stopped auger at 14'6" **Sampler refused at 15'5"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-24
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	3 4 6			**SM**	slightly moist moderately firm to hard	**SILTY SAND WITH GRAVEL** considerable fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, nonplastic, brown
		U	22					
5		S	22 35 50/4"					note: increase in fines content below 5' note: decrease in gravel content below 5'
10		S	23 50/5"					note: weakly cemented below 10'
15		S	25 50/4"					
								Stopped auger at 14'6" **Sampler refused at 15'4"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-25
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes: / Visual Classification
0										**Visual Classification**
		S	6	10	11			SC	slightly moist firm to hard	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, low medium plasticity, brown
		S	6	22	39					
5		S	13	24	29					note: increase in fines content below 5' note: weakly cemented below 5'
10		S	26	50/5"						
15		S	37	50/4"						**Stopped auger at 14'6"** **Sampler refused at 15'4"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-26
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes: / Visual Classification
0										**Visual Classification**
		S	2	3	3			SC	slightly moist soft to hard	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, medium plasticity, brown
		S	3	4	4					
5		U		26						note: weakly cemented below 5'
10		S	29		50/4"					note: increase in fines content below 10'
15		S	22	14	50/5"					
										Stopped auger at 14'6" **Sampler refused at 15'11"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-27
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	6 7 8			SC	slightly moist moderately firm to hard	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained sand, low medium plasticity, brown
		S	8 19 28					
5		S	13 27 31					note: weakly cemented below 5' note: increase in fines content below 5'
10		S	25 50/5"					
15		S	35 50/4"					
								Stopped auger at 14'6" **Sampler refused at 15'4"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-28
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	1	2	2			SM	slightly moist very soft to very firm	**SILTY SAND WITH GRAVEL** some fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
		S	16	12	13					
5		S	9	16	22					note: clayey sand zone (SC) between 5' to 6'
10		S	7	13	14					note: well graded sand below 10'
15		S	4	11	9					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-29
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	6	8	9			**SM**	slightly moist moderately firm to very firm	**SILTY SAND WITH GRAVEL** some fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, nonplastic, brown
		S	9	12	11					
5		S	9	12	15					
10		S	8	5	5					note: increase in sand content below 10'
15		S	6	11	30					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-30
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	2 2 2			**SM**	slightly moist very soft to very firm	**SILTY SAND WITH GRAVEL** some fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, nonplastic, brown
		S	2 2 3					
5		S	4 6 7					note: increase in sand content below 5'
10		S	6 6 7					
						CL	slightly moist hard	**SANDY CLAY** occasional fine grained, subangular to subrounded gravel, considerable fine to medium grained, subangular to subrounded sand, weakly cemented, medium plasticity, brown
15		S	16 50/5"					
								Stopped auger at 14'6" **Sampler refused at 15'5"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	Boring No.	B-31
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	Rig Type:	CME-45
Project Location:	Buckeye, Arizona	Boring Type:	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	Boring Location:	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	4	6	7			**SM**	slightly moist moderately firm to firm	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, low plasticity, brown
		S	7	10	11					
5		U		23						
								SC		**CLAYEY SAND** occasional fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, medium plasticity, brown
10		S	10	17	24					
15		S	18	19	24					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-32
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
	X	S	2 2 3			**SM**	slightly moist soft to firm	**SILTY SAND WITH GRAVEL** some fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, nonplastic, brown
	X	S	3 3 3					
5	X	S	3 3 3					
	X	S	13 13 15					note: increase in fines content below 7'
10	X	S	13 29 34			**SC**	slightly moist hard	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented medium plasticity, brown
15	X	S	32 50/5"					
								Stopped auger at 14'6" **Sampler refused at 15'9"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-33
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	1	2	2			GP	slightly moist very soft to firm	**GRAVEL WITH SAND** considerable medium to coarse grained, subangular to subrounded sand, predominantly fine grained, angular to subrounded gravel, nonplastic, brown
		S	4	5	8					
5		U	10	11	9					note: increase in sand content below 5'
								SC	slightly moist hard	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, medium plasticity, brown
10		S	21	25	27					
								SP-SM	slightly moist medium dense	**SAND WITH SILT AND GRAVEL** some fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, nonplastic, brown
15		S	9	8	9					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-34
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/12/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	4 4 4			**SM**	slightly moist soft to firm	**SILTY SAND** occasional fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
		U	19					
5		S	3 3 4					
		S	10 13 11					note: increase in gravel content below 7' note: fine to medium grained, subangular to subrounded sand content below 7'
10		S	9 9 9					
15		S	7 7 6					
								Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-35
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/13/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	2	3	3			**SM**	slightly moist soft to moderately firm	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
		S	4	4	5					
5		U		11						note: increase in sand content below 5'
10		S	6	6	7			**SP-SM**	slightly moist medium dense	**SAND WITH SILT** trace fine grained, subangular to subrounded gravel, predominantly fime to medium grained, subangular to subrounded sand, nonplastic, brown
15		S	7	8	8					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-36
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/13/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	1	1	2			**SM**	slightly moist very soft to moderately firm	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
		S	3	3	4					
5		S	5	6	7					note: increase in sand content below 5'
10		S	6	7	7			**SP-SM**	slightly moist medium dense	**SAND WITH SILT** trace fine grained, subangular to subrounded gravel, predominantly fime to medium grained, subangular to subrounded sand, nonplastic, brown
15		S	7	9	9					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-37
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/13/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	2	2	2			**SM**	slightly moist very soft to moderately firm	**SILTY SAND** occasional fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
		S	3	4	5					
5		S	5	6	7					note: increase in sand content below 5' note: increase in gravel content below 5'
10		S	6	7	8			**SP-SM**	slightly moist medium dense	**SAND WITH SILT** trace fine grained, subangular to subrounded gravel, predominantly fime to medium grained, subangular to subrounded sand, nonplastic, brown
15		S	8	8	10					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-38
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/13/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes: / Visual Classification
0										**Visual Classification**
		S	1	2	2			SM	slightly moist very soft to firm	**SILTY SAND WITH GRAVEL** some fine grained, angular to subrounded gravel, predominantly well graded, subangular to subrounded sand, nonplastic, brown
		U		13						
5		S	5	5	6					
10		S	6	7	9					note: increase in gravel content below 10'
								SP-SM	slightly moist medium dense	**SAND WITH SILT AND GRAVEL** trace fine grained, subangular to subrounded gravel, predominantly fime to medium grained, subangular to subrounded sand, nonplastic, brown
15		S	7	9	12					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-39
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/13/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	2	3	3			**SM**	slightly moist soft to moderately firm	**SILTY SAND** occasional fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, nonplastic, brown
		S	3	3	3					
5		S	6	5	5					note: increase in fines content below 5'
										note: increase in gravel content below 7'
10		S	10	13	23			**SC**	slightly moist very firm	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fime to medium grained, subangular to subrounded sand, low plasticity, brown
15		S	9	14	24					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-40
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/13/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	2	2	3			**SM**	slightly moist soft to moderately firm	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, nonplastic, brown
		S	3	3	4					
5		S	5	6	7					note: increase in gravel content below 5'
10		S	9	14	22			**SC**	slightly moist very firm	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fime to medium grained, subangular to subrounded sand, low plasticity, brown
15		S	14	16	20					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-41
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/13/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0										**Visual Classification**
		S	2	2	2			**SM**	slightly moist soft to moderately firm	**SILTY SAND WITH GRAVEL** considerable fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
		S	3	3	4					
5		U		15						
10		S	7	11	17					note: decrease in fines content below 10'
15		S	6	9	12					
										Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-42
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/13/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
		S	2 2 2			SC	slightly moist very soft to firm	**CLAYEY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, medium plasticity, brown
		U	16					
5		S	4 4 5					
10		S	7 13 16					note: increase in gravel content below 10'
15		S	12 14 15					
								Stopped auger at 14'6" **Stopped sampler at 16'** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	B-43
Project Name:	Trillium at Douglas Ranch Phase I, Village 3	**Rig Type:**	CME-45
Project Location:	Buckeye, Arizona	**Boring Type:**	Hollow Stem Auguer
Date(s) Complete:	1/13/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)			Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes: / Visual Classification
0										**Visual Classification**
		S	1	2	2			SC	slightly moist very soft to firm	**CLAYEY SAND WITH GRAVEL** some fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, low to medium plasticity, brown
		S	3	3	4					
5		S	4	5	7					note: well graded sand between 5' to 6'
10		S	9	12	22					note: weakly cemented below 10' note: decrease in gravel content below 10'
15		S	15	29	50/3"					
										Stopped auger at 14'6" **Sampler refused at 15'9"** **Backfilled with drill cutting**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-01
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
0								**Visual Classification**
	X	D				**SM**	slightly moist	**SILTY SAND** ocasional fine grained, angular to subrounded gravel, predominantly medium grained, subangular to subrounded, nonplastic, brown
								Stopped backhoe at 3' **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-02
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
5		D				SP-SM	slightly moist	**SAND WITH SILT AND GRAVEL** some fine grained, subangular to subrounded gravel, predominantly medium grained, subangular to subrounded sand, nonplastic, brown
10								**Stopped backhoe at 5'** **Backfilled with spoils**
15								

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-03
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
5		D				**SP-SM**	slightly moist	**SAND WITH SILT AND GRAVEL** trace fine grained, angular to subrounded gravel, predominantly medium grained, subangular to subrounded sand, nonplastic, brown
10								
15								**Stopped backhoe at 10'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-04
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SM**	slightly moist	**SAND WITH SILT** trace fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, nonplastic, brown
5								note: increase in gravel content below 5'
10								note: increase in fines content below 8'
15								**Stopped backhoe at 12'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-05
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes: / Visual Classification
								Visual Classification
		D				**SM**	slightly moist	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrouned sand, low plasticity, brown
5								note: increase in sand content below 5'
10								note: increase in gravel content below 8' note: reddish brown color below 8'
15								**Stopped backhoe at 12'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-06
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SM**	slightly moist	**SILTY SAND** occasional fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
5								note: increase in coarse sand content below 5'
10								note: increase in gravel content below 8' note: reddish brown color below 8'
15								**Stopped backhoe at 12'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-07
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SM**	slightly moist	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
5								note: increase in coarse sand content below 5'
10								note: reddish brown color below 7' note: increase in gravel content below 10'
15								**Stopped backhoe at 12'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-08
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SM**	slightly moist	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
5								note: increase in sand content below 5'
10								note: increase in gravel content below 8' note: reddish brown color below 8'
15								**Stopped backhoe at 12'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-09
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SM**	slightly moist	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, medium plasticity, brown
5								
								note: increase in gravel content below 6'
								note: weakly cemented below 8'
10								
15								**Stopped backhoe at 12'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-10
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SC**	slightly moist	**CLAYE SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented, low plasticity, brown
5								
								note: increase in fines content below 6'
								note: incraese in gravel content below 8'
								note: moderately cemented below 8'
10								
								Stopped backhoe at 12' **Backfilled with spoils**
15								

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-11
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
5		D				**SM**	slightly moist	**SILTY SAND WITH GRAVEL** some fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, weakly cemented, nonplastic, brown note: incraese in gravel content below 5' note: moderately cemented below 6'
10								**Backhoe refused at 7'** **Backfilled with spoils**
15								

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-12
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
5		D				SC	slightly moist	**CLAYE SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented, low plasticity, brown note: increase in fines content below 5' note: moderately cemented below 7'
10								**Backhoe refused at 8'** **Backfilled with spoils**
15								

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-13
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				SP-SM	slightly moist	**SAND WITH AND GRAVEL** considerable fine grained, subangular to subrounded gravel, predominantly medium to coarse grained, subangular to subrounded sand, nonplastic, brown
5								note: increase in gravel content below 5'
10								note: decrease in fines content below 8'
15								**Stopped backhoe at 12'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-14
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SM**	slightly moist	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
5								note: increase in coarse sand content below 5'
10								note: increase in gravel content below 7'
15								**Stopped backhoe at 12'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-15
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/8/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SM**	slightly moist	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
5								note: increase in coarse sand content below 5'
								note: increase in gravel content below 7' note: moderately cemented below 7'
10								**Backhoe refused at 8'** **Backfilled with spoils**
15								

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-16
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/14/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
5		D				SC	slightly moist	**CLAYE SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented, medium plasticity, brown
10								note: incraese in gravel content below 8'
15								note: moderately cemented below 10' **Stopped backhoe at 12'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-17
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/14/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				SC	slightly moist	**CLAYE SAND** occasional fine grained, subangular to subrounded gravel, predominantly fine grained sand, low to medium plasticity, brown
5								
								note: incraese in gravel content below 7'
10								
								note: moderately cemented below 10'
								Stopped backhoe at 12' **Backfilled with spoils**
15								

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-18
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/14/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
5		D				SC	slightly moist	**CLAYE SAND WITH SAND** some fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, weakly cemented, medium plasticity, brown note: increase in fines content below 5' note: moderately cemented below 6'
10								**Backhoe refused at 8'** **Backfilled with spoils**
15								

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-19
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/14/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
5		D				**SM**	slightly moist	**SILTY SAND** occasional fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded sand, nonplastic, brown note: increase in gravel content below 5'
10						**SP-SM**	slightly moist	**SAND WITH SILT** trace fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded, nonplastic, brown
15								**Stopped backhoe at 12'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-20
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/14/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SM**	slightly moist	**SILTY SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, nonplastic, brown
5								
								note: increase in sand content below 6'
								note: increase in gravel content below 7'
10								
								Stopped backhoe at 12' **Backfilled with spoils**
15								

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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Tempe, Arizona 85282

GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-21
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/14/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
5		D				SC	slightly moist	**CLAYE SAND** trace fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented, low to medium plasticity, brown note: increase in gravel content below 5' note: moderately cemented below 6'
10								**Backhoe refused at 8'** **Backfilled with spoils**
15								

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-22
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/14/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SC**	slightly moist	**CLAYE SAND WITH GRAVEL** some fine grained, angular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented, low to medium plasticity, brown
5								
10								note: moderately cemented below 7'
15								**Backhoe refused at 10'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-23
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/14/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SC**	slightly moist	**CLAYE SAND** occasional fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented, low to medium plasticity, brown
5								note: moderately cemented below 7'
10								**Backhoe refused at 9'** **Backfilled with spoils**
15								

