GEOTECHNICAL INVESTIGATION REPORT
JOMAX ROAD, DYSART ROAD TO 126TH DRIVE
CITY OF PEORIA PROJECT NO. EN00857
CITY OF SURPRISE PROJECT NO. P65410
PEORIA AND SURPRISE, ARIZONA

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SUBJECT: Geotechnical Investigation Report
Jomax Road, Dysart Road to 126th Drive
City of Peoria Project No. EN00857
City of Surprise Project ID No. P65410
Cities of Peoria and Surprise, Arizona

Ethos Engineering, LLC (Ethos) is pleased to present the results of a geotechnical investigation performed for the planned roadway improvements along Jomax Road from Dysart Road to 126th Drive in the Cities of Peoria and Surprise. Our scope of services was performed in general accordance with our proposal dated June 6, 2025, and discussions with T.Y. Lin International (TYLin). This report presents the results of our field investigation, laboratory testing, and engineering analyses along with corresponding geotechnical engineering recommendations.

We appreciate the opportunity to be of service to TYLin on this project. If you have any questions regarding this report, please do not hesitate to contact us.

Sincerely,

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1.0 PROJECT DESCRIPTION

We understand the Cities of Surprise and Peoria are planning to improve an approximate 0.7-mile segment of Jomax Road from Dysart Road on the west to 126th Drive on east. For purposes of design and permitting, the project will follow City of Peoria (City) standards. In general, this segment of Jomax Road currently exists as an unpaved dirt trail. The planned roadway improvements include design of Jomax Road to its ultimate six lane arterial configuration, including a roundabout at the intersection with Dysart Road. Drainage improvements associated with the project include new storm drains, new retention areas with depths on the order of 3 to 5 feet adjacent to the new roadway, and a new multi-cell box culvert at the McMicken Wash crossing.

2.0 FIELD EXPLORATION

Prior to our field exploration, Ethos obtained City engineering permit E260411 dated March 26, 2026 for the field exploration. Ethos staked the planned boring locations in the field and coordinated utility clearance of each location with Arizona 811.

The field investigation was performed between April 14 and 16, 2026 and included 6 borings (P-1 to P-4, S-1 and S-2) advanced to depths ranging from approximately 5 to 30 feet, and four percolation test holes (PERC-1 to PERC-4) advanced to depths ranging from approximate 1 to 4 feet, with a total drill footage was approximately 90 feet. Auger refusal was encountered on cemented soil with cobbles in Borings S-1, S-2, and PERC-3 at depths of 29, 24, and 2.5 feet, respectively. The boring locations are shown on Figures 1 through 2 attached to this report. Logs of the borings are presented in Appendix A.

Drilling was performed by ACS Services LLC using a truck-mounted CME-75 drill rig equipped with hollow-stem augers. Drive sampling was performed using standard penetration test (SPT) split spoon samplers or open-end drive samplers (2.42-inch-diameter brass rings) at maximum 5-foot intervals in each boring using a calibrated automatic hydraulic-actuated 140-pound hammer, free falling 30 inches. The hammer efficiency is noted in the heading of each boring log. The SPT and ring samplers were driven 18 and 12 inches, respectively, or to refusal (i.e. 50 blows for less than a 6-inch interval). Unless noted otherwise on the boring logs, the sample penetration resistance was recorded as the number of blows per six inches of penetration and are presented on the borings logs adjacent to each sample. Additionally, representative bulk samples of the near-surface soils were obtained from the drill cuttings.

The recovered soil samples were removed from the sampler, sealed to reduce moisture loss, and stored for subsequent review and laboratory testing. Upon completion, the borings were backfilled to the surface with drill cuttings unless noted otherwise on the boring logs.

Encountered soils were visually inspected, labeled and classified in the field, and logged in general accordance with ASTM D2488, the Unified Soil Classification System (USCS), and Ethos guidelines. Field direction, and logging of borings were performed by Ethos personnel.

3.0 LABORATORY TESTING

Selected laboratory tests were assigned by Ethos and performed by Veritas Materials Testing LLC on representative samples recovered from the field investigation to support our field classification and to provide information regarding engineering characteristics and properties of the subsurface soils. A summary of the laboratory testing program is presented in Table 3.1. The results of the laboratory tests are presented in Appendix B.

Table 3.1: Laboratory Testing Program

Item/Description	Estimated Number
Grain Size Analysis (Total - Coarse and Fine) - ASTM C136 & C117	7
Atterberg Limits (Plasticity Index) - ASTM D4318	7
Moisture Content - ASTM D2216	7
Density of Soil In Place (Unit Weight) - ASTM D2937	3
Moisture-Density (standard Proctor) - ASTM D698, Method A	1
Expansion (swell, constant surcharge) - ASTM D4546	1
R-Value - ASTM D2844	2
pH and Resistivity - AZ Method 236e	2
Sulfates and Chlorides - AZ Method 733b	2

4.0 SITE CONDITIONS AND GEOTECHNICAL PROFILE

4.1 Site Conditions

The Jomax Road alignment is currently unpaved between Dysart Road and 126th Drive and generally exists as an east-west oriented dirt trail. Vegetation consisting of desert bushes and shrubs is relatively sparse along the alignment, with the exception of at ephemeral drainages that cross the alignment in a roughly north-south orientation. The largest drainage channel is located near the midpoint of this segment and includes denser vegetation with larger bushes and trees, and a bed approximately 5 to 7 feet below the surrounding grades. A mountain is located to the northwest of the Jomax Road and Dysart Road intersection.

4.2 Regional Geologic Setting

Published geologic mapping indicates that surficial geologic units along the project consist of late and middle Pleistocene aged surficial deposits (Richard et al 2000). These deposits are described as unconsolidated to weakly consolidated alluvial fan, terrace, and basin-floor deposits with moderate to strong soil development. Fan and terrace deposits are primarily well-graded, moderately bedded gravel and sand, and basin-floor deposits are primarily sand, silt, and clay. The mountain located to the northwest of the Jomax Road and Dysart Road intersection is mapped as middle Miocene to Oligocene volcanic rocks consisting of lava, tuff, fine-grained intrusive rock, and diverse pyroclastic rocks.

4.3 Site Subsurface Conditions

Based on the results of the field and laboratory testing, the subgrade soils generally consist of low to medium plasticity silty and clayey sands with variable amounts of gravel (SC-SM, SC, SM). The sand particles are generally fine to coarse, and the gravel particles and generally fine. Cobbles and possible boulders were encountered in the borings and resulted in auger refusal at several locations. The grain sizes of sand and gravel particles indicated on the logs are representative of the predominant grain sizes based on laboratory testing and visual inspection. The soils are generally moderately firm to very firm and weakly to moderately cemented in the upper 5 to 7 feet, becoming very dense/hard and moderately to strongly cemented below about 7 feet. Refer to the boring logs in Appendix A for additional details of the conditions encountered in the borings.

4.4 Groundwater Conditions

Groundwater was not encountered during the field investigation to the maximum depth explored of 29 feet. A review of groundwater data in the ADWR Groundwater Site Inventory (ADWR 2025) includes information from several ADWR index well sites located in the vicinity of the site. With the exception of a well site located along the Jomax Road alignment at the Agua Fria River that showed groundwater at a depth of 82 feet, the index wells indicate groundwater depths of about 200 to 300 feet in the project area. Groundwater is not anticipated to be a design and construction consideration for this project.

4.5 Percolation Rates

Percolation testing was performed to evaluate infiltration rates at the planned retention basin locations along Jomax Road and Dysart Road, and within the existing basin associated with the Vistancia development on the north side of Jomax Road. The testing was performed in general accordance with the EPA method as outlined in the FCDMC Drainage Policies and Standards (FCDMC, 2018). The results are summarized in Table 4.1.