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-24
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/14/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
5		D				SC	slightly moist	**CLAYE SAND WITH GRAVEL** some fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented, medium plasticity, brown note: increase in gravel content below 5' note: increase in sand content below 5' note: reddish brown sand color below 7' note: moderately cemented below 8'
10								**Backhoe refused at 9'** **Backfilled with spoils**
15								

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-25
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/14/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SC**	slightly moist	**CLAYE SAND** occasional fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemented, low to medium plasticity, brown
5								note: moderately cemented below 7'
10								**Backhoe refused at 9'** **Backfilled with spoils**
15								

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER

DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-26
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/14/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes: / Visual Classification
								Visual Classification
5		D				**SM**	slightly moist	**SILTY SAND WITH GRAVEL** some fine grained, subangular to subrounded gravel, predominantly fine to medium grained, subangular to subrounded sand, weakly cemenetd, nonplastic, brown note: increase in gravel content below 6'
10						**SP-SM**	slightly moist	**SAND WITH SILT AND GRAVEL** some fine grained, subangular to subrounded gravel, predominantly well graded, subangular to subrounded, nonplastic, brown
15								**Stopped backhoe at 12'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

Alpha Project Number:	20-G-11044	**Boring No.**	TP-27
Project Name:	Trillium at Douglas Ranch - Phase I, Village 3	**Rig Type:**	John Deere 310 Backhoe
Project Location:	Buckeye, Arizona	**Boring Type:**	Test Pits
Date(s) Complete:	1/14/2021	**Boring Location:**	See Figure 1 - Site Map

Depth (Feet)	Sample	Sample Type	Blow Count (6 inch Interval)	Dry Density (PCF)	Moisture (%)	Unified Soil Classification	Remarks	Field and Drilling Notes:
								Visual Classification
		D				**SM**	slightly moist	**SILTY SAND** occasional fine grained, subangular to subrounded gravel, predominantly fine grained sand, nonplastic, brown
5								
10								note: increase in sand content below 8' note: increase in gravel content below 8'
15								**Stopped backhoe at 12'** **Backfilled with spoils**

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon
A = Auger Cuttings U = Relatively Undisturbed Ring D = Disturbed Bulk

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GROUNDWATER		
DEPTH	TIME	DATE
N/A	N/A	N/A

APPENDIX B
Laboratory Test Results

Table B-1 - Summary of Laboratory Test Results

Boring Number	Depth (ft[1])		USCS/Group Symbol[2] (ASTM D2487)	Percent Fines (minus No. 200) (ASTM C136/C117)	Percent Sand (Retained Between the No. 4 and No. 200	Percent Gravel (Retained Above No. 4 Sieve)	Liquid Limit (ASTM D4318)	Plasticity Index (ASTM D4318)	In-Place Dry Density (pcf[3]) (ASTM D2937)	Moisture Content (%[4]) (ASTM D2216)	Swell Potential (%[4]) (ASTM D4546)	Expansion Index (ASTM D4829)	Consolidation (ASTM D2435)	Maximum Dry Density (pcf[3]) (ASTM D698A)	Optimum Moisture Content (%[4]) (ASTM D698A)	Soluble Sulfates (ppm[5]) ARIZ 733	Chlorides (ppm[5]) (ARIZ 736)	Resistivity (Ohm-cm[6]) (ARIZ 236)	pH (ARIZ 236)
	Begin	End																	
B-01	0.0	4.5	SC	25	50	25	41	16			2.4			119.3	11.1	<3	101		
B-02	0.0	4.5	SM	36	55	9	21	3											
B-03	0.0	4.5	SM	23	64	13	33	8				1				<3	114		
B-07	0.0	4.5	SM	21	50	29	31	1				3				183	253	682	8.2
B-09	0.0	4.5	SC	15	56	29	30	10			0.3	0		116.9	10.1	860	340		
B-09	2.5	3.5							109.6	7.4			5.3						
B-11	0.0	4.5	SM	25	58	17	37	5				5				942	809		
B-13	0.0	4.5	SM	38	47	15	30	7				3				208	300		
B-13	2.5	3.5							102.5	6.3			6.3						
B-16	0.0	4.5	SM	32	55	13	45	7				1		119.0	11.3	5	203		
B-19	0.0	4.5	SC	46	42	12	36	15				4							
B-19	2.5	3.5							117.5	3.7			2.5						
B-21	0.0	4.5	ML	61	36	3	27	4				0				9	304	1,500	8.6
B-21	2.5	3.5							104.8	3.2									
B-24	0.0	4.5	SM	16	54	30	NV	NP				0				287	164		
B-26	0.0	4.5	SC	36	51	13	47	20				7				549	893		
B-26	4.5	5.5							113.6	3.8			3.8						
B-31	0.0	4.5	SM	38	54	8	30	5											
B-31	4.5	5.5							110.9	3.3			1.7						
B-33	0.0	4.5	GP	4.5	44	52	NV	NP											
B-34	2.5	3.5							112.2	3.2									
B-35	0.0	4.5	SM	28	61	11	NV	NP						122.9	9.8				
B-35	4.5	5.5							119.9	2.1			3.4						
B-38	0.0	4.5	SM	28	55	17	NV	NP											
B-38	2.5	3.5							108.5	2.5			2.5						
B-42	0.0	4.5	SC	31	56	13	33	12				0				223	185	1,295	8.6
B-42	2.5	3.5							107.7	4.1			3.6						
TP-01	0.0	5.0	SM	13	80	7	NV	NP											
TP-02	0.0	5.0	SP-SM	8.8	71	20	NV	NP											
TP-03	0.0	5.0	SP-SM	5.4	87	8	NV	NP											
TP-05	0.0	5.0	SM	35	57	8	26	4											
TP-07	0.0	5.0	SM	21	67	12	NV	NP											
TP-09	0.0	5.0	SM	39	49	12	33	6											
TP-11	0.0	5.0	SM	30	53	17	NV	NP				4				4	43		
TP-13	0.0	5.0	SP-SM	5.9	61	33	NV	NP											
TP-15	0.0	5.0	SM	22	67	11	NV	NP											
TP-16	0.0	5.0	SC	41	47	12	37	14				10				548	357		
TP-18	0.0	5.0	SC	30	48	22	42	17				5		115.4	13.7	424	573		
TP-24	0.0	5.0	SC	14	70	16	35	13				0				5	118	2,455	8.7
TP-26	0.0	5.0	SM	20	57	23	NV	NP						110.6	13.0				
			Average	**26**	**57**	**17**	**---**	**---**	**110.7**	**4.0**	**---**	**---**	**---**	**117.4**	**11.5**	**327**	**317**	**1,483**	**8.5**
			Standard Deviation	**13**	**11**	**10**	**---**	**---**	**5.4**	**1.7**	**---**	**---**	**---**	**4.2**	**1.6**	**320**	**254**	**735**	**0.2**
			Minimum	**4.5**	**36**	**3**	**NV**	**NP**	**102.5**	**2.1**	**0.3**	**0**	**1.7**	**110.6**	**9.8**	**4**	**43**	**682**	**8.2**
			Maximum	**61**	**87**	**52**	**47**	**20**	**119.9**	**7.4**	**2.4**	**10**	**6.3**	**122.9**	**13.7**	**942**	**893**	**2,455**	**8.7**
			Count	**30**	**30**	**30**	**30**	**30**	**10**	**10**	**2**	**15**	**8**	**6**	**6**	**15**	**15**	**4**	**4**

Notes:

[1] ft = feet

[2] USCS group symbol as determined by laboratory testing (ASTM D2487).

[3] pcf = pounds per cubic foot

[4] % = percent

[5] ppm = parts per million

[6] ohm-cm = ohm-centimeters

APPENDIX B
LABORATORY TESTING

LABORATORY TESTS

Laboratory tests were performed on selected samples to aid in soil classification and to evaluate physical properties of the soils, which may affect the Geotechnical aspects of project design and construction. A description of the laboratory testing program is presented below.

Sieve Analysis

Sieve analyses were performed to evaluate the gradation characteristics of the material and to aid in soil classification. Tests were performed in general accordance with ASTM Test Method C136/C117 and D2487.

Atterberg Limits

Atterberg Limits tests were performed to aid in soil classification and to evaluate the plasticity characteristics of the material. Additionally, test results were correlated to published data to evaluate the shrink/swell potential of near-surface site soils. Tests were performed in general accordance with ASTM Test Method D4318.

Moisture-Density Relationship

The test results are used to determine the maximum dry density from the peak point of the compaction curve and its corresponding moisture content, also known as the optimum moisture. Additionally, test results are used to determine earthwork factors. Tests were performed in general accordance with ASTM Test Method D698.

In-Place Density and Moisture Content

The test results are used to determine the in-place density and water content of soil samples. Tests were performed in general accordance with ASTM Test Method D2937.

Expansion Index

Expansion index tests were performed on bulk soil samples to evaluate the expansion potential of the site soils. Test procedures were in general accordance with ASTM Test Method D4829.

One-Dimensional Consolidation

A one-dimensional consolidation test was performed on a ring samples to evaluate consolidation potential of the site soil. Test procedure was in general accordance with ASTM Test Method D 2435.

Swell

Swell tests were performed on remolded bulk soil samples to evaluate the swell potential of the subgrade soils. Test procedures were in general accordance with ASTM Test Method D4546.

Sulfate Content

Sulfate content tests were performed to evaluate the corrosion potential of the on-site soils. Tests were performed in general accordance with ARIZ 733.

Chloride Content

Chloride content tests were performed to evaluate the corrosion potential of the on-site soils. Tests were performed in general accordance with ARIZ 736.

pH and Resistivity

pH and resistivity tests were performed on the bulk soil sample to evaluate the site soil corrosion potential. Test procedure was in general accordance with Arizona Test Method 236.

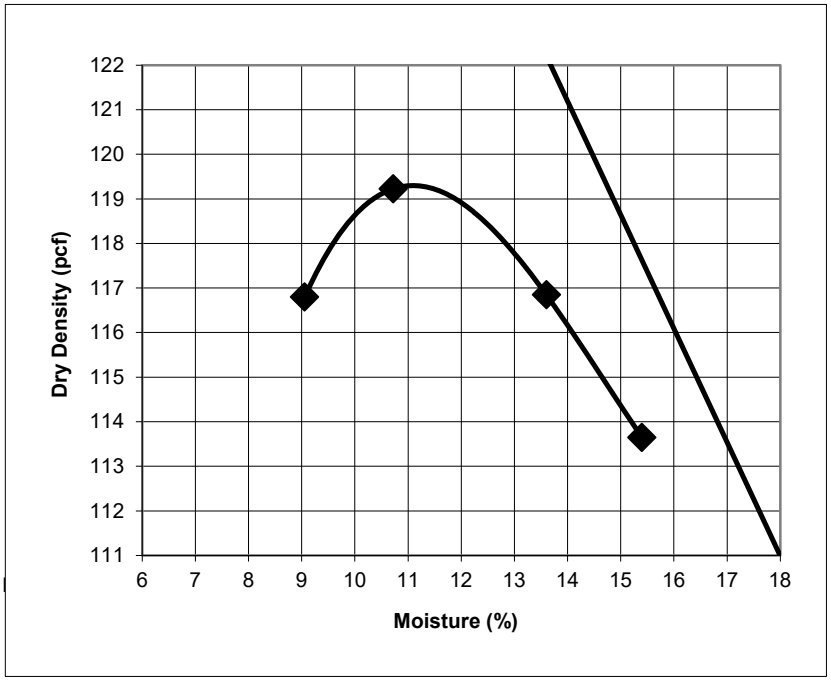
Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43627
Material:	Native Soil	**Sample Date:**	01/11/21
Sample Source:	B-01 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Laboratory Compaction Characteristics of Soils Using
Standard Efforts (12,400ft-lb-ft/cu.ft) (ASTMD698A)
Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

ONE DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS, 144 PSF SURCHARGE (ASTM D-4546)

	English (pcf)	Metric (kg/cu.m)
Maximum Dry Density:	119.3	1911
Optimum Moisture (%):	11.1	11.1



Sieve Size	Percent Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	97
1/2 in / 12.5 mm	92
3/8 in / 9.5 mm	87
1/4 in / 6.4 mm	80
#4, 4.75mm	75
#8, 2.36mm	64
#10, 2.00mm	61
#16, 1.18mm	52
#30, 0.60mm	42
#40, .425mm	39
#50, .300mm	35
#100, .150mm	30
#200, .075mm	25

LL:	41
PI:	16
% Swell:	2.4
USCS:	SC
AASHTO:	A-2-7(0)

Notes:

- The Zero Air Void Curve Represents a Specific Gravity of 2.65 assumed for the -#4 Material.
- This is a Summarized Report of the Referenced Procedures and Does Not Include All Reporting Requirements. Additional Data Can be Provided at Clients Request.