Table 4.1: Summary of Percolation Test Results

Test Location	Test Depth (feet)	Method	USCS Soil Type	Field Percolation Rate (inches/hour)
PERC-01	4	EPA	Silty, Clayey Sand with Gravel (SC-SM)	0.3[1,2]
PERC-02	2.5	EPA	Silty, Clayey Sand with Gravel (SC-SM)	2.0[1,2]
PERC-03	4	EPA	Sand with Clay (SP-SC)	4.0[1,2]
PERC-04	1	EPA	Silty Sand with Gravel (SM)	4.0[1,3]

Notes: EPA – Environmental Protection Agency

(1) Field percolation rates do not have a de-rating design factor applied. Appropriate de-rating design factors should be applied for basin sizing.

(2) Tests performed in a 12-inch diameter PVC-lined test hole.

(3) Test performed in a 12-inch diameter unlined test hole at the existing basin bottom.

4.6 Site Seismicity

The project seismic American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) criteria were determined in accordance with Section 3.10 of the AASHTO LRFD Bridge Design Specifications (AASHTO, 2012). The horizontal design acceleration is defined as having a 7% chance of exceedance during a 75-year recurrence interval. Based on the conditions encountered in the field, a Site Class C is considered applicable for the project site.

The probabilistic horizontal spectral acceleration values for the designated return period and corresponding peak horizontal ground acceleration (PGA) were obtained from the U.S. Geological Survey seismic hazards program website (USGS, 2009). The resulting seismic design values are presented in Table 4.1.

Table 4.1: Summary of Seismic Parameters

Seismic Design Parameter	Value
Latitude	33.72498º N
Longitude	-112.33740º E
Site Class	C
Peak Ground Acceleration (PGA)	0.055g
Short Period Acceleration (S_S)	0.125g
Long Period Acceleration (S_1)	0.041g
Site Coefficient, F_{PGA}	1.2
Site Coefficient, F_a	1.2
Site Coefficient, F_v	1.7
Spectral Acceleration, A_s	0.066g
Spectral Acceleration, S_{DS}	0.150g
Spectral Acceleration, S_{D1}	0.069g
Seismic Zone	1

5.0 ENGINEERING ANALYSES AND RECOMMENDATIONS

5.1 General

The following sections of this report present our recommendations for the planned roadway improvements. These recommendations are based on our understanding of the project, the results of the field and laboratory testing, and engineering analyses.

5.2 Pavements

Pavement thickness design for the project was performed following the procedures presented in the Arizona Department of Transportation (ADOT) Pavement Design Manual (PDM) (ADOT 2017), and then compared to the City minimum pavement section for an arterial roadway (City of Peoria, 2026). It was determined that the City minimum pavement section controls the design for this project. A discussion of the analyses parameters and results are presented in the following sections. Associated pavement design calculations are presented in Appendix C.

5.2.1 Traffic Data and Design ESALs

Design traffic for the project was provided by the TYLin design team. Two-way Average Annual Daily Traffic (AADT) projections were provided for years 2030 and 2050 for each leg of the Jomax Road and Dysart Road intersection. The data also indicated percent trucks at 2 percent for each leg in both 2030 and 2050. Table 5.1 presents the AADT values provided by the TYLin design team.

Table 5.1: Summary of Two-Way AADT Values

Location	2030 Two-Way AADT	2050 Two-Way AADT
Jomax Road, West of Dysart Road	15,639[1]	30,436[1]
Jomax Road, East of Dysart Road	7,920	25,609
Dysart Road, South of Jomax Road	7,605[1]	11,413
Dysart Road, North of Jomax Road	4,449	12,057[1]

Notes:
(1) Values utilized to conservatively approximate AADT at the roundabout intersection.

For pavement design purposes, the highest two-way AADT value from the Jomax Road legs were summed with highest two-way AADT value from the Dysart Road legs (as indicated in Table 5.1) to conservatively approximate AADT at the roundabout intersection. These values were also conservatively used for Jomax Road east of the intersection, and are also considered applicable to Dysart Road approaching the intersection. Additionally, we understand this project will construct an interim arterial condition with a single-lane roundabout and two travel lanes in each direction. The pavement design conservatively considered a single travel lane for Jomax Road outside of the roundabout intersection.

Based on this information, the following traffic data was utilized for pavement design of Jomax Road:

- 2030 Two-Way AADT = 23,244 vehicles
- 2050 Two-Way AADT = 42,493 vehicles
- Truck % = 2% (assumed 1% singles and 1% combos)

Design equivalent single axle loads (ESALs) in the design lane were computed following the procedures outlined in the ADOT PDM using the following parameters:

- Design Life = 20 years
- Build Year = 2030
- Direction Distribution (D_D) = 0.50
- Lane Distribution (D_L) = 1.0 for the single-lane roundabout
- Vehicle Class Distribution = AZ-4
- Growth Rate = 3.1 percent (calculated using 2030 and 2050 volumes)

Based on these parameters, the following design ESALs were calculated:

- Jomax Road, Dysart Road to 126th Drive
    - 2030 to 2049 = 2,385,148 ESALs (flexible)
    - 2030 to 2049 = 3,248,650 ESALs (rigid)

5.2.2 Pavement Subgrade and Resilient Modulus

Bulk samples of the pavement subgrade soils were collected from locations P-1 through P-4 during the field investigation. Test results for the pavement subgrade soil samples are presented in Table 5.2.

Table 5.2: Results of Subgrade Testing

Boring ID	Sample Depth (feet)	USCS Group Symbol	Percent Fines	Plasticity Index	Correlated R-Value	Tested R-Value
P-1	0.0 – 4.0	SC-SM	29	7	51	70
P-2	0.0 – 4.0	SC	40	8	42	---
P-3	0.0 – 4.0	SC	35	16	33	---
P-4	0.0 – 4.0	SC	23	13	44	42
				Number of Tests	4	2
				Average	42.4	56.0
				Standard Deviation	7.4	19.8

Based on the R-value results, we recommend a design R-value of 30 be utilized for pavement design, which corresponds to a design resilient modulus of 17,875 pounds per square inch (psi) when considering a seasonal variation factor of 1.0 for Peoria, Arizona.

5.2.3 Pavement Section – Flexible

The results of the pavement design using the procedure in the ADOT PDM and design inputs outlined herein indicate a minimum calculated structural number of 3.15 is required for flexible pavements using asphalt concrete (AC) over aggregate base (AB). This value was compared to the minimum equivalent structural number of 3.88 required by the City for Arterial roadways (City of Peoria, 2026). Based on the results, the City minimum required pavement section governs the flexible pavement thickness design for the project and should be utilized.

Table 5.3 presents the required minimum pavement section per the City for an Arterial roadway, the associated equivalent minimum structural number for the City minimum pavement section, and the calculated structural number using the procedure in the ADOT PDM (2017) and design parameters outlined herein.

Table 5.3: Equivalent vs. Required Minimum Structural Number

Location	Roadway Type	City Minimum Pavement Section	Equivalent Minimum Structural Number	Calculated Minimum Structural Number
New Construction – Jomax Road, Dysart Road to 126th Drive	Major Arterial	5.0 inches AC over 12.0 inches AB	3.88	3.15

The 5-inch AC thickness for the new roadway should be constructed in 2 lifts consisting of a 3-inch base lift using a ¾-inch mix and a 2-inch surface lift using a ½-inch mix. We understand approved City of Phoenix high-volume mix designs will likely be utilized for this project. Pavement construction and materials should be in accordance with the current Maricopa Association of Governments (MAG) Uniform Standard Specifications and Details for Public Works Construction Standard Specifications (MAG Standards) and the City Supplement to the MAG Standards.

5.2.4 Pavement Section – Rigid

A rigid pavement section consisting of Portland cement concrete pavement (PCCP) over AB will be utilized for the truck apron at the roundabout. The minimum rigid pavement thickness was evaluated following the procedures in the ADOT PDM and resulted in a thickness less than the minimum required thickness of 9 inches required following ADOT standards. Therefore, we recommend the minimum rigid pavement section at the roundabout truck apron meets ADOTs minimum requirements as presented in Table 5.4.

Table 5.4: Recommended Pavement Sections in Inches

Location	PCCP	AB	Total Thickness
New Construction – Truck Apron Jomax Road at Dysart Road Roundabout	9.0	4.0	13.0

5.3 Shallow Foundations

5.3.1 Design Parameters

Shallow foundations constructed of reinforced concrete, including mat and spread footing foundations, will be utilized to support the planned new box culvert and wing walls. The new foundations are anticipated to be founded near the existing wash bottom, approximately 5 to 7 feet below the adjacent site grades. Table 5.5 provides design parameters for shallow foundations for the new box culvert.

Table 5.5: Design Parameters for Shallow Foundations

Design Parameter	Recommended Values
Allowable Bearing Pressure	Mat Foundations – 4,000 psf Continuous and Isolated Footings – 2,500 psf
Modulus of Subgrade Reaction (k)	200 pounds per square inch per inch (pci)
Minimum Foundation Width (b)	Mat Foundations – 10 feet Continuous and Isolated Footings – 2 feet
Minimum Embedment Depth[1]	Mat Foundations – 1 foot Continuous and Isolated Footings – 2 feet
Subgrade Support	Prepared subgrade as recommended in the Earthwork section of this report
Estimated Total Settlement	1 inch or less
Differential Settlement	¾ of the total settlement

Notes:
(1) Below lowest adjacent grade.

5.3.2 Sliding Resistance

Sliding resistance for shallow foundations can consist of two components: friction sliding resistance between soil and foundation, and passive resistance of the soil acting against the face of the foundation. A coefficient of friction of 0.40 is recommended for computing the ultimate lateral resistance between the bases of foundations and compacted site soils.

The ultimate passive resistance against the edges of footings, stem walls, and other vertical foundation elements, in contact with properly compacted engineered fill or native site soils, should be considered as being equal to the force exerted by a fluid pressure of 375 pounds per square foot per foot of depth below the ground surface. This passive resistance should be used only where horizontal ground extends a minimum distance equal to two times the footing depth. If sloping ground conditions are present within this minimum horizontal distance, the Geotechnical Engineer should be contacted to provide reduced passive pressure values.

The preceding values are based on using site soils with a compacted moist unit weight of 115 pcf and an effective (drained) friction angle of 32 degrees. When friction and passive resistance are used in combination, the passive resistance component should be reduced by half.

5.4 Lateral Earth Pressures

Structures retaining soils should be designed for the lateral earth pressure imposed by the soils. The magnitude of the lateral earth pressure is a function of the backfill material, imposed surcharge loads, drainage accommodations, and the rigidity of the retaining structure. We recommend granular structure backfill soils be utilized and should extend a minimum of 3 feet laterally from the back edge of all structure walls. The structure backfill materials should meet the requirements outlined in the Earthwork section of this report. Behind the structure backfill zone, the near surface native soils may be utilized as wall backfill.

Walls which are free to deflect a minimum of 0.2 percent of the wall height should be designed for the full active earth pressure condition and an active equivalent fluid unit weight of about 35 psf per foot of wall height. Walls which are restrained from lateral movement should be designed for the at-rest condition using an equivalent fluid unit weight of 54 psf per foot of wall height.

The lateral earth pressures presented herein assume a horizontal backfill surface and do not include hydrostatic pressure or surcharge loadings which should be incorporated into the structural design in addition to the earth pressure loading. Vertical surcharge loads (e.g., traffic loading) should be added to the above earth pressures after multiplying them by an earth pressure coefficient of 0.31 for active conditions, and 0.47 for at-rest conditions. The preceding values are based on using site soils with a compacted moist unit weight of 115 pcf and an effective (drained) friction angle of 32 degrees.

5.5 Temporary Slopes

Temporary slopes should be excavated in accordance with OSHA (2020). In accordance with Subpart P, Appendix A, the near surface soils to an approximate depth of 20 feet are considered to be Type B soils. For excavations less than 20 feet in such soils, Subpart P, Appendix B indicates a maximum allowable unshored slope of 1H:1V for Type B soils. Flatter slopes may be required where either sandy soils are encountered or where the soils become excessively wet, and soft.

Should steeper slopes be required due to the proximity of existing structures or other contractor needs, the stability of the slopes should be verified by a registered geotechnical engineer (State of Arizona) who is proficient in slope stability analyses. Based on the overall site conditions, it does appear that steeper slopes would be feasible in cohesive and/or cemented soil layers across the project, pending further analysis of specific locations and excavations.

The perimeter of all excavations should be protected against water runoff and infiltration near the edges to maintain stability. Heavy equipment and spoil piles should not be allowed within 10 feet of the edge of the excavation. The perimeter of all excavations should be protected against water runoff and infiltration near the edges to maintain stability.

5.6 Surface Drainage

Long-term performance of pavements and structures will require that the subgrade soils and backfill be protected against excessive water infiltration and/or saturation. Surface drainage should be established away from foundations and pavements to minimize moisture infiltration into the subgrade. Structural fill and backfill should be well compacted to reduce possible moisture infiltration through loose soil intervals.

5.7 Soil Corrosion or Degradation Potential

5.7.1 Metal in Contact with Soil

The corrosion potential of near surface soils on corrugated metal pipes was characterized using laboratory pH and electrical resistivity testing, performed on two samples in accordance with Arizona Test Method 236. The laboratory pH testing had results of 8.1 and 8.5 (average 8.3). The resistivity testing had results of 860 and 1,027 ohm-centimeters (ohm-cm) (average 944 ohm-cm). It is recommended that the type and/or coating of metal in direct contact with soil be selected in accordance with ADOT Pipe Selection Guidelines (ADOT, 1996). The test results are included in Appendix B and summarized in Table B-1.

5.7.2 Concrete in Contact with Soil

Two samples from the field investigation were tested for soluble sulfates and chlorides (Arizona Test Method 733 and Arizona Test Method 736) to support design of concrete structures. The test results are included in Appendix B and summarized in Table B-1.

Total soluble sulfate testing had results of 32 and 108 parts per million (ppm) with an average of 70 ppm. The sulfate test measures the water-leachable or “available” sulfate content. These results were compared to Table 19.3.1.1, “Exposure Categories and Classes,” in Section 19.3.1, of the American Concrete Institute’s (ACI’s) *Building Code Requirements for Structural Concrete* (ACI 2019). All of the samples fall within Exposure Class S0 for water-soluble sulfate (SO_4^{2-}) in soil by percent mass (SO_4<0.1% or 1,000 ppm) and are categorized with a severity level of “not applicable” in terms of sulfate exposure. Based on ACI Table 19.3.2.1, “Requirements for Concrete by Exposure Class,” in Section 19.3.2 (ACI 2019), there is no restriction on Portland cement type for concrete structures in contact with these materials.

Chloride testing had results of 39 and 183 ppm with an average of 111 ppm. Regarding chloride attack, Section 19.3.2 (ACI 2019) indicates that when concrete is exposed to external sources of chlorides, concrete should be proportioned to satisfy the requirements for the applicable exposure class in Table 19.3.1.1 (ACI 2019). The anticipated concrete exposure for this segment falls within Exposure Class C1. Table 19.3.2.1 (ACI 2019) should be referred to for requirements for concrete by exposure class. For Exposure Class C1, the minimum compressive strength of concrete specified is 2,500 psi and the maximum water-soluble chloride ion content in concrete, by percent weight of cement, is 0.30% for non-prestressed concrete and 0.06% for prestressed concrete.

5.7.3 Further Evaluation

The results presented in this section are general in nature and may not be representative of site conditions. We recommend that the results of our laboratory testing be reviewed by a person or firm experienced in corrosion protection designs for the actual construction at the site, and/or by the appropriate pipe or material manufacturer. A qualified corrosion engineer should be consulted if corrosion of underground utilities is a concern or if a detailed evaluation is necessary.