Reviewed by: JV

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43628
Material:	Native Soil	**Sample Date:**	01/11/21
Sample Source:	B-02 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	98
1/2 in / 12.5 mm	97
3/8 in / 9.5 mm	95
1/4 in / 6.4 mm	93
#4, 4.75mm	91
#8, 2.36mm	83
#10, 2.00mm	81
#16, 1.18mm	72
#30, 0.60mm	60
#40, .425mm	55
#50, .300mm	50
#100, .150mm	43
#200, .075mm	36

Atterberg Limits

LL:	21
PL:	18
PI:	3
USCS:	SM
AASHTO:	A-4(0)

Reviewed by: JV

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43629
Material:	Native Soil	**Sample Date:**	01/11/21
Sample Source:	B-03 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	99
1/2 in / 12.5 mm	98
3/8 in / 9.5 mm	96
1/4 in / 6.4 mm	92
#4, 4.75mm	87
#8, 2.36mm	74
#10, 2.00mm	70
#16, 1.18mm	59
#30, 0.60mm	45
#40, .425mm	40
#50, .300mm	36
#100, .150mm	29
#200, .075mm	23

Atterberg Limits

LL:	33
PL:	25
PI:	8
EI:	1
USCS:	SM
AASHTO:	A-2-4(0)

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Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43630
Material:	Native Soil	**Sample Date:**	01/11/21
Sample Source:	B-07 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	98
1 1/4 in / 32 mm	95
1 in / 25 mm	93
3/4 in / 19 mm	89
1/2 in / 12.5 mm	85
3/8 in / 9.5 mm	81
1/4 in / 6.4 mm	75
#4, 4.75mm	71
#8, 2.36mm	58
#10, 2.00mm	55
#16, 1.18mm	47
#30, 0.60mm	39
#40, .425mm	36
#50, .300mm	33
#100, .150mm	28
#200, .075mm	21

Atterberg Limits

LL:	31
PL:	30
PI:	1
EI:	3
USCS:	SM
AASHTO:	A-1-b(0)

Reviewed by: JV

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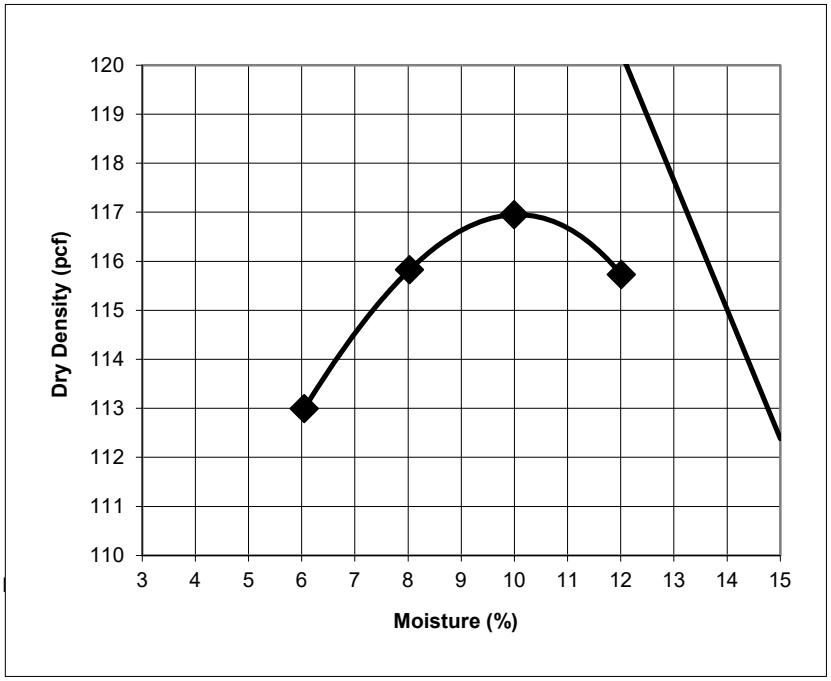
Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43631
Material:	Native Soil	**Sample Date:**	01/11/21
Sample Source:	B-09 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Laboratory Compaction Characteristics of Soils Using
Standard Efforts (12,400ft-lb-ft/cu.ft) (ASTMD698A)
Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)
ONE DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS, 144 PSF SURCHARGE (ASTM D-4546)

	English (pcf)	Metric (kg/cu.m)
Maximum Dry Density:	116.9	1873
Optimum Moisture (%):	10.1	10.1



Sieve Size	Percent Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	98
3/4 in / 19 mm	94
1/2 in / 12.5 mm	88
3/8 in / 9.5 mm	84
1/4 in / 6.4 mm	77
#4, 4.75mm	71
#8, 2.36mm	58
#10, 2.00mm	55
#16, 1.18mm	45
#30, 0.60mm	34
#40, .425mm	29
#50, .300mm	25
#100, .150mm	19
#200, .075mm	15

LL:	30
PI:	10
EI:	0
% Swell:	0.3
USCS:	SC
AASHTO:	A-2-4(0)

Notes:

- The Zero Air Void Curve Represents a Specific Gravity of 2.5 assumed for the -#4 Material.
- This is a Summarized Report of the Referenced Procedures and Does Not Include All Reporting Requirements. Additional Data Can be Provided at Clients Request.

Reviewed by: JV

Alpha Geotechnical and Materials, Inc.
2504 West Southern Avenue
Tempe, Arizona 85282

Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43632
Material:	Native Soil	**Sample Date:**	01/11/21
Sample Source:	B-11 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	99
1 1/4 in / 32 mm	99
1 in / 25 mm	99
3/4 in / 19 mm	98
1/2 in / 12.5 mm	96
3/8 in / 9.5 mm	94
1/4 in / 6.4 mm	88
#4, 4.75mm	83
#8, 2.36mm	68
#10, 2.00mm	65
#16, 1.18mm	55
#30, 0.60mm	44
#40, .425mm	41
#50, .300mm	37
#100, .150mm	32
#200, .075mm	25

Atterberg Limits

LL:	37
PL:	32
PI:	5
EI:	5
USCS:	SM
AASHTO:	A-1-b(0)

Reviewed by: JV

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43633
Material:	Native Soil	**Sample Date:**	01/11/21
Sample Source:	B-13 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	98
1 1/4 in / 32 mm	98
1 in / 25 mm	98
3/4 in / 19 mm	97
1/2 in / 12.5 mm	95
3/8 in / 9.5 mm	93
1/4 in / 6.4 mm	89
#4, 4.75mm	85
#8, 2.36mm	77
#10, 2.00mm	75
#16, 1.18mm	67
#30, 0.60mm	58
#40, .425mm	55
#50, .300mm	51
#100, .150mm	45
#200, .075mm	38

Atterberg Limits

LL:	30
PL:	23
PI:	7
EI:	3
USCS:	SM
AASHTO:	A-4(0)

Reviewed by: JV

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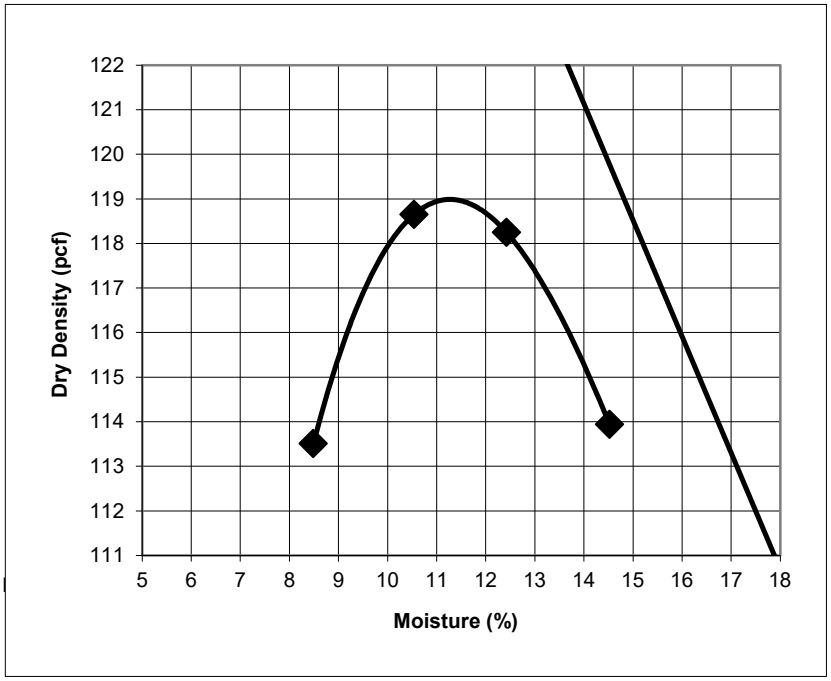
Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43634
Material:	Native Soil	**Sample Date:**	01/11/21
Sample Source:	B-16 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Laboratory Compaction Characteristics of Soils Using
Standard Efforts (12,400ft-lb-ft/cu.ft) (ASTMD698A)
Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

	English (pcf)	Metric (kg/cu.m)
Maximum Dry Density:	119.0	1906
Optimum Moisture (%):	11.3	11.3



Sieve Size	Percent Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	99
1 1/4 in / 32 mm	98
1 in / 25 mm	98
3/4 in / 19 mm	97
1/2 in / 12.5 mm	97
3/8 in / 9.5 mm	95
1/4 in / 6.4 mm	91
#4, 4.75mm	87
#8, 2.36mm	78
#10, 2.00mm	75
#16, 1.18mm	67
#30, 0.60mm	56
#40, .425mm	52
#50, .300mm	48
#100, .150mm	41
#200, .075mm	32

LL:	45
PI:	7
EI:	1
USCS:	SM
AASHTO:	A-2-5(0)

Notes:

- The Zero Air Void Curve Represents a Specific Gravity of 2.65 assumed for the -#4 Material.
- This is a Summarized Report of the Referenced Procedures and Does Not Include All Reporting Requirements. Additional Data Can be Provided at Clients Request.

Reviewed by: JV

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43635
Material:	Native Soil	**Sample Date:**	01/12/21
Sample Source:	B-19 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	99
3/4 in / 19 mm	99
1/2 in / 12.5 mm	97
3/8 in / 9.5 mm	95
1/4 in / 6.4 mm	91
#4, 4.75mm	88
#8, 2.36mm	81
#10, 2.00mm	79
#16, 1.18mm	73
#30, 0.60mm	66
#40, .425mm	63
#50, .300mm	60
#100, .150mm	54
#200, .075mm	46

Atterberg Limits

LL:	36
PL:	21
PI:	15
EI:	4
USCS:	SC
AASHTO:	A-6(4)

Reviewed by: JV

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Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43636
Material:	Native Soil	**Sample Date:**	01/12/21
Sample Source:	B-21 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	100
1/2 in / 12.5 mm	100
3/8 in / 9.5 mm	99
1/4 in / 6.4 mm	98
#4, 4.75mm	97
#8, 2.36mm	93
#10, 2.00mm	92
#16, 1.18mm	88
#30, 0.60mm	82
#40, .425mm	79
#50, .300mm	77
#100, .150mm	71
#200, .075mm	61

Atterberg Limits

LL:	27
PL:	23
PI:	4
EI:	0
USCS:	ML
AASHTO:	A-4(1)

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43637
Material:	Native Soil	**Sample Date:**	01/12/21
Sample Source:	B-24 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	99
1 1/4 in / 32 mm	99
1 in / 25 mm	97
3/4 in / 19 mm	94
1/2 in / 12.5 mm	89
3/8 in / 9.5 mm	84
1/4 in / 6.4 mm	75
#4, 4.75mm	70
#8, 2.36mm	59
#10, 2.00mm	56
#16, 1.18mm	48
#30, 0.60mm	37
#40, .425mm	33
#50, .300mm	29
#100, .150mm	23
#200, .075mm	16

Atterberg Limits

LL:	NV
PI:	NP
EI:	0
USCS:	SM
AASHTO:	A-1-b(0)

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43638
Material:	Native Soil	**Sample Date:**	01/12/21
Sample Source:	B-26 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	99
1/2 in / 12.5 mm	97
3/8 in / 9.5 mm	95
1/4 in / 6.4 mm	91
#4, 4.75mm	87
#8, 2.36mm	78
#10, 2.00mm	75
#16, 1.18mm	66
#30, 0.60mm	56
#40, .425mm	53
#50, .300mm	49
#100, .150mm	43
#200, .075mm	36

Atterberg Limits

LL:	47
PL:	27
PI:	20
EI:	7
USCS:	SC
AASHTO:	A-7-6(2)

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43639
Material:	Native Soil	**Sample Date:**	01/12/21
Sample Source:	B-31 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	100
1/2 in / 12.5 mm	99
3/8 in / 9.5 mm	98
1/4 in / 6.4 mm	95
#4, 4.75mm	92
#8, 2.36mm	82
#10, 2.00mm	80
#16, 1.18mm	72
#30, 0.60mm	62
#40, .425mm	59
#50, .300mm	55
#100, .150mm	48
#200, .075mm	38

Atterberg Limits

LL:	30
PL:	25
PI:	5
USCS:	SM
AASHTO:	A-4(0)

Reviewed by: JV

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Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43640
Material:	Native Soil	**Sample Date:**	01/12/21
Sample Source:	B-33 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	98
1 1/4 in / 32 mm	98
1 in / 25 mm	97
3/4 in / 19 mm	94
1/2 in / 12.5 mm	84
3/8 in / 9.5 mm	73
1/4 in / 6.4 mm	54
#4, 4.75mm	48
#8, 2.36mm	32
#10, 2.00mm	28
#16, 1.18mm	20
#30, 0.60mm	14
#40, .425mm	11
#50, .300mm	9
#100, .150mm	6
#200, .075mm	4.5

Atterberg Limits

LL:	NV
PI:	NP
USCS:	GP
AASHTO:	A-1-a(1)

Reviewed by: JV

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Tempe, Arizona 85282

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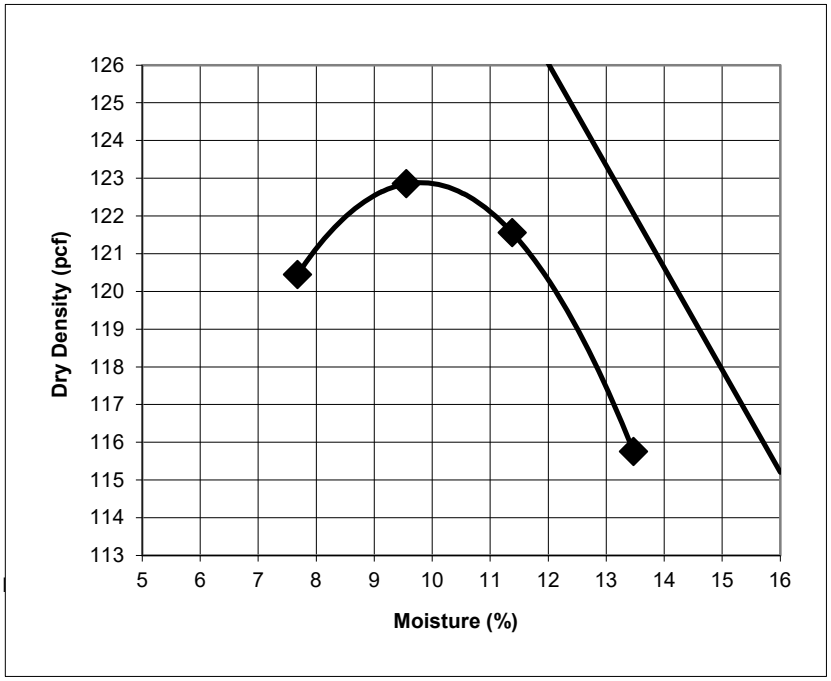
Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43641
Material:	Native Soil	**Sample Date:**	01/13/21
Sample Source:	B-35 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Laboratory Compaction Characteristics of Soils Using
Standard Efforts (12,400ft-lb-ft/cu.ft) (ASTMD698A)
Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

	English (pcf)	Metric (kg/cu.m)
Maximum Dry Density:	122.9	1968
Optimum Moisture (%):	9.8	9.8



Sieve Size	Percent Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	99
1/2 in / 12.5 mm	98
3/8 in / 9.5 mm	96
1/4 in / 6.4 mm	92
#4, 4.75mm	89
#8, 2.36mm	80
#10, 2.00mm	77
#16, 1.18mm	67
#30, 0.60mm	54
#40, .425mm	49
#50, .300mm	44
#100, .150mm	36
#200, .075mm	28

LL:	NV
PI:	NP
USCS:	SM
AASHTO:	A-2-4(0)

Notes:

- The Zero Air Void Curve Represents a Specific Gravity of 2.65 assumed for the -#4 Material.
- This is a Summarized Report of the Referenced Procedures and Does Not Include All Reporting Requirements. Additional Data Can be Provided at Clients Request.