5.8 Earthwork

The following earthwork recommendations are intended to provide support for the pavements at the site. Earthwork should be performed in accordance with the current MAG Standards, the City Supplement to the MAG Standards, and as modified herein. The recommendations presented in this report are contingent upon performing the earthwork recommended herein. The grading activities at the site should be performed under observation and testing directed by a Geotechnical Engineer.

5.8.1 Site Preparation

Completely remove all vegetation (including roots) and other organics, debris, any unstable (soft, loose, disturbed, water softened, etc.) soils, any uncontrolled fill, structural elements not intended to remain, and other deleterious materials from proposed pavement and structure areas prior to construction. This site grading should extend laterally a minimum of 2 feet beyond pavement areas unless noted otherwise. All areas of excavation should be observed and approved by a representative of the geotechnical engineer after clearing and before any filling operations begin at the site.

5.8.2 Subgrade Preparation

The following sections outline subgrade preparation recommendations for the project. For all areas, prior to placement of engineered fill, the exposed subgrade should be scarified to a minimum depth of 6 inches, adjusted to a moisture content within the range of plus or minus 2 percent of optimum, and compacted to at least 95% of maximum dry density as determined by the applicable MAG test methods.

After subgrade preparation and prior to fill placement, the exposed subgrade should be proof-rolled with a loaded 4,000-gallon water truck under the observation of the Geotechnical Engineer. Excessively soft or loose soils that are not remediated by the outlined subgrade preparation should be improved as directed by the Geotechnical Engineer prior to fill placement.

5.8.3 Fill Materials and Placement

In general, the existing site soils are considered suitable for reuse as engineered fill. Fill placed within the upper 2 feet of finished subgrade in pavement areas should meet or exceed the design R-value of 30 utilized for the pavement design. Additionally, borrow materials should generally meet the criteria outlined in Table 5.6.

Table 5.6: General Borrow Requirements

Parameter	Range of Values
Percent passing the 4-inch sieve	100
Percent passing the No. 4 sieve	40 to 100
Percent passing the No. 200 sieve	5 to 45
Plasticity index	0 to 15

Construction of embankment fill should be in accordance with Section 211 of MAG Standards and the project's special provisions. Fill material should be placed in loose lifts no thicker than 10 inches where heavy compaction equipment is used, provided compaction can be achieved throughout the lift thickness. Where hand operated compactors are used, loose lifts should not exceed 6 inches in thickness. Fill lifts should be of uniform thickness when compacted. All fill should be compacted to a minimum of 95% of the maximum dry density at within plus or minus 2% of the optimum moisture content as determined per ASTM D698.

5.8.4 Aggregate Base

Aggregate base material should meet the requirements of Section 702-1 of the MAG Standards. Aggregate base should be moisture conditioned to within 3 percent of the optimum moisture content and compacted to a minimum of 100 percent of the maximum ASTM D698 Standard Proctor density.

5.8.5 Earthwork Factors

Based on the results of the field and laboratory testing, we recommend a shrinkage value of 10% be utilized for the project.

5.8.6 Ground Compaction Factor

The ground compaction factor is an estimate of the ground height loss, including clearing and grubbing, that will result from compaction of the surface to 95% relative compaction. Based on site conditions, the recommended ground compaction factor for the project is 0.05 feet.

6.0 CLOSURE

The geotechnical services were performed in a manner consistent with that level of care and skill ordinarily exercised by other members of the geotechnical profession practicing in the same locality, under similar conditions and at the date the services were provided. Our conclusions, opinions and recommendations are based on the completed test borings, visual observations and the review of plans prepared by others. It is possible that conditions could vary beyond the data evaluated. Ethos makes no guarantee or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by the Client and their representatives, and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on site 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 shall notify Ethos of such intended use. Based on the intended use of the report, Ethos may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the Client or anyone else will release Ethos from any liability resulting from the use of this report by any unauthorized party.

7.0 REFERENCES

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FIGURES

Jomax Road, Dysart Road to 126th Drive

Figure 1 - Site Plan Showing Test Locations

Jomax Road, Dysart Road to 126th Drive

Figure 2 - Site Plan Showing Test Locations

APPENDIX A

Boring Logs

SOIL SAMPLING & BORING LOG INFORMATION

GENERAL INFORMATION

The material and in-situ moisture descriptions of soils presented on the boring logs are based on visual observation and classification in general accordance with the Unified Soil Classification System (USCS), presented on the next page. The field logs were modified, where appropriate, based on laboratory testing of selected samples.

SAMPLING DESCRIPTION

The blow counts are recorded on the boring logs in 6-inch increments unless sampler refusal (50 blows for less than 6 inches) occurs.

Type	Symbol	Description	Type	Symbol	Description
Bulk		Drill cuttings, approximately 30 to 40 pounds.	Modified California Sampler (Ring)		3-inch OD, lined with 2.42-inch ID rings, advanced 12 inches using a 140-lb hammer with a 30-inch drop (see ASTM D3550 for more details).
Auger		Drill cuttings, approximately 5 to 10 pounds.	Shelby Tube (ST)		3-inch OD thin-walled sample. Hydraulically driven/pushed (see ASTM D1587 for more details).
Hand		Cuttings taken from a test pit or hand auger.	Rock Core		N-series (1.8-inch OD) core or H-series (2.4-inch OD) core (see ASTM D2113 for more details).
Standard Penetration Test (SPT) Sampler		2-inch OD advanced 18 inches using 140-lb hammer with a 30-inch drop (see ASTM D1586 for more details).	Dynamic Cone Penetrometer (DCP)		Solid stem cone-shaped sampler advanced 12 inches using a 15-lb mass with a 20-inch drop. Correlations from Sowers and Hedges 1966 are used to approximate N-values. (see ASTM D6951 for more details).

RELATIVE CONSISTENCY, FIRMNESS, OR DENSITY

The relative density for cohesionless, coarse-grained soils and the consistency and firmness for fine-grained soils, near saturated and unsaturated, respectively, are described on the test boring logs based on standard penetration test (SPT) blows per foot (N) (ASTM D1586) or modified California sampler ring sampler (ASTM D3550) blow counts. See Sampling Description table for details.

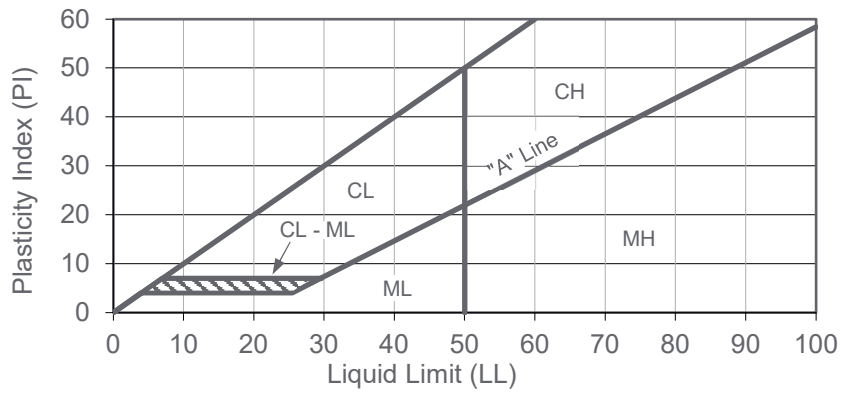
Cohesive Soils - Saturated or Near Saturated			Cohesive Soils – Unsaturated or Cemented Soils			Cohesionless Coarse-Grained Soils		
SPT/ N-Value (blows/ft)	Ring Sampler (blows/ft)	Consistency	SPT/ N-Value (blows/ft)	Ring Sampler (blows/ft)	Firmness	SPT/ N-Value (blows/ft)	Ring Sampler (blows/ft)	Relative Density
<2	<3	Very Soft	<4	<6	Very Soft	<4	<6	Very Loose
3-4	4-6	Soft	5-8	7-12	Soft	5-10	7-15	Loose
5-8	7-12	Medium Stiff	9-15	13-23	Medium Firm	11-30	16-45	Medium Dense
9-15	13-23	Stiff	16-30	24-45	Firm	31-50	46-75	Dense
16-30	24-45	Very Stiff	31-50	46-75	Very Firm	>50	>75	Very Dense
>30	>45	Hard	>50	>75	Hard			

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487)

The information below provides a general overview of the USCS classification system. See ASTM D2487 for more details.

Coarse-Grained Soils (more than 50% of material is larger than No. 200 sieve size)				
Criteria for Assigning Group Symbols & Names		**Graphic**	**Symbol**	**Group Description**
Gravels (more than 50% of coarse fraction larger than No. 4 sieve size)	Clean Gravels (less than 5% fines)		GW	Well-graded gravels, gravel-sand mixtures or sand-gravel-cobble (SGC) mixtures.
			GP	Poorly-graded gravels, gravel-sand mixtures or sand-gravel-cobble (SGC) mixtures.
	Gravels with more than 12% fines		GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
Sand (50% or more of coarse fraction smaller than No. 4 sieve size)	Clean Sands (less than 5% fines)		SW	Well-graded sands, gravelly sand mixtures.
			SP	Poorly-graded sands, gravelly sand mixtures.
	Sands with more than 12% fines		SM	Silty sands, sand-silt mixtures with a PI < 4 or plots below the "A" line.
			SC	Clayey sands, sand-clay mixtures.
Coarse-grained soils with between 5% and 12% passing the No. 200 sieve have a dual symbol.				
Fine-Grained Soils (50% or more of material is smaller than No. 200 sieve size)				
Silts and Clays (liquid limit < 50)	Plasticity Index > 7 and plots on or above "A" line		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
	Plasticity Index < 4 or plots below "A" line		ML	Inorganic silts, clayey silts, with low plasticity.
Silts and Clays (liquid limit ≥ 50)	Plasticity Index plots on or above "A" line		CH	Inorganic clays of high plasticity, silty and sandy clays of high plasticity.
	Plasticity Index plots below "A" line		MH	Inorganic silts of high plasticity, silty soils, elastic silts.
Fine-grained soils with plasticity that plots in the hatched zone on the plasticity chart have a dual symbol.				

PLASTICITY CHART



PLASTICITY	
Description	**Amount**
Nonplastic	No Value (NV)
Low	LL < 30
Medium	30 ≤ LL < 50
High	50 ≤ LL

CEMENTATION

The table below provides a general overview of soil cementation. Cementation is evaluated using four criteria: reaction to hydrochloric acid (HCl); visual observation of calcium carbonate; finger pressure required to break down the soil; and blow counts from the sample when present. The soil must meet all four criteria to be classified as cemented.

Description	Criteria			
	HCl Reaction	Observation of Calcium Carbonate	Finger Pressure	Blow Counts
Weakly	Slight	Some filaments and possible nodules	Crumbles with moderate finger pressure	N >15
Moderately	Moderate to Strong	Filaments continuous throughout, nodules present, and sample is white/gray	Considerable finger pressure required to break into chunks	> 30 for last interval
Strongly	Strong	Filaments continuous and almost indistinguishable, nodules are larger, and sample is white	Will not crumble or break with firm finger pressure	Refusal

PARTICLE SIZES

Particle Name	Size (mm)	Sieve Size
Silt/Clay	<0.075	<#200
Sand (fine)	0.075 to 0.425	#200 to #40
Sand (medium)	0.425 to 2	#40 to #10
Sand (coarse)	2 to 4.75	#10 to #4
Gravel (fine)	4.75 to 19	#4 to 3/4-inch
Gravel (coarse)	19 to 75	3/4-inch to 3-inch
Cobbles	75 to 300	3-inch to 12-inch
Boulders	>300	> 12 inch

WATER LEVEL

Symbol	Description
	Water level while drilling
	Water level after drilling/static
	Perched water

Water levels on the boring logs are those measured at the time of the investigation. Groundwater levels often vary seasonally and will vary over time.

AMOUNT MODIFIERS

Description	Amount
Rare*	<5%
Trace	~10%
Some	~20%
Considerable	~30%

*Only used to describe coarse-grained fraction (i.e. sand, gravel, cobbles, or boulders) when present

ANGULARITY

Description	Visual Example
Angular	
Subangular	
Subrounded	
Rounded	

ethos ENGINEERING, LLC	PROJECT NAME: Jomax Road, Dysart Road to 126th Drive		**BORING ID: P-1**
	PROJECT LOCATION: Peoria, AZ		AGENCY PROJECT NUMBER: EN00857
PROJECT NUMBER: 2025057	CLIENT NAME: T. Y. Lin International		DATE STARTED: 04/14/2026 / DATE COMPLETED: 04/14/2026
DRILLING METHOD(S): Hollow Stem Auger	TOOLING: 6-1/4" ID Hollow Stem Auger		HAMMER TYPE: Auto / HAMMER EFFICIENCY: 86.3%
SURFACE ELEVATION: 1353'	STATION: -	OFFSET AND OFFSET DIRECTION: - null	-
DRILLING FIRM: ACS Services, LLC	DRILLER: K. Poole	FIELD ENGINEER: R. Bohon	RIG TYPE: CME-75 / RIG NUMBER: 76
REPORTED DEPTH: 5.5'	GROUNDWATER DEPTH: N/A	REVIEWED BY: J. Huston	LATITUDE: 33.72492 / LONGITUDE: -112.34246

Elevation (feet)	Depth (feet)	Graphic Log	Soil Description and Remarks	Samples: Bulk	Samples: Driven	Samples: Blow Counts/6"	Laboratory Results: Moisture Content (%)	Laboratory Results: Dry Density (pcf)	Laboratory Results: Atterberg Limits (LL-PL-PI)	Laboratory Results: Fines (%)
1350			**SILTY, CLAYEY SAND WITH GRAVEL** (SC-SM), some to considerable fine to coarse subangular to subrounded gravel, fine to coarse subangular sand, weak to moderate cementation, low plasticity, light brown, slightly moist, very firm			13-30			29-22-7	29
	5		5.5			20-23-23 (46)				

Auger stopped at 4 feet. Sampler stopped at 5.5 feet.
Backfilled with cuttings.

ethos ENGINEERING, LLC.	**PROJECT NAME:** Jomax Road, Dysart Road to 126th Drive		**BORING ID:**	**P-2**
	PROJECT LOCATION: Peoria, AZ		AGENCY PROJECT NUMBER: EN00857	
PROJECT NUMBER: 2025057	CLIENT NAME: T. Y. Lin International		DATE STARTED: 04/14/2026	DATE COMPLETED: 04/14/2026
DRILLING METHOD(S): Hollow Stem Auger	TOOLING: 6-1/4" ID Hollow Stem Auger		HAMMER TYPE: Auto	HAMMER EFFICIENCY: 86.3%
SURFACE ELEVATION: 1349'	STATION: -	OFFSET AND OFFSET DIRECTION: - null		-
DRILLING FIRM: ACS Services, LLC	DRILLER: K. Poole	FIELD ENGINEER: R. Bohon	RIG TYPE: CME-75	RIG NUMBER: 76
REPORTED DEPTH: 5.5'	GROUNDWATER DEPTH: N/A	REVIEWED BY: J. Huston	LATITUDE: 33.72498	LONGITUDE: -112.33846