Reviewed by: JV

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Tempe, Arizona 85282

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43642
Material:	Native Soil	**Sample Date:**	01/13/21
Sample Source:	B-38 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	99
3/4 in / 19 mm	98
1/2 in / 12.5 mm	95
3/8 in / 9.5 mm	92
1/4 in / 6.4 mm	87
#4, 4.75mm	83
#8, 2.36mm	74
#10, 2.00mm	72
#16, 1.18mm	64
#30, 0.60mm	54
#40, .425mm	49
#50, .300mm	44
#100, .150mm	36
#200, .075mm	28

Atterberg Limits

LL:	NV
PI:	NP
USCS:	SM
AASHTO:	A-2-4(0)

Reviewed by: JV

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Tempe, Arizona 85282

Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43643
Material:	Native Soil	**Sample Date:**	01/13/21
Sample Source:	B-42 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	99
1/2 in / 12.5 mm	97
3/8 in / 9.5 mm	95
1/4 in / 6.4 mm	90
#4, 4.75mm	87
#8, 2.36mm	76
#10, 2.00mm	73
#16, 1.18mm	64
#30, 0.60mm	52
#40, .425mm	48
#50, .300mm	44
#100, .150mm	37
#200, .075mm	31

Atterberg Limits

LL:	33
PL:	21
PI:	12
EI:	0
USCS:	SC
AASHTO:	A-2-6(0)

Reviewed by: JV

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Tempe, Arizona 85282

Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43644
Material:	Native Soil	**Sample Date:**	01/08/21
Sample Source:	TP-01 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	99
1/2 in / 12.5 mm	98
3/8 in / 9.5 mm	97
1/4 in / 6.4 mm	95
#4, 4.75mm	93
#8, 2.36mm	84
#10, 2.00mm	81
#16, 1.18mm	66
#30, 0.60mm	43
#40, .425mm	34
#50, .300mm	27
#100, .150mm	19
#200, .075mm	13

Atterberg Limits

LL:	NV
PI:	NP
USCS:	SM
AASHTO:	A-1-b(0)

Reviewed by: JV

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Tempe, Arizona 85282

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43645
Material:	Native Soil	**Sample Date:**	01/08/21
Sample Source:	TP-02 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	98
3/4 in / 19 mm	97
1/2 in / 12.5 mm	94
3/8 in / 9.5 mm	91
1/4 in / 6.4 mm	85
#4, 4.75mm	80
#8, 2.36mm	64
#10, 2.00mm	59
#16, 1.18mm	44
#30, 0.60mm	29
#40, .425mm	24
#50, .300mm	19
#100, .150mm	13
#200, .075mm	8.8

Atterberg Limits

LL:	NV
PI:	NP
USCS:	SP-SM
AASHTO:	A-1-b(1)

Reviewed by: JV

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Tempe, Arizona 85282

Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43646
Material:	Native Soil	**Sample Date:**	01/08/21
Sample Source:	TP-03 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	100
1/2 in / 12.5 mm	98
3/8 in / 9.5 mm	96
1/4 in / 6.4 mm	94
#4, 4.75mm	92
#8, 2.36mm	81
#10, 2.00mm	76
#16, 1.18mm	58
#30, 0.60mm	31
#40, .425mm	21
#50, .300mm	14
#100, .150mm	8
#200, .075mm	5.4

Atterberg Limits

LL:	NV
PI:	NP
USCS:	SP-SM
AASHTO:	A-1-b(1)

Reviewed by: JV

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Tempe, Arizona 85282

Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43647
Material:	Native Soil	**Sample Date:**	01/08/21
Sample Source:	TP-05 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	99
1/2 in / 12.5 mm	98
3/8 in / 9.5 mm	97
1/4 in / 6.4 mm	94
#4, 4.75mm	92
#8, 2.36mm	85
#10, 2.00mm	82
#16, 1.18mm	74
#30, 0.60mm	62
#40, .425mm	58
#50, .300mm	54
#100, .150mm	46
#200, .075mm	35

Atterberg Limits

LL:	26
PL:	22
PI:	4
USCS:	SM
AASHTO:	A-2-4(0)

Reviewed by: JV

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43648
Material:	Native Soil	**Sample Date:**	01/08/21
Sample Source:	TP-07 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	99
3/4 in / 19 mm	97
1/2 in / 12.5 mm	95
3/8 in / 9.5 mm	92
1/4 in / 6.4 mm	90
#4, 4.75mm	88
#8, 2.36mm	77
#10, 2.00mm	74
#16, 1.18mm	63
#30, 0.60mm	48
#40, .425mm	42
#50, .300mm	37
#100, .150mm	29
#200, .075mm	21

Atterberg Limits

LL:	NV
PI:	NP
USCS:	SM
AASHTO:	A-1-b(0)

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43649
Material:	Native Soil	**Sample Date:**	01/08/21
Sample Source:	TP-09 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	100
3/4 in / 19 mm	97
1/2 in / 12.5 mm	94
3/8 in / 9.5 mm	93
1/4 in / 6.4 mm	90
#4, 4.75mm	88
#8, 2.36mm	80
#10, 2.00mm	77
#16, 1.18mm	71
#30, 0.60mm	62
#40, .425mm	59
#50, .300mm	55
#100, .150mm	48
#200, .075mm	39

Atterberg Limits

LL:	33
PL:	27
PI:	6
USCS:	SM
AASHTO:	A-4(0)

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43650
Material:	Native Soil	**Sample Date:**	01/08/21
Sample Source:	TP-11 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	99
1 in / 25 mm	98
3/4 in / 19 mm	95
1/2 in / 12.5 mm	91
3/8 in / 9.5 mm	89
1/4 in / 6.4 mm	86
#4, 4.75mm	83
#8, 2.36mm	72
#10, 2.00mm	62
#16, 1.18mm	58
#30, 0.60mm	55
#40, .425mm	52
#50, .300mm	48
#100, .150mm	40
#200, .075mm	30

Atterberg Limits

LL:	NV
PI:	NP
EI:	4
USCS:	SM
AASHTO:	A-2-4(0)

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43651
Material:	Native Soil	**Sample Date:**	01/08/21
Sample Source:	TP-13 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	96
3/4 in / 19 mm	95
1/2 in / 12.5 mm	87
3/8 in / 9.5 mm	82
1/4 in / 6.4 mm	73
#4, 4.75mm	67
#8, 2.36mm	50
#10, 2.00mm	46
#16, 1.18mm	34
#30, 0.60mm	21
#40, .425mm	17
#50, .300mm	13
#100, .150mm	8
#200, .075mm	5.9

Atterberg Limits

LL:	NV
PI:	NP
USCS:	SP-SM
AASHTO:	A-1-a(1)

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43652
Material:	Native Soil	**Sample Date:**	01/08/21
Sample Source:	TP-15 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	98
3/4 in / 19 mm	97
1/2 in / 12.5 mm	95
3/8 in / 9.5 mm	94
1/4 in / 6.4 mm	91
#4, 4.75mm	89
#8, 2.36mm	83
#10, 2.00mm	81
#16, 1.18mm	72
#30, 0.60mm	59
#40, .425mm	52
#50, .300mm	45
#100, .150mm	33
#200, .075mm	22

Atterberg Limits

LL:	NV
PI:	NP
USCS:	SM
AASHTO:	A-2-4(0)

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43653
Material:	Native Soil	**Sample Date:**	01/14/21
Sample Source:	TP-16 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	99
1 in / 25 mm	98
3/4 in / 19 mm	97
1/2 in / 12.5 mm	95
3/8 in / 9.5 mm	93
1/4 in / 6.4 mm	91
#4, 4.75mm	88
#8, 2.36mm	83
#10, 2.00mm	80
#16, 1.18mm	74
#30, 0.60mm	65
#40, .425mm	61
#50, .300mm	58
#100, .150mm	52
#200, .075mm	41

Atterberg Limits

LL:	37
PL:	23
PI:	14
EI:	10
USCS:	SC
AASHTO:	A-6(2)

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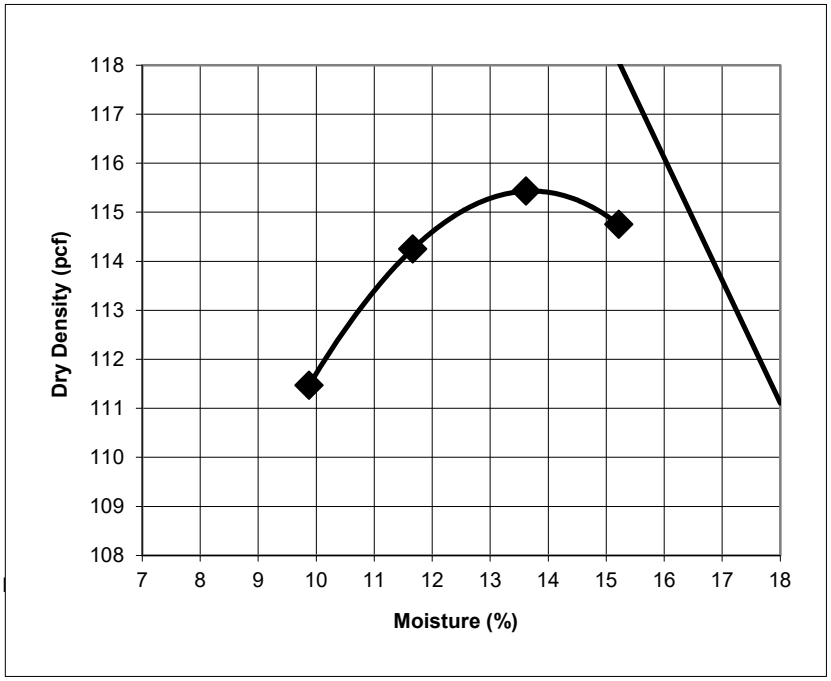
Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43654
Material:	Native Soil	**Sample Date:**	01/14/21
Sample Source:	TP-18 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Laboratory Compaction Characteristics of Soils Using
Standard Efforts (12,400ft-lb-ft/cu.ft) (ASTMD698A)
Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

	English (pcf)	Metric (kg/cu.m)
Maximum Dry Density:	115.4	1849
Optimum Moisture (%):	13.7	13.7



Sieve Size	Percent Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	100
1 in / 25 mm	99
3/4 in / 19 mm	97
1/2 in / 12.5 mm	93
3/8 in / 9.5 mm	89
1/4 in / 6.4 mm	82
#4, 4.75mm	78
#8, 2.36mm	66
#10, 2.00mm	63
#16, 1.18mm	55
#30, 0.60mm	47
#40, .425mm	44
#50, .300mm	42
#100, .150mm	37
#200, .075mm	30

LL:	42
PI:	17
EI:	5
USCS:	SC
AASHTO:	A-2-7(0)

Notes:

- The Zero Air Void Curve Represents a Specific Gravity of 2.65 assumed for the -#4 Material.
- This is a Summarized Report of the Referenced Procedures and Does Not Include All Reporting Requirements. Additional Data Can be Provided at Clients Request.

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Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43655
Material:	Native Soil	**Sample Date:**	01/14/21
Sample Source:	TP-24 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)
Expansion Index of Soils (ASTM D 4829)

Mechanical Analysis

Sieve Size	% Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	100
1 1/4 in / 32 mm	99
1 in / 25 mm	97
3/4 in / 19 mm	95
1/2 in / 12.5 mm	92
3/8 in / 9.5 mm	90
1/4 in / 6.4 mm	86
#4, 4.75mm	84
#8, 2.36mm	70
#10, 2.00mm	67
#16, 1.18mm	55
#30, 0.60mm	39
#40, .425mm	32
#50, .300mm	26
#100, .150mm	20
#200, .075mm	14

Atterberg Limits

LL:	35
PL:	22
PI:	13
EI:	0
USCS:	SC
AASHTO:	A-2-6(0)

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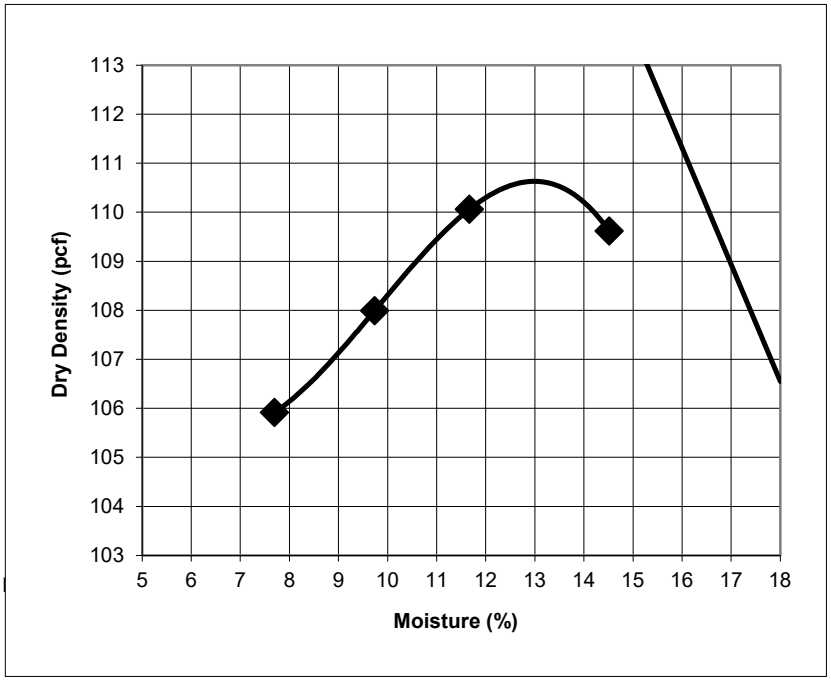
Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43656
Material:	Native Soil	**Sample Date:**	01/14/21
Sample Source:	TP-26 @ 0' - 5'	**Sampled by:**	AA
Proposed Use:	Pads		

Laboratory Compaction Characteristics of Soils Using
Standard Efforts (12,400ft-lb-ft/cu.ft) (ASTMD698A)
Sieve Analysis of Fine and Coarse Aggregates (ASTM C136/C117)
Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318) (Dry Prep)

	English (pcf)	Metric (kg/cu.m)
Maximum Dry Density:	110.6	1772
Optimum Moisture (%):	13.0	13.0



Sieve Size	Percent Passing
6 in / 152mm	100
4 in / 100mm	100
3 in / 75mm	100
2 in / 50mm	100
1 1/2 in / 37.5mm	98
1 1/4 in / 32 mm	98
1 in / 25 mm	96
3/4 in / 19 mm	93
1/2 in / 12.5 mm	89
3/8 in / 9.5 mm	86
1/4 in / 6.4 mm	80
#4, 4.75mm	77
#8, 2.36mm	68
#10, 2.00mm	66
#16, 1.18mm	57
#30, 0.60mm	44
#40, .425mm	39
#50, .300mm	34
#100, .150mm	27
#200, .075mm	20

LL:	NV
PI:	NP
USCS:	SM
AASHTO:	A-1-b(0)

Notes:

- The Zero Air Void Curve Represents a Specific Gravity of 2.5 assumed for the -#4 Material.
- This is a Summarized Report of the Referenced Procedures and Does Not Include All Reporting Requirements. Additional Data Can be Provided at Clients Request.