Elevation (feet)	Depth (feet)	Graphic Log	Soil Description and Remarks	Samples: Bulk	Samples: Driven	Samples: Blow Counts/6"	Laboratory Results: Moisture Content (%)	Laboratory Results: Dry Density (pcf)	Laboratory Results: Atterberg Limits (LL-PL-PI)	Laboratory Results: Fines (%)
			CLAYEY SAND (SC), trace fine to coarse subangular to subrounded gravel, fine to coarse subangular sand, weak cementation, low plasticity, light brown, slightly moist, firm							
						7-16	2.9		30-22-8	40
1345										
	5					10-16-14 (30)				
			5.5							

Auger stopped at 4 feet. Sampler stopped at 5.5 feet.
Backfilled with cuttings.

ethos ENGINEERING, LLC	PROJECT NAME: Jomax Road, Dysart Road to 126th Drive		**BORING ID: P-3**
	PROJECT LOCATION: Peoria, AZ		AGENCY PROJECT NUMBER: EN00857
PROJECT NUMBER: 2025057	CLIENT NAME: T. Y. Lin International		DATE STARTED: 04/14/2026 / DATE COMPLETED: 04/14/2026
DRILLING METHOD(S): Hollow Stem Auger	TOOLING: 6-1/4" ID Hollow Stem Auger		HAMMER TYPE: Auto / HAMMER EFFICIENCY: 86.3%
SURFACE ELEVATION: 1347'	STATION: -	OFFSET AND OFFSET DIRECTION: - null	-
DRILLING FIRM: ACS Services, LLC	DRILLER: K. Poole	FIELD ENGINEER: R. Bohon	RIG TYPE: CME-75 / RIG NUMBER: 76
REPORTED DEPTH: 5.5'	GROUNDWATER DEPTH: N/A	REVIEWED BY: J. Huston	LATITUDE: 33.72492 / LONGITUDE: -112.33565

Elevation (feet)	Depth (feet)	Graphic Log	Soil Description and Remarks	Samples: Bulk	Samples: Driven	Samples: Blow Counts/6"	Laboratory Results: Moisture Content (%)	Laboratory Results: Dry Density (pcf)	Laboratory Results: Atterberg Limits (LL-PL-PI)	Laboratory Results: Fines (%)
1345			**CLAYEY SAND WITH GRAVEL** (SC), some to considerable predominantly fine subangular to subrounded gravel, fine to coarse subrounded sand, moderate cementation, medium plasticity, light brown, slightly moist, hard			50/5"	4.2		37-21-16	35
	5		5.5			12-19-44 (63)				

Auger stopped at 4 feet. Sampler stopped at 5.5 feet.
Backfilled with cuttings.

ethos ENGINEERING, LLC	PROJECT NAME: Jomax Road, Dysart Road to 126th Drive		**BORING ID: P-4**
	PROJECT LOCATION: Peoria, AZ		AGENCY PROJECT NUMBER: EN00857
PROJECT NUMBER: 2025057	CLIENT NAME: T. Y. Lin International		DATE STARTED: 04/14/2026 / DATE COMPLETED: 04/14/2026
DRILLING METHOD(S): Hollow Stem Auger	TOOLING: 6-1/4" ID Hollow Stem Auger		HAMMER TYPE: Auto / HAMMER EFFICIENCY: 86.3%
SURFACE ELEVATION: 1353'	STATION: -	OFFSET AND OFFSET DIRECTION: - null	-
DRILLING FIRM: ACS Services, LLC	DRILLER: K. Poole	FIELD ENGINEER: R. Bohon	RIG TYPE: CME-75 / RIG NUMBER: 76
REPORTED DEPTH: 5.5'	GROUNDWATER DEPTH: N/A	REVIEWED BY: J. Huston	LATITUDE: 33.72618 / LONGITUDE: -112.33264

Elevation (feet)	Depth (feet)	Graphic Log	Soil Description and Remarks	Samples: Bulk	Samples: Driven	Samples: Blow Counts/6"	Laboratory Results: Moisture Content (%)	Laboratory Results: Dry Density (pcf)	Laboratory Results: Atterberg Limits (LL-PL-PI)	Laboratory Results: Fines (%)
1350			**CLAYEY SAND WITH GRAVEL** (SC), some to considerable predominantly fine subangular to subrounded gravel, fine to coarse subrounded sand, weak cementation, medium plasticity, light brown, slightly moist, moderately firm to firm			24-21	4.0		35-22-13	23
	5		5.5			4-6-8 (14)				

Auger stopped at 4 feet. Sampler stopped at 5.5 feet.
Backfilled with cuttings.

ethos ENGINEERING, LLC	**PROJECT NAME:** Jomax Road, Dysart Road to 126th Drive		**BORING ID:** **PERC-1**
	PROJECT LOCATION: Peoria, AZ		AGENCY PROJECT NUMBER: EN00857
PROJECT NUMBER: 2025057	CLIENT NAME: T. Y. Lin International		DATE STARTED: 04/14/2026 / DATE COMPLETED: 04/14/2026
DRILLING METHOD(S): Auger	TOOLING: 12" Continuous Flight Auger		HAMMER TYPE: - / HAMMER EFFICIENCY: -
SURFACE ELEVATION: 1352'	STATION: -	OFFSET AND OFFSET DIRECTION: - null	-
DRILLING FIRM: ACS Services, LLC	DRILLER: K. Poole	FIELD ENGINEER: R. Bohon	RIG TYPE: CME-75 / RIG NUMBER: 76
REPORTED DEPTH: 4.0'	GROUNDWATER DEPTH: N/A	REVIEWED BY: J. Huston	LATITUDE: 33.72393 / LONGITUDE: -112.34274

Elevation (feet)	Depth (feet)	Graphic Log	Soil Description and Remarks	Samples: Bulk	Samples: Driven	Samples: Blow Counts/6"	Laboratory Results: Moisture Content (%)	Laboratory Results: Dry Density (pcf)	Laboratory Results: Atterberg Limits (LL-PL-PI)	Laboratory Results: Fines (%)
1350			**SILTY, CLAYEY SAND WITH GRAVEL** (SC-SM), occasional cobbles, some fine to coarse subangular to subrounded gravel, considerable fine sand, moderate to strong cementation, low plasticity, tan to light brown, slightly moist							
			4							
			Auger stopped at 4 feet. Casing set for percolation testing and pre-soaked.							

ethos ENGINEERING, LLC.	**PROJECT NAME:** Jomax Road, Dysart Road to 126th Drive		**BORING ID:** **PERC-2**
	PROJECT LOCATION: Peoria, AZ		AGENCY PROJECT NUMBER: EN00857
PROJECT NUMBER: 2025057	CLIENT NAME: T. Y. Lin International		DATE STARTED: 04/14/2026 / DATE COMPLETED: 04/15/2026
DRILLING METHOD(S): Auger	TOOLING: 12" Continuous Flight Auger		HAMMER TYPE: - / HAMMER EFFICIENCY: -
SURFACE ELEVATION: 1350'	STATION: -	OFFSET AND OFFSET DIRECTION: - null	-
DRILLING FIRM: ACS Services, LLC	DRILLER: K. Poole	FIELD ENGINEER: R. Bohon	RIG TYPE: CME-75 / RIG NUMBER: 76
REPORTED DEPTH: 2.5'	GROUNDWATER DEPTH: N/A	REVIEWED BY: J. Huston	LATITUDE: 33.72525 / LONGITUDE: -112.34129

Elevation (feet)	Depth (feet)	Graphic Log	Soil Description and Remarks	Samples: Bulk	Samples: Driven	Samples: Blow Counts/6"	Laboratory Results: Moisture Content (%)	Laboratory Results: Dry Density (pcf)	Laboratory Results: Atterberg Limits (LL-PL-PI)	Laboratory Results: Fines (%)
			SILTY, CLAYEY SAND WITH GRAVEL (SC-SM), some cobbles, considerable fine to coarse subangular to subrounded gravel, predominantly fine to medium subangular sand, weak cementation, nonplastic to low plasticity, tan to light brown, slightly moist							
			2.5							

Auger refused at 2.5 feet. Casing set for percolation testing and pre-soaked.

ethos ENGINEERING, LLC.	PROJECT NAME: Jomax Road, Dysart Road to 126th Drive		BORING ID:	PERC-3
	PROJECT LOCATION: Peoria, AZ		AGENCY PROJECT NUMBER: EN00857	
PROJECT NUMBER: 2025057	CLIENT NAME: T. Y. Lin International		DATE STARTED: 04/14/2026	DATE COMPLETED: 04/16/2026
DRILLING METHOD(S): Auger	TOOLING: 12" Continuous Flight Auger		HAMMER TYPE: -	HAMMER EFFICIENCY: -
SURFACE ELEVATION: 1349'	STATION: -	OFFSET AND OFFSET DIRECTION: - null		-
DRILLING FIRM: ACS Services, LLC	DRILLER: K. Poole	FIELD ENGINEER: R. Bohon	RIG TYPE: CME-75	RIG NUMBER: 76
REPORTED DEPTH: 4.0'	GROUNDWATER DEPTH: N/A	REVIEWED BY: J. Huston	LATITUDE: 33.72523	LONGITUDE: -112.33886

Elevation (feet)	Depth (feet)	Graphic Log	Soil Description and Remarks	Samples: Bulk	Samples: Driven	Samples: Blow Counts/6"	Laboratory Results: Moisture Content (%)	Laboratory Results: Dry Density (pcf)	Laboratory Results: Atterberg Limits (LL-PL-PI)	Laboratory Results: Fines (%)
1345	4		**SAND WITH CLAY** (SP-SC), trace fine subangular to subrounded gravel, predominantly fine sand, weak cementation, medium plasticity, light brown to tan, slightly moist							

Auger stopped at 4 feet. Casing set for percolation testing and pre-soaked.

ethos ENGINEERING, LLC	**PROJECT NAME:** Jomax Road, Dysart Road to 126th Drive		**BORING ID: PERC-4**
	PROJECT LOCATION: Peoria, AZ		AGENCY PROJECT NUMBER: EN00857
PROJECT NUMBER: 2025057	CLIENT NAME: T. Y. Lin International		DATE STARTED: 04/15/2026 / DATE COMPLETED: 04/16/2026
DRILLING METHOD(S): -	TOOLING: Hand Auger		HAMMER TYPE: - / HAMMER EFFICIENCY: -
SURFACE ELEVATION: 1348'	STATION: -	OFFSET AND OFFSET DIRECTION: - null	-
DRILLING FIRM: Ethos Engineering, LLC	DRILLER: R. Bohon	FIELD ENGINEER: R. Bohon	RIG TYPE: - / RIG NUMBER: -
REPORTED DEPTH: 1.0'	GROUNDWATER DEPTH: N/A	REVIEWED BY: J. Huston	LATITUDE: 33.72532 / LONGITUDE: -112.33539

Elevation (feet)	Depth (feet)	Graphic Log	Soil Description and Remarks	Samples: Bulk	Samples: Driven	Samples: Blow Counts/6"	Laboratory Results: Moisture Content (%)	Laboratory Results: Dry Density (pcf)	Laboratory Results: Atterberg Limits (LL-PL-PI)	Laboratory Results: Fines (%)
			SILTY SAND WITH GRAVEL (SM), considerable predominantly fine subangular to subrounded gravel, fine sand, light brown to gray, slightly moist 1							
			Hand excavated to 1 foot. Pre-soaked for percolation testing.							

ethos ENGINEERING, LLC	PROJECT NAME: Jomax Road, Dysart Road to 126th Drive		**BORING ID: S-1**
	PROJECT LOCATION: Peoria, AZ		AGENCY PROJECT NUMBER: EN00857
PROJECT NUMBER: 2025057	CLIENT NAME: T. Y. Lin International		DATE STARTED: 04/14/2026 / DATE COMPLETED: 04/14/2026
DRILLING METHOD(S): Hollow Stem Auger	TOOLING: 6-1/4" ID Hollow Stem Auger		HAMMER TYPE: Auto / HAMMER EFFICIENCY: 86.3%
SURFACE ELEVATION: 1346'	STATION: -	OFFSET AND OFFSET DIRECTION: - null	-
DRILLING FIRM: ACS Services, LLC	DRILLER: K. Poole	FIELD ENGINEER: R. Bohon	RIG TYPE: CME-75 / RIG NUMBER: 76
REPORTED DEPTH: 29.8'	GROUNDWATER DEPTH: N/A	REVIEWED BY: J. Huston	LATITUDE: 33.72490 / LONGITUDE: -112.33731

Elevation (feet)	Depth (feet)	Graphic Log	Soil Description and Remarks	Samples: Bulk	Samples: Driven	Samples: Blow Counts/6"	Laboratory Results: Moisture Content (%)	Laboratory Results: Dry Density (pcf)	Laboratory Results: Atterberg Limits (LL-PL-PI)	Laboratory Results: Fines (%)
1345			**SAND WITH CLAY AND GRAVEL** (SP-SC), considerable fine to coarse subangular to subrounded gravel, fine to coarse subangular sand, weak to moderate cementation, low to medium plasticity, light brown, slightly moist, very firm to hard			22-43				
	5					16-20	2.3	109.1	27-18-9	11
1340						7-16-27 (43)				
	10					19-45-50/5"				
1335										
			12							
			CLAYEY SAND (SC), trace fine subangular to subrounded gravel, predominantly fine sand, moderate cementation, medium plasticity, light brown, slightly moist, hard			44-50/1"				
	15									
1330						12-32-45 (77)				

ethos ENGINEERING, LLC	PROJECT NAME: Jomax Road, Dysart Road to 126th Drive		BORING ID: S-1
	PROJECT LOCATION: Peoria, AZ		AGENCY PROJECT NUMBER: EN00857
PROJECT NUMBER: 2025057	CLIENT NAME: T. Y. Lin International		DATE STARTED: 04/14/2026 / DATE COMPLETED: 04/14/2026
DRILLING METHOD(S): Hollow Stem Auger	TOOLING: 6-1/4" ID Hollow Stem Auger		HAMMER TYPE: Auto / HAMMER EFFICIENCY: 86.3%
SURFACE ELEVATION: 1346'	STATION: -	OFFSET AND OFFSET DIRECTION: - null	-
DRILLING FIRM: ACS Services, LLC	DRILLER: K. Poole	FIELD ENGINEER: R. Bohon	RIG TYPE: CME-75 / RIG NUMBER: 76
REPORTED DEPTH: 29.8'	GROUNDWATER DEPTH: N/A	REVIEWED BY: J. Huston	LATITUDE: 33.72490 / LONGITUDE: -112.33731

Elevation (feet)	Depth (feet)	Graphic Log	Soil Description and Remarks	Samples: Bulk	Samples: Driven	Samples: Blow Counts/6"	Laboratory Results: Moisture Content (%)	Laboratory Results: Dry Density (pcf)	Laboratory Results: Atterberg Limits (LL-PL-PI)	Laboratory Results: Fines (%)
1325			... continued from previous page							
	25		Note: brown at 24 feet		X	16-40-50/5"				
1320			Note: cobbles below 27 feet							
			Note: auger refusal at 29 feet (possible cobble) 29.8		X	12-50/3"				

Auger refused at 29 feet. Sampler refusal at 29.8 feet.
Backfilled with cuttings.