Reviewed by: JV

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Project:	Village 2 Community Core	**Project Number:**	20-G-11044
Project Location:	Sun Valley Parkway and Cactus Road		
Client:	TW Purchase LLC and JF Purchase, LLC	**Sample Number:**	See Below
Material:	Native	**Date Sampled:**	1/11/21
Sample Source:	See Below		

Density of Soil in Place by the Drive-Cylinder Method (ASTM D2937)

Sample Number	Boring	Moisture: Wet Wt. (g)	Moisture: Dry Wt. (g)	**Moist. Content**	# Of Rings	Wet Wt.+ Rings (g)	Wt.of Rings (g)	**Dry Density (pcf)**
43657	**Boring B-09 @ 2.5'-3.5'**	711.0	662.1	**7.4%**	5	932.8	221.8	**109.6**
43658	**Boring B-13 @ 2.5'-3.5'**	658.1	619.0	**6.3%**	5	878.2	220.1	**102.5**
43659	**Boring B-19 @ 2.5'-3.5'**	735.4	709.3	**3.7%**	5	963.0	227.6	**117.5**
43661	**Boring B-26 @ 2.5'-3.5'**	712.3	685.9	**3.8%**	5	938.0	225.7	**113.6**
43662	**Boring B-31 @ 2.5'-3.5'**	692.3	669.9	**3.3%**	5	915.3	223.0	**110.9**
43664	**Boring B-35 @ 2.5'-3.5'**	738.9	723.9	**2.1%**	5	958.4	219.5	**119.9**

Reviewed by: **JV**

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Project:	Village 2 Community Core	**Project Number:**	20-G-11044
Project Location:	Sun Valley Parkway and Cactus Road		
Client:	TW Purchase LLC and JF Purchase, LLC	**Sample Number:**	See Below
Material:	Native	**Date Sampled:**	1/11/21
Sample Source:	See Below		

Density of Soil in Place by the Drive-Cylinder Method (ASTM D2937)

Sample Number	Boring	Moisture: Wet Wt. (g)	Moisture: Dry Wt. (g)	**Moist. Content**	# Of Rings	Wet Wt.+ Rings (g)	Wt.of Rings (g)	**Dry Density (pcf)**
43660	**Boring B-21 @ 2.5'-3.5'**	783.7	759.3	**3.2%**	6	1048.8	265.1	**104.8**
43663	**Boring B-34 @ 2.5'-3.5'**	830.8	813.3	**2.2%**	6	1100.7	269.9	**112.2**
43665	**Boring B-38 @ 2.5'-3.5'**	671.2	655.1	**2.5%**	5	895.4	224.2	**108.5**
43666	**Boring B-42 @ 2.5'-3.5'**	677.2	650.6	**4.1%**	5	903.3	226.1	**107.7**

Reviewed by: **JV**

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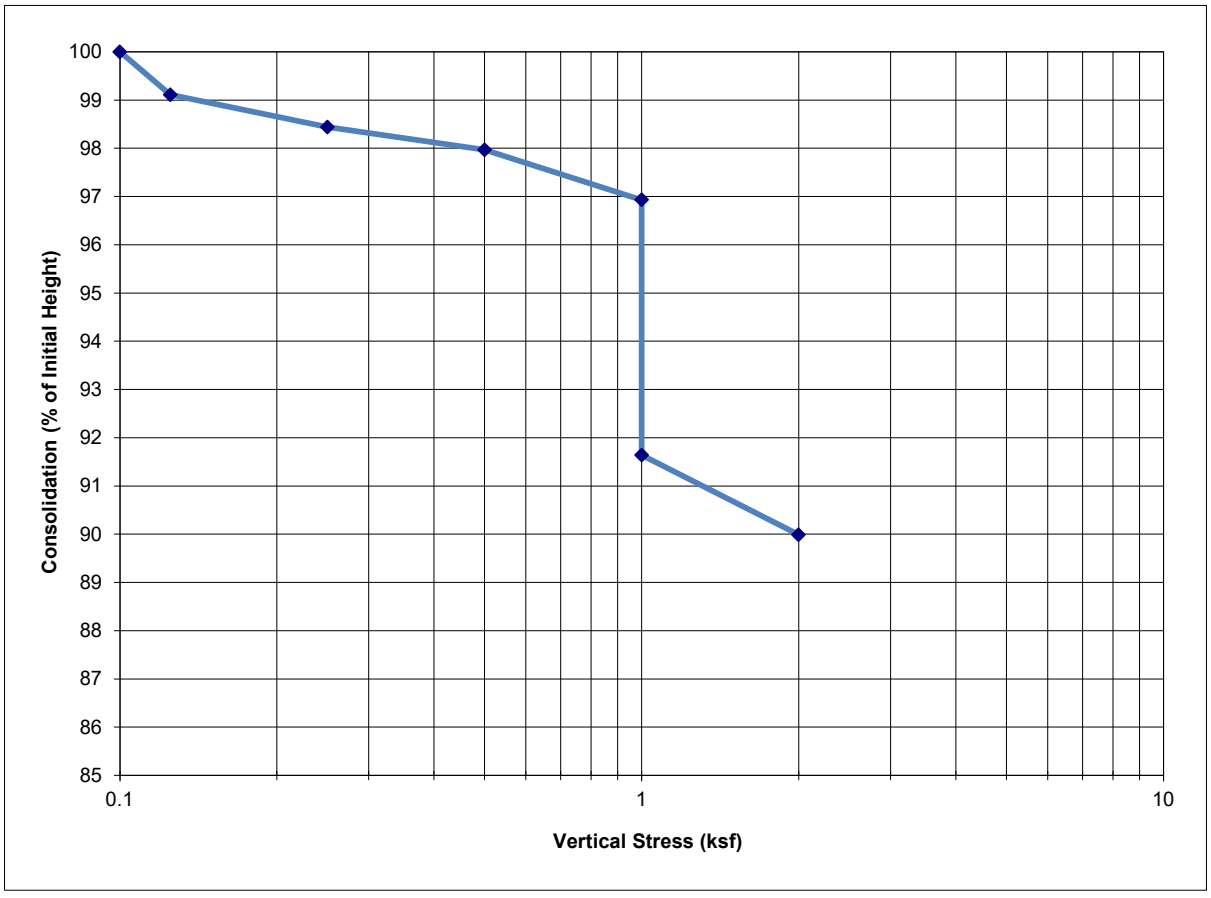
Project:	Village 2 Community Core	**Project Number:**	20-G-11044
Project Location:	Sun Valley Parkway and Cactus Road		
Client:	TW Purchase LLC and JF Purchase, LLC	**Sample Number:**	43657
Material:	Native	**Date Sampled:**	01/11/21
Sample Source:	Boring B-09 @ 2.5'-3.5'		
Sample Prep:	Insitu		

One-Dimensional Consolidation Properties of Soils (ASTM D2435)

Initial Volume (cu.in)	4.60	Final Volume (cu.in)	4.14
Initial Moisture Content	6.6%	Final Moisture Content	19.3%
Initial Dry Density(pcf)	95.8	FInal Dry Density(pcf)	106.4
Initial Degree of Saturation	24%	FInal Degree of Saturation	93%
Initial Void Ratio	0.7	Final Void Ratio	0.6
Estimated Specific Gravity	2.65	Saturated at	1 ksf



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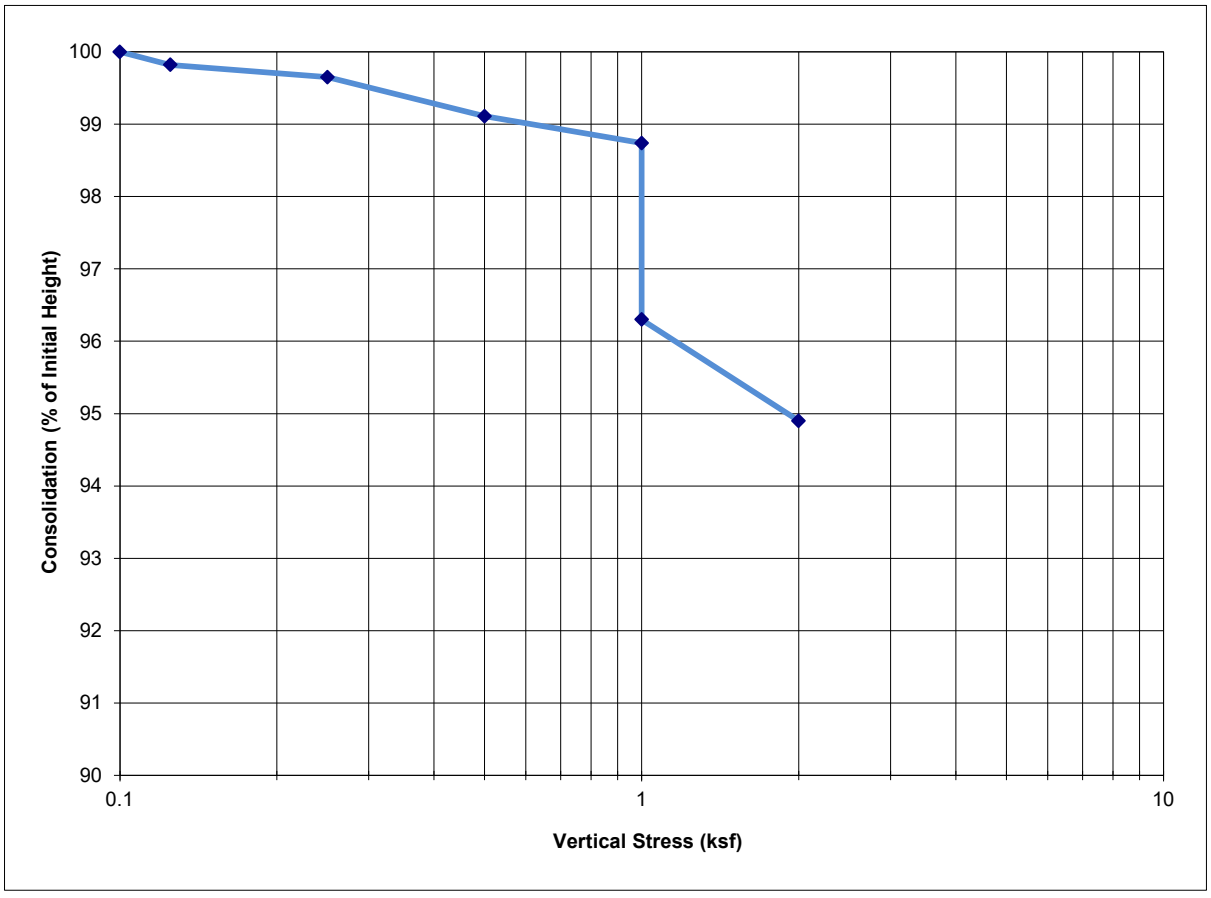
Project:	Village 2 Community Core	**Project Number:**	20-G-11044
Project Location:	Sun Valley Parkway and Cactus Road		
Client:	TW Purchase LLC and JF Purchase, LLC	**Sample Number:**	43659
Material:	Native	**Date Sampled:**	01/12/21
Sample Source:	Boring B-19 @ 2.5'-3.5'		
Sample Prep:	Insitu		

One-Dimensional Consolidation Properties of Soils (ASTM D2435)

Initial Volume (cu.in)	4.60	Final Volume (cu.in)	4.37
Initial Moisture Content	4.4%	Final Moisture Content	18.7%
Initial Dry Density(pcf)	106.0	FInal Dry Density(pcf)	111.6
Initial Degree of Saturation	21%	FInal Degree of Saturation	103%
Initial Void Ratio	0.6	Final Void Ratio	0.5
Estimated Specific Gravity	2.65	Saturated at	1 ksf



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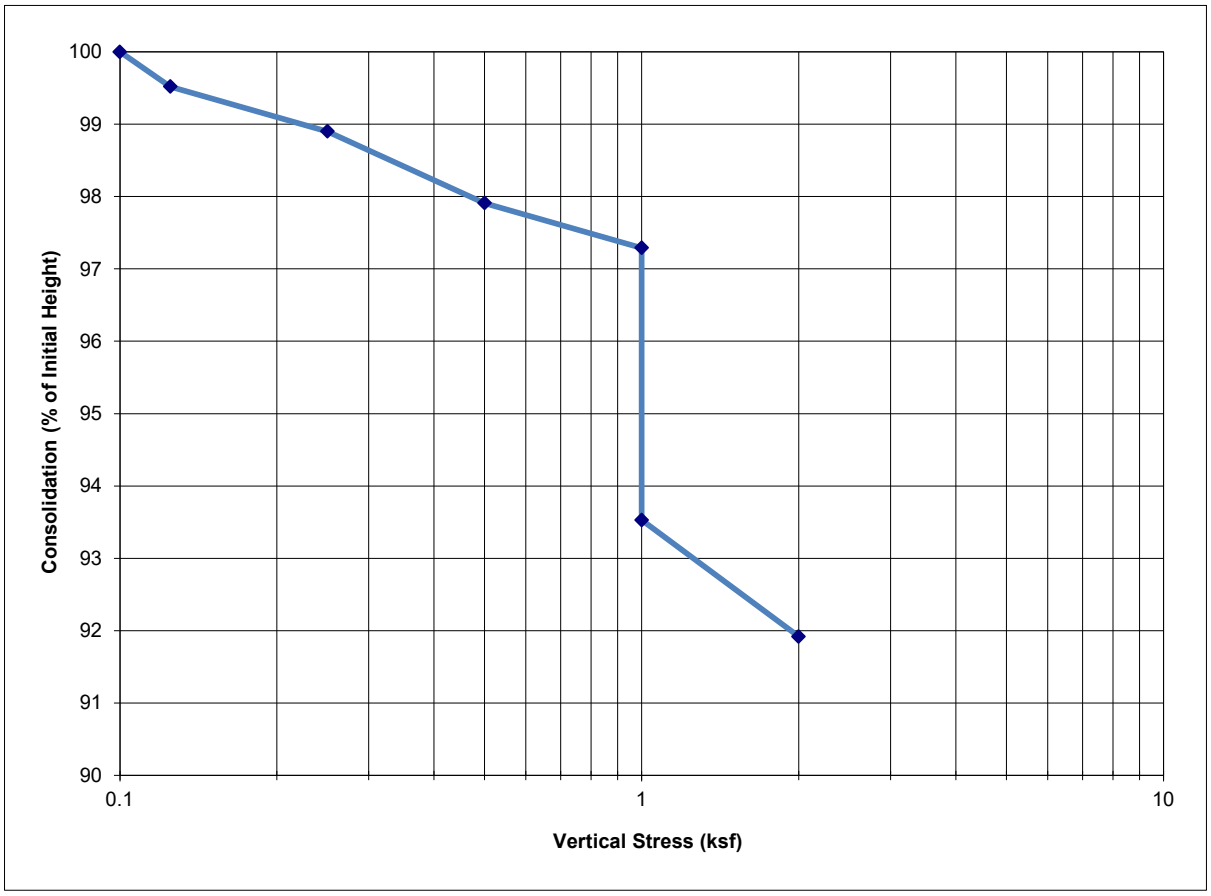
Project:	Village 2 Community Core	**Project Number:**	20-G-11044
Project Location:	Sun Valley Parkway and Cactus Road		
Client:	TW Purchase LLC and JF Purchase, LLC	**Sample Number:**	43661
Material:	Native	**Date Sampled:**	01/12/21
Sample Source:	Boring B-26 @ 2.5'-3.5'		
Sample Prep:	Insitu		

One-Dimensional Consolidation Properties of Soils (ASTM D2435)

Initial Volume (cu.in)	4.60	Final Volume (cu.in)	4.23
Initial Moisture Content	3.9%	Final Moisture Content	17.4%
Initial Dry Density(pcf)	104.4	FInal Dry Density(pcf)	113.5
Initial Degree of Saturation	18%	FInal Degree of Saturation	101%
Initial Void Ratio	0.6	Final Void Ratio	0.5
Estimated Specific Gravity	2.65	Saturated at	1 ksf



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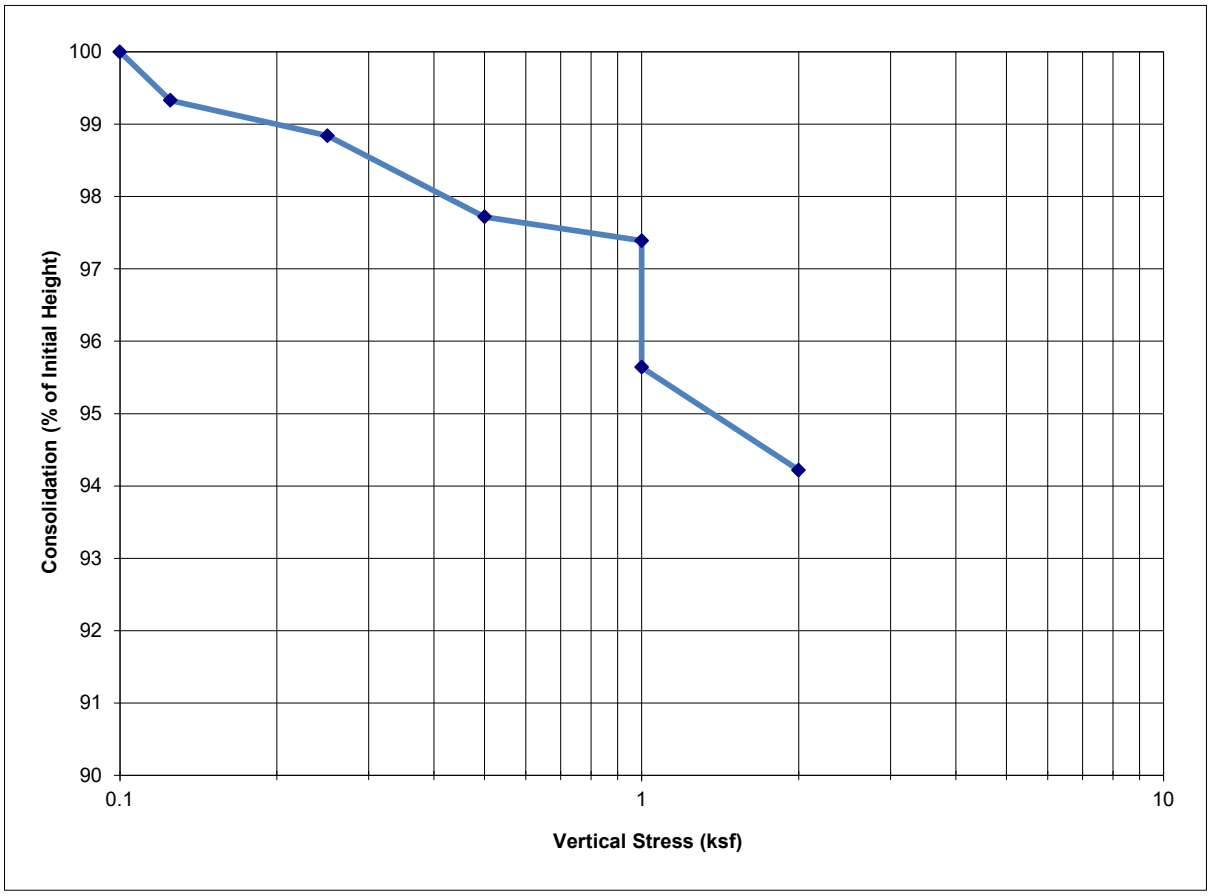
Project:	Village 2 Community Core	**Project Number:**	20-G-11044
Project Location:	Sun Valley Parkway and Cactus Road		
Client:	TW Purchase LLC and JF Purchase, LLC	**Sample Number:**	43662
Material:	Native	**Date Sampled:**	01/12/21
Sample Source:	Boring B-31 @ 2.5'-3.5'		
Sample Prep:	Insitu		

One-Dimensional Consolidation Properties of Soils (ASTM D2435)

Initial Volume (cu.in)	4.60	Final Volume (cu.in)	4.34
Initial Moisture Content	6.0%	Final Moisture Content	25.7%
Initial Dry Density(pcf)	99.3	FInal Dry Density(pcf)	105.3
Initial Degree of Saturation	24%	FInal Degree of Saturation	119%
Initial Void Ratio	0.7	Final Void Ratio	0.6
Estimated Specific Gravity	2.65	Saturated at	1 ksf



Reviewed by: JV

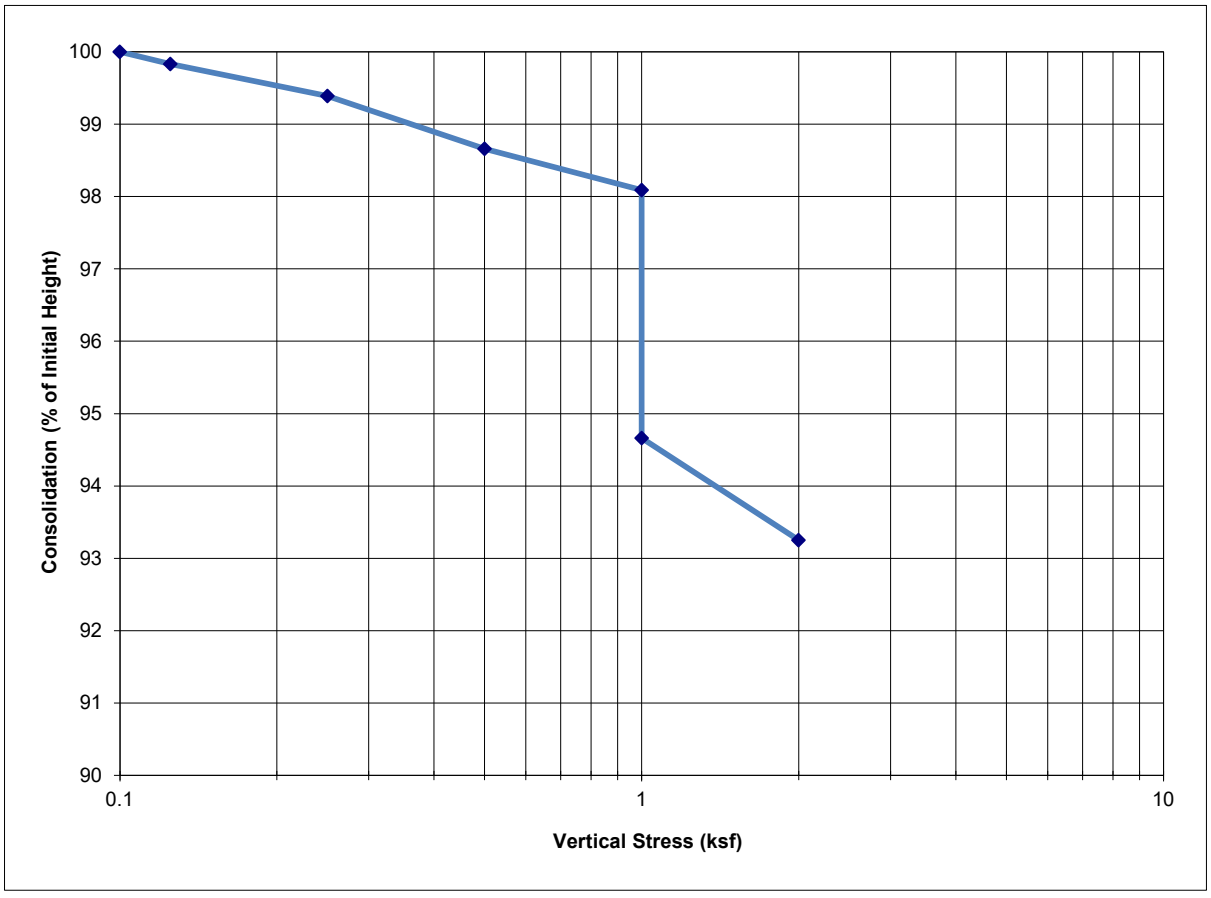
Alpha Geotechnical and Materials, Inc.
2504 West Southern Avenue
Tempe, Arizona 85282

Alpha Geotechnical & Materials, Inc.

Project:	Village 2 Community Core	**Project Number:**	20-G-11044
Project Location:	Sun Valley Parkway and Cactus Road		
Client:	TW Purchase LLC and JF Purchase, LLC	**Sample Number:**	43664
Material:	Native	**Date Sampled:**	01/13/21
Sample Source:	Boring B-35 @ 2.5'-3.5'		
Sample Prep:	Insitu		

One-Dimensional Consolidation Properties of Soils (ASTM D2435)

Initial Volume (cu.in)	4.60	Final Volume (cu.in)	4.29
Initial Moisture Content	2.9%	Final Moisture Content	17.2%
Initial Dry Density(pcf)	101.3	FInal Dry Density(pcf)	108.6
Initial Degree of Saturation	12%	FInal Degree of Saturation	87%
Initial Void Ratio	0.6	Final Void Ratio	0.5
Estimated Specific Gravity	2.65	Saturated at	1 ksf



Reviewed by: JV

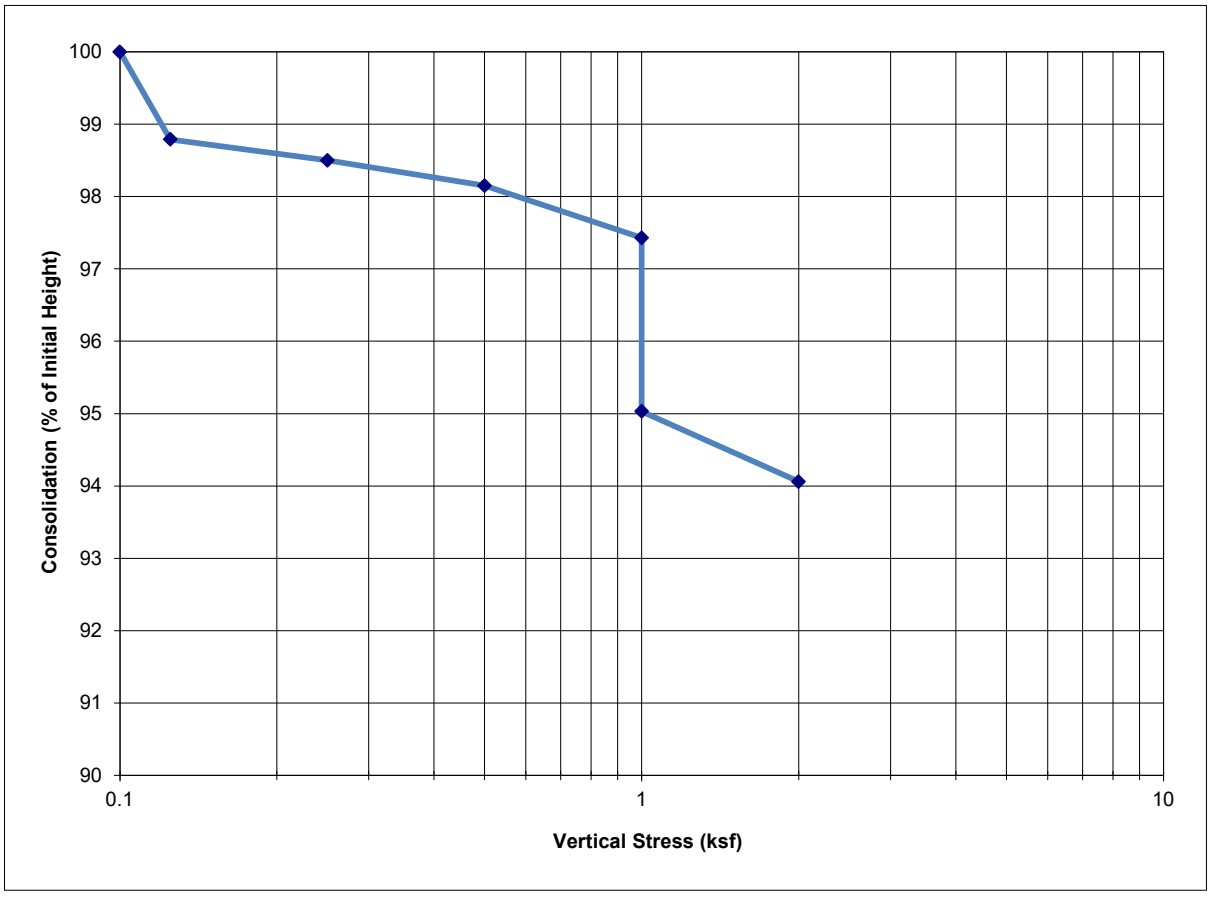
Alpha Geotechnical and Materials, Inc.
2504 West Southern Avenue
Tempe, Arizona 85282

Alpha Geotechnical & Materials, Inc.

Project:	Village 2 Community Core	**Project Number:**	20-G-11044
Project Location:	Sun Valley Parkway and Cactus Road		
Client:	TW Purchase LLC and JF Purchase, LLC	**Sample Number:**	43665
Material:	Native	**Date Sampled:**	01/13/21
Sample Source:	Boring B-38 @ 2.5'-3.5'		
Sample Prep:	Insitu		

One-Dimensional Consolidation Properties of Soils (ASTM D2435)

Initial Volume (cu.in)	4.60	Final Volume (cu.in)	4.33
Initial Moisture Content	2.3%	Final Moisture Content	14.6%
Initial Dry Density(pcf)	107.4	FInal Dry Density(pcf)	114.1
Initial Degree of Saturation	11%	FInal Degree of Saturation	86%
Initial Void Ratio	0.5	Final Void Ratio	0.4
Estimated Specific Gravity	2.65	Saturated at	1 ksf



Reviewed by: JV

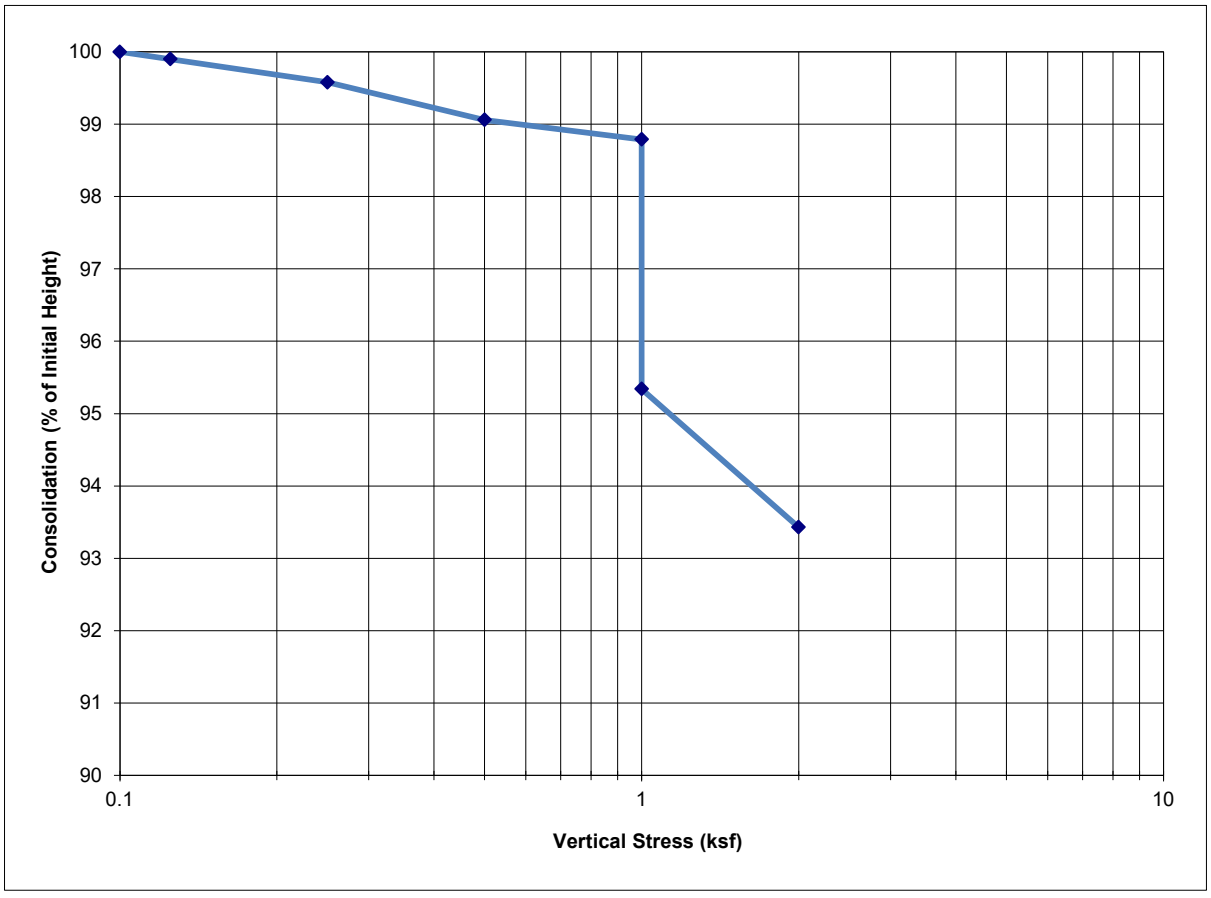
Alpha Geotechnical and Materials, Inc.
2504 West Southern Avenue
Tempe, Arizona 85282

Alpha Geotechnical & Materials, Inc.

Project:	Village 2 Community Core	**Project Number:**	20-G-11044
Project Location:	Sun Valley Parkway and Cactus Road		
Client:	TW Purchase LLC and JF Purchase, LLC	**Sample Number:**	43666
Material:	Native	**Date Sampled:**	01/13/21
Sample Source:	Boring B-42 @ 2.5'-3.5'		
Sample Prep:	Insitu		

One-Dimensional Consolidation Properties of Soils (ASTM D2435)

Initial Volume (cu.in)	4.60	Final Volume (cu.in)	4.30
Initial Moisture Content	3.9%	Final Moisture Content	17.6%
Initial Dry Density(pcf)	105.9	FInal Dry Density(pcf)	113.3
Initial Degree of Saturation	18%	FInal Degree of Saturation	101%
Initial Void Ratio	0.6	Final Void Ratio	0.5
Estimated Specific Gravity	2.65	Saturated at	1 ksf



Reviewed by: JV

Alpha Geotechnical and Materials, Inc.
2504 West Southern Avenue
Tempe, Arizona 85282

Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43630
Material:	Native Soil	**Sample Date:**	1/11/2021
Sample Source:	B-07 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

pH & Resistivity (AZ 236)

Resistivity (Ohm-cm)	pH
682	8.21

Reviewed by: JV

Alpha Geotechnical and Materials, Inc.
2504 West Southern Avenue
Tempe, Arizona 85282

Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43636
Material:	Native Soil	**Sample Date:**	1/12/2021
Sample Source:	B-21 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

pH & Resistivity (AZ 236)

Resistivity (Ohm-cm)	pH
1500	8.6

Reviewed by: JV

Alpha Geotechnical and Materials, Inc.
2504 West Southern Avenue
Tempe, Arizona 85282

Alpha Geotechnical & Materials, Inc.

Project:	Trillium at Douglas Ranch Phase 1 Village 3	**Project Number:**	20-G-11044
Location:	Sun Valley Parkway and Cactus Road	**Sample Number:**	43643
Material:	Native Soil	**Sample Date:**	1/13/2021
Sample Source:	B-42 @ 0' - 4.5'	**Sampled by:**	AA
Proposed Use:	Pads		

pH & Resistivity (AZ 236)

Resistivity (Ohm-cm)	pH
1295	8.58

Reviewed by: JV

Alpha Geotechnical and Materials, Inc.
2504 West Southern Avenue
Tempe, Arizona 85282

MOTZZ LABORATORY, INC.

Laboratory Analysis Report

Alpha Geotechnical and Materials
Juan Valenciano
2504 W. Southern Ave
Tempe, AZ 85282

Project: 20-G-11044
Date Received: 1/19/2021
Date Reported: 1/21/2021

PO Number: 20-G-11044

Lab Number: 935266-1 43627 B-01 (0'-4.5')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	< 3	ppm	
Chloride	ARIZ 736b	101	ppm	

Lab Number: 935266-2 43629 B-03 (0'-4.5')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	< 3	ppm	
Chloride	ARIZ 736b	114	ppm	

Lab Number: 935266-3 43630 B-07 (0'-4.5')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	183	ppm	
Chloride	ARIZ 736b	253	ppm	

Lab Number: 935266-4 43631 B-09 (0'-4.5')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	860	ppm	
Chloride	ARIZ 736b	340	ppm	

Lab Number: 935266-5 43632 B-11 (0'-4.5')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	942	ppm	
Chloride	ARIZ 736b	809	ppm	

Lab Number: 935266-6 43633 B-13 (0'-4.5')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	208	ppm	
Chloride	ARIZ 736b	300	ppm	

MOTZZ LABORATORY, INC.

Laboratory Analysis Report

Alpha Geotechnical and Materials
Juan Valenciano
2504 W. Southern Ave
Tempe, AZ 85282

Project: 20-G-11044
Date Received: 1/19/2021
Date Reported: 1/21/2021
PO Number: 20-G-11044

Lab Number: 935266-7 43634 B-16 (0'-4.5')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	5	ppm	
Chloride	ARIZ 736b	203	ppm	

Lab Number: 935266-8 43636 B-21 (0'-4.5')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	9	ppm	
Chloride	ARIZ 736b	304	ppm	

Lab Number: 935266-9 43637 B-24 (0'-4.5')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	287	ppm	
Chloride	ARIZ 736b	164	ppm	

Lab Number: 935266-10 43638 B-26 (0'-4.5')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	549	ppm	
Chloride	ARIZ 736b	893	ppm	

Lab Number: 935266-11 43643 B-42 (0'-4.5')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	223	ppm	
Chloride	ARIZ 736b	185	ppm	

Lab Number: 935266-12 43650 TP-11 (0'-5.0)

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	4	ppm	
Chloride	ARIZ 736b	43	ppm	

MOTZZ LABORATORY, INC.

Laboratory Analysis Report

Alpha Geotechnical and Materials
Juan Valenciano
2504 W. Southern Ave
Tempe, AZ 85282

Project: 20-G-11044
Date Received: 1/19/2021
Date Reported: 1/21/2021
PO Number: 20-G-11044

Lab Number: 935266-13 43653 TP-16 (0'-5.0')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	548	ppm	
Chloride	ARIZ 736b	357	ppm	

Lab Number: 935266-14 43654 TP-18 (0'-5.0')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	424	ppm	
Chloride	ARIZ 736b	573	ppm	

Lab Number: 935266-15 43655 TP-24 (0'-5.0')

Test Parameter	Method	Result	Units	Levels
Sulfate	ARIZ 733b	5	ppm	
Chloride	ARIZ 736b	118	ppm	

APPENDIX C
Pavement Design

Calculate Equivalent Single Axle Loads (ESALs)

Average Daily Traffic based on Traffic Counts	ADT =	1,000
Traffic Count Year	Year =	2021
First Design Year	Year =	2021
Estimated Average Daily Traffic in first design year (two-way)	ADT =	1,000
Percent Trucks ≥ Class 4 [Load Equivalent Factor = 1.2]	% Heavy Trucks =	2%
Cars [Load Equivalent Factor = 0.0008]	% Cars =	98%
Initial two-way daily 18-kip ESALs	$W_{0(2\text{-}18)}$ =	25

Annual growth rate as a percent	g =	0%
Number of years in analysis period	n =	20
Overall Growth Factor	OGF =	20.19
Two way 18-kip ESALs for the analysis period	$W_{2\text{-}18}$ =	182,652

Number of Lanes	# =	2
Directional distribution factor	D_D =	50%
Lane distribution factor	D_L =	0.90
Cumulative 18-kip ESALs for design lane	**W_{18} =**	**82,194**

Design Year	Start Year	End Year	Annual ESALs	Cumulative ESALs
1	2021	2022	4,071	4,071
2	2022	2023	4,075	8,146
3	2023	2024	4,079	12,225
4	2024	2025	4,083	16,308
5	2025	2026	4,087	20,395
6	2026	2027	4,091	24,486
7	2027	2028	4,095	28,581
8	2028	2029	4,099	32,680
9	2029	2030	4,103	36,784
10	2030	2031	4,108	40,891
11	2031	2032	4,112	45,003
12	2032	2033	4,116	49,119
13	2033	2034	4,120	53,239
14	2034	2035	4,124	57,363
15	2035	2036	4,128	61,491
16	2036	2037	4,132	65,623
17	2037	2038	4,136	69,760
18	2038	2039	4,141	73,900
19	2039	2040	4,145	78,045
20	2040	2041	4,149	82,194

Pavement Design (Maricopa County Department of Transportaion - Chapter 10)

Roadway Functional Classification | Residential (Local)

Effective Roadbed Soil Resilient Modulus (Subgrade Support)

R-Test Values

Correlated R-Values

Plasticity Index	% Passing No. 200	Correlated R-Value	Plasticity Index	% Passing No. 200	Correlated R-Value
16	31	28	9	37	40
9	38	40	0	16	94
11	40	34	0	10	102
11	43	33	0	14	97
10	23	45	0	8	105
9	18	51	0	14	97
9	20	50	0	23	86
0	14	97	0	17	93
12	41	32	0	12	99
10	23	45	3	33	62

Total R-Value Tests	0	Total Correlated R- Value Tests	30	Mean R-Value	43
Mean of R-value tests		Mean of Correlated R-Value tests	43	Design R-Value	26
Std. Dev of R Value Tests		Std. Dev of correlated R-Value Tests	28.19	Seasonal Variation Factor	1.00

Calculated Resilient Modulus (M_R)	15,479	pounds per square inch (psi)
Design Resilient Modulus	15,479	psi **[Maximum M_R 26,000 psi]**

Reliability

Level of Reliability	80%
Standard Normal Random Variable (Z_R)	-0.841
Overall Standard Deviation (S_0)	0.45

Performance Criteria (Serviceability)

Initial Serviceability (P_0)	4.2
Terminal Serviceabilty (P_t)	2
Change in Serviceability (ΔPSI)	2.2

Traffic Loading

Equivalent Single Axle Loads (from ESAL calculation)	82,194

Performance Criteria (Serviceability)

Strucutral Number (SN)	**1.58**

Roadway Section

	Coefficients			
Material Type	**Material**	**Drainage**	**Thickness**	**Structural Number**
Asphalt Rubber AC	0.42	1.00		
Asphalt Concrete (AC)	0.42	1.00	2	0.84
Cement Treated Base (CTB)	0.28	1.00		
Aggregate Base (AB)	0.12	1.00	7	0.84
MAG Select	0.11	1.00		
Stabilized Subgrade**	0.16	1.00		
			Design Structural Number	**1.68**
			Required Structural Number	**1.58**

**The coefficient for stabilized subgrade is to be determined using a non-soaked 7-day compressive strength, using ASTM D1633 Method A, and the following formula: ai = 0.15+0.0001*(CSCLS).
CSCLS = Compressive strength of cement or lime stabilized subgrade (psi).

Calculate Equivalent Single Axle Loads (ESALs)

Average Daily Traffic based on Traffic Counts	ADT =	2,500
Traffic Count Year	Year =	2021
First Design Year	Year =	2021
Estimated Average Daily Traffic in first design year (two-way)	ADT =	2,500
Percent Trucks ≥ Class 4 [Load Equivalent Factor = 1.2]	% Heavy Trucks =	2%
Cars [Load Equivalent Factor = 0.0008]	% Cars =	99%
Initial two-way daily 18-kip ESALs	$W_{0(2\text{-}18)}$ =	47

Annual growth rate as a percent	g =	0%
Number of years in analysis period	n =	20
Overall Growth Factor	OGF =	20.19
Two way 18-kip ESALs for the analysis period	$W_{2\text{-}18}$ =	346,158

Number of Lanes	# =	2
Directional distribution factor	D_D =	50%
Lane distribution factor	D_L =	0.90
Cumulative 18-kip ESALs for design lane	**W_{18} =**	**155,771**

Design Year	Start Year	End Year	Annual ESALs	Cumulative ESALs
1	2021	2022	7,715	7,715
2	2022	2023	7,723	15,437
3	2023	2024	7,730	23,168
4	2024	2025	7,738	30,906
5	2025	2026	7,746	38,651
6	2026	2027	7,753	46,405
7	2027	2028	7,761	54,166
8	2028	2029	7,769	61,935
9	2029	2030	7,777	69,712
10	2030	2031	7,785	77,496
11	2031	2032	7,792	85,289
12	2032	2033	7,800	93,089
13	2033	2034	7,808	100,897
14	2034	2035	7,816	108,712
15	2035	2036	7,824	116,536
16	2036	2037	7,831	124,367
17	2037	2038	7,839	132,206
18	2038	2039	7,847	140,053
19	2039	2040	7,855	147,908
20	2040	2041	7,863	155,771

Pavement Design (Maricopa County Department of Transportaion - Chapter 10)

Roadway Functional Classification | Collectors

Effective Roadbed Soil Resilient Modulus (Subgrade Support)

R-Test Values

Correlated R-Values

Plasticity Index	% Passing No. 200	Correlated R-Value	Plasticity Index	% Passing No. 200	Correlated R-Value
16	31	28	9	37	40
9	38	40	0	16	94
11	40	34	0	10	102
11	43	33	0	14	97
10	23	45	0	8	105
9	18	51	0	14	97
9	20	50	0	23	86
0	14	97	0	17	93
12	41	32	0	12	99
10	23	45	3	33	62

Total R-Value Tests	0	Total Correlated R- Value Tests	30	Mean R-Value	43
Mean of R-value tests		Mean of Correlated R-Value tests	43	Design R-Value	26
Std. Dev of R Value Tests		Std. Dev of correlated R-Value Tests	28.19	Seasonal Variation Factor	1.00

Calculated Resilient Modulus (M_R)	15,479	pounds per square inch (psi)
Design Resilient Modulus	15,479	psi **[Maximum M_R 26,000 psi]**

Reliability

Level of Reliability	90%
Standard Normal Random Variable (Z_R)	-1.282
Overall Standard Deviation (S_0)	0.45

Performance Criteria (Serviceability)

Initial Serviceability (P_0)	4.4
Terminal Serviceabilty (P_t)	2.3
Change in Serviceability (ΔPSI)	2.1

Traffic Loading

Equivalent Single Axle Loads (from ESAL calculation)	155,771

Performance Criteria (Serviceability)

Strucutral Number (SN)	**1.91**

Roadway Section

	Coefficients			
Material Type	**Material**	**Drainage**	**Thickness**	**Structural Number**
Asphalt Rubber AC	0.42	1.00		
Asphalt Concrete (AC)	0.42	1.00	3	1.26
Cement Treated Base (CTB)	0.28	1.00		
Aggregate Base (AB)	0.12	1.00	6	0.72
MAG Select	0.11	1.00		
Stabilized Subgrade**	0.16	1.00		
			Design Structural Number	**1.98**
			Required Structural Number	**1.91**

**The coefficient for stabilized subgrade is to be determined using a non-soaked 7-day compressive strength, using ASTM D1633 Method A, and the following formula: ai = 0.15+0.0001*(CSCLS).
CSCLS = Compressive strength of cement or lime stabilized subgrade (psi).

Calculate Equivalent Single Axle Loads (ESALs)

Average Daily Traffic based on Traffic Counts	ADT =	7,500
Traffic Count Year	Year =	2019
First Design Year	Year =	2022
Estimated Average Daily Traffic in first design year (two-way)	ADT =	7,959
Percent Trucks ≥ Class 4 [Load Equivalent Factor = 1.2]	% Heavy Trucks =	3%
Cars [Load Equivalent Factor = 0.0008]	% Cars =	97%
Initial two-way daily 18-kip ESALs	$W_{0(2\text{-}18)}$ =	293

Annual growth rate as a percent	g =	2%
Number of years in analysis period	n =	20
Overall Growth Factor	OGF =	24.30
Two way 18-kip ESALs for the analysis period	$W_{2\text{-}18}$ =	2,595,843

Number of Lanes	# =	2
Directional distribution factor	D_D =	50%
Lane distribution factor	D_L =	0.90
Cumulative 18-kip ESALs for design lane	**W_{18} =**	**1,168,129**

Design Year	Start Year	End Year	Annual ESALs	Cumulative ESALs
1	2022	2023	48,076	48,076
2	2023	2024	49,038	97,114
3	2024	2025	50,019	147,133
4	2025	2026	51,019	198,152
5	2026	2027	52,039	250,191
6	2027	2028	53,080	303,272
7	2028	2029	54,142	357,413
8	2029	2030	55,225	412,638
9	2030	2031	56,329	468,967
10	2031	2032	57,456	526,423
11	2032	2033	58,605	585,028
12	2033	2034	59,777	644,805
13	2034	2035	60,972	705,777
14	2035	2036	62,192	767,969
15	2036	2037	63,436	831,405
16	2037	2038	64,704	896,109
17	2038	2039	65,999	962,108
18	2039	2040	67,319	1,029,426
19	2040	2041	68,665	1,098,091
20	2041	2042	70,038	1,168,129

Pavement Design (Maricopa County Department of Transportaion - Chapter 10)

Roadway Functional Classification | Arterials & Industrial

Effective Roadbed Soil Resilient Modulus (Subgrade Support)

R-Test Values

Correlated R-Values

Plasticity Index	% Passing No. 200	Correlated R-Value	Plasticity Index	% Passing No. 200	Correlated R-Value
16	31	28	9	37	40
9	38	40	0	16	94
11	40	34	0	10	102
11	43	33	0	14	97
10	23	45	0	8	105
9	18	51	0	14	97
9	20	50	0	23	86
0	14	97	0	17	93
12	41	32	0	12	99
10	23	45	3	33	62

Total R-Value Tests	0	Total Correlated R- Value Tests	30	Mean R-Value	43
Mean of R-value tests		Mean of Correlated R-Value tests	43	Design R-Value	26
Std. Dev of R Value Tests		Std. Dev of correlated R-Value Tests	28.19	Seasonal Variation Factor	1.00

Calculated Resilient Modulus (M_R)	15,479	pounds per square inch (psi)
Design Resilient Modulus	15,479	psi **[Maximum M_R 26,000 psi]**

Reliability

Level of Reliability	95%
Standard Normal Random Variable (Z_R)	-1.645
Overall Standard Deviation (S_0)	0.45

Performance Criteria (Serviceability)

Initial Serviceability (P_0)	4.5
Terminal Serviceabilty (P_t)	2.5
Change in Serviceability (ΔPSI)	2

Traffic Loading

Equivalent Single Axle Loads (from ESAL calculation)	1,168,129

Performance Criteria (Serviceability)

Strucutral Number (SN)	**2.82**

Roadway Section

	Coefficients			
Material Type	**Material**	**Drainage**	**Thickness**	**Structural Number**
Asphalt Rubber AC	0.42	1.00		
Asphalt Concrete (AC)	0.42	1.00	4	1.68
Cement Treated Base (CTB)	0.28	1.00		
Aggregate Base (AB)	0.12	1.00	10	1.2
MAG Select	0.11	1.00		
Stabilized Subgrade**	0.16	1.00		
			Design Structural Number	**2.88**
			Required Structural Number	**2.82**

**The coefficient for stabilized subgrade is to be determined using a non-soaked 7-day compressive strength, using ASTM D1633 Method A, and the following formula: ai = 0.15+0.0001*(CSCLS).
CSCLS = Compressive strength of cement or lime stabilized subgrade (psi).

Calculate Equivalent Single Axle Loads (ESALs)

Average Daily Traffic based on Traffic Counts	ADT =	7,748
Traffic Count Year	Year =	2019
First Design Year	Year =	2022
Estimated Average Daily Traffic in first design year (two-way)	ADT =	8,222
Percent Trucks ≥ Class 4 [Load Equivalent Factor = 1.2]	% Heavy Trucks =	3%
Cars [Load Equivalent Factor = 0.0008]	% Cars =	97%
Initial two-way daily 18-kip ESALs	$W_{0(2\text{-}18)}$ =	302

Annual growth rate as a percent	g =	2%
Number of years in analysis period	n =	20
Overall Growth Factor	OGF =	24.30
Two way 18-kip ESALs for the analysis period	$W_{2\text{-}18}$ =	2,681,679

Number of Lanes	# =	2
Directional distribution factor	D_D =	50%
Lane distribution factor	D_L =	0.90
Cumulative 18-kip ESALs for design lane	**W_{18} =**	**1,206,755**

Design Year	Start Year	End Year	Annual ESALs	Cumulative ESALs
1	2022	2023	49,666	49,666
2	2023	2024	50,659	100,326
3	2024	2025	51,673	151,998
4	2025	2026	52,706	204,704
5	2026	2027	53,760	258,464
6	2027	2028	54,835	313,300
7	2028	2029	55,932	369,232
8	2029	2030	57,051	426,283
9	2030	2031	58,192	484,474
10	2031	2032	59,356	543,830
11	2032	2033	60,543	604,373
12	2033	2034	61,754	666,126
13	2034	2035	62,989	729,115
14	2035	2036	64,248	793,363
15	2036	2037	65,533	858,896
16	2037	2038	66,844	925,740
17	2038	2039	68,181	993,921
18	2039	2040	69,545	1,063,466
19	2040	2041	70,935	1,134,401
20	2041	2042	72,354	1,206,755

Pavement Design (Maricopa County Department of Transportaion - Chapter 10)

Roadway Functional Classification | Highways and Parkways

Effective Roadbed Soil Resilient Modulus (Subgrade Support)

R-Test Values

Correlated R-Values

Plasticity Index	% Passing No. 200	Correlated R-Value	Plasticity Index	% Passing No. 200	Correlated R-Value
16	31	28	9	37	40
9	38	40	0	16	94
11	40	34	0	10	102
11	43	33	0	14	97
10	23	45	0	8	105
9	18	51	0	14	97
9	20	50	0	23	86
0	14	97	0	17	93
12	41	32	0	12	99
10	23	45	3	33	62

Total R-Value Tests	0	Total Correlated R- Value Tests	30	Mean R-Value	43
Mean of R-value tests		Mean of Correlated R-Value tests	43	Design R-Value	26
Std. Dev of R Value Tests		Std. Dev of correlated R-Value Tests	28.19	Seasonal Variation Factor	1.00

Calculated Resilient Modulus (M_R)	15,479	pounds per square inch (psi)
Design Resilient Modulus	15,479	psi **[Maximum M_R 26,000 psi]**

Reliability

Level of Reliability	95%
Standard Normal Random Variable (Z_R)	-1.645
Overall Standard Deviation (S_0)	0.45

Performance Criteria (Serviceability)

Initial Serviceability (P_0)	4.6
Terminal Serviceabilty (P_t)	2.7
Change in Serviceability (ΔPSI)	1.9

Traffic Loading

Equivalent Single Axle Loads (from ESAL calculation)	1,206,755

Performance Criteria (Serviceability)

Strucutral Number (SN)	**2.85**

Roadway Section

	Coefficients			
Material Type	**Material**	**Drainage**	**Thickness**	**Structural Number**
Asphalt Rubber AC	0.42	1.00		
Asphalt Concrete (AC)	0.42	1.00	4	1.68
Cement Treated Base (CTB)	0.28	1.00		
Aggregate Base (AB)	0.12	1.00	10	1.2
MAG Select	0.11	1.00		
Stabilized Subgrade**	0.16	1.00		
			Design Structural Number	**2.88**
			Required Structural Number	**2.85**

**The coefficient for stabilized subgrade is to be determined using a non-soaked 7-day compressive strength, using ASTM D1633 Method A, and the following formula: ai = 0.15+0.0001*(CSCLS).
CSCLS = Compressive strength of cement or lime stabilized subgrade (psi).