ethos ENGINEERING, LLC	PROJECT NAME: Jomax Road, Dysart Road to 126th Drive		**BORING ID: S-2**
	PROJECT LOCATION: Peoria, AZ		AGENCY PROJECT NUMBER: EN00857
PROJECT NUMBER: 2025057	CLIENT NAME: T. Y. Lin International	DATE STARTED: 04/14/2026	DATE COMPLETED: 04/14/2026
DRILLING METHOD(S): Hollow Stem Auger	TOOLING: 6-1/4" ID Hollow Stem Auger	HAMMER TYPE: Auto	HAMMER EFFICIENCY: 86.3%
SURFACE ELEVATION: 1342'	STATION: - / OFFSET AND OFFSET DIRECTION: - null		-
DRILLING FIRM: ACS Services, LLC	DRILLER: K. Poole / FIELD ENGINEER: R. Bohon	RIG TYPE: CME-75	RIG NUMBER: 76
REPORTED DEPTH: 24.0'	GROUNDWATER DEPTH: N/A / REVIEWED BY: J. Huston	LATITUDE: 33.72473	LONGITUDE: -112.33680

Elevation (feet)	Depth (feet)	Graphic Log	Soil Description and Remarks	Samples: Bulk	Samples: Driven	Samples: Blow Counts/6"	Laboratory Results: Moisture Content (%)	Laboratory Results: Dry Density (pcf)	Laboratory Results: Atterberg Limits (LL-PL-PI)	Laboratory Results: Fines (%)
			SILTY SAND WITH GRAVEL (SM), some fine to coarse subangular to subrounded gravel, predominantly fine sand, nonplastic, light brown, slightly moist, loose							
1340						3-4	3.8	102.7		
	5					3-6	4.6	96.9		
1335										
			Note: dense to very dense below 7 feet			8-15-22 (37)			NP	34
						20-50/6"				
	10		Note: possible cobble at 10 feet							
1330										
			14							
	15		**CLAYEY SAND** (SC), trace fine subangular to subrounded gravel, fine to medium subangular sand, strong cementation, medium plasticity, light brown, slightly moist, hard			16-26-34 (60)			32-20-12	32
1325										
						16-50/5"				

ethos ENGINEERING, LLC.	PROJECT NAME: Jomax Road, Dysart Road to 126th Drive		**BORING ID: S-2**
	PROJECT LOCATION: Peoria, AZ		AGENCY PROJECT NUMBER: EN00857
PROJECT NUMBER: 2025057	CLIENT NAME: T. Y. Lin International		DATE STARTED: 04/14/2026 / DATE COMPLETED: 04/14/2026
DRILLING METHOD(S): Hollow Stem Auger	TOOLING: 6-1/4" ID Hollow Stem Auger		HAMMER TYPE: Auto / HAMMER EFFICIENCY: 86.3%
SURFACE ELEVATION: 1342'	STATION: -	OFFSET AND OFFSET DIRECTION: - null	-
DRILLING FIRM: ACS Services, LLC	DRILLER: K. Poole	FIELD ENGINEER: R. Bohon	RIG TYPE: CME-75 / RIG NUMBER: 76
REPORTED DEPTH: 24.0'	GROUNDWATER DEPTH: N/A	REVIEWED BY: J. Huston	LATITUDE: 33.72473 / LONGITUDE: -112.33680

Elevation (feet)	Depth (feet)	Graphic Log	Soil Description and Remarks	Samples: Bulk	Samples: Driven	Samples: Blow Counts/6"	Laboratory Results: Moisture Content (%)	Laboratory Results: Dry Density (pcf)	Laboratory Results: Atterberg Limits (LL-PL-PI)	Laboratory Results: Fines (%)
1320			... continued from previous page Note: possible cobble or boulder at 24 feet 24							
			Auger refused at 24 feet. Sampler refused at 24 feet. Backfilled with cuttings.			50/0"				

APPENDIX B

Laboratory Test Results

TABLE B-1: SUMMARY OF LABORATORY TEST RESULTS

Boring Number	Sample Depth [feet]		USCS/Group Symbol (ASTM D2487)	Percent Fines (minus #200) (ASTM C136)	Liquid Limit (ASTM D4318)	Plasticity Index (ASTM D4318)	Moisture Content [%] (ASTM D2216)	In-Place Dry Density [pcf][1] (ASTM D2937)	Optimum Moisture Content [%][2] (ASTM D698A)	Maximum Dry Density [pcf][2] (ASTM D698A)	Expansion [%] (ASTM D4546)	R-Value (ASTM D2844)	pH (AZ 236)	Resistivity [ohm-cm] (AZ 236)	Sulfates [ppm] (AZ 733)	Chlorides [ppm] (AZ 736)
	Begin	End														
P-1	0.0	4.0	SC-SM	29	29	7	3.2					70				
P-2	0.0	4.0	SC	40	30	8	2.9									
P-3	0.0	4.0	SC	35	37	16	4.2		12.4	117.5	2.0					
P-4	0.0	4.0	SC	23	35	13	4.0					42				
S-1	0.0	4.0											8.5	1,027		
S-1	1.0	2.0													108	183
S-1	4.0	5.0	SP-SC	11	27	9	2.3	109.1								
S-2	0.0	4.0											8.1	860		
S-2	1.0	2.0					3.8	102.7								
S-2	4.0	5.0					4.6	96.9							32	39
S-2	7.0	8.5	SM	34	NV	NP										
S-2	14.0	15.5	SC	32	32	12										
Average				**29.1**	**31.7**	**10.8**	**3.6**	**102.9**	**12.4**	**117.5**	**2.0**	**56.0**	**8.3**	**944**	**70**	**111**
Standard Deviation				**9.6**	**3.8**	**3.4**	**0.8**	**6.1**	**--**	**--**	**--**	**19.8**	**0.3**	**118.1**	**53.7**	**101.8**
Maximum				**40.0**	**37.0**	**16.0**	**4.6**	**109.1**	**12.4**	**117.5**	**2.0**	**70.0**	**8.5**	**1,027**	**108**	**183**
Minimum				**11.0**	**27.0**	**7.0**	**2.3**	**96.9**	**12.4**	**117.5**	**2.0**	**42.0**	**8.1**	**860**	**32**	**39**
Count				**7**	**7**	**7**	**7**	**3**	**1**	**1**	**1**	**2**	**2**	**2**	**2**	**2**

Notes: pcf = pounds per cubic foot; ohm-cm = ohm-centimeters; ppm = parts per million

[1] Moisture content determined in accordance with ASTM D2216.

[2] Values do not include rock correction.

MECHANICAL SIEVE ANALYSIS TEST REPORT

Client: Ethos Engineering
Project: Jomax Road, Dysart to 126th Drive
Location: Surprise and Peoria, AZ
Material: See Boring Logs

Job No.: 25-37001
Work Order No.: 1
Date Sampled: 4/15/26
Date Reported: 4/20/26

MECHANICAL SIEVE ANALYSIS (ASTM C136/C117) PLASTICITY INDEX (ASTM D4318) GROUP SYMBOL, USCS (ASTM D2487)

		Lab #	26-0088-01	26-0088-04	26-0088-07	26-0088-09	26-0088-17	26-0088-28	26-0088-30
		Boring #	P-1 (0.0-4.0')	P-2 (0.0-4.0')	P-3 (0.0-4.0')	P-4 (0.0-4.0')	S-1 (4.0-5.0')	S-2 (7.0-8.5')	S-2 (14.0-15.5')
USCS		LL	29	30	37	35	27	NV	32
USCS		PI	7	8	16	13	9	NP	12
USCS		USCS	SC-SM	SC	SC	SC	SP-SC	SM	SC
					Percent Passing By Weight				
Cobbles		6"	100	100	100	100	100	100	100
Gravel	Coarse	3"	100	100	100	100	100	100	100
Gravel	Coarse	2"	100	100	100	100	100	100	100
Gravel	Coarse	1 1/2"	97	100	100	100	87	100	100
Gravel	Coarse	1 1/4"	97	100	99	100	87	100	100
Gravel	Coarse	1"	94	100	98	97	84	100	100
Gravel	Fine	3/4"	92	98	94	92	75	89	100
Gravel	Fine	1/2"	88	96	88	87	69	85	99
Gravel	Fine	3/8"	85	95	84	83	66	79	99
Gravel	Fine	1/4"	80	94	79	77	60	78	97
Sand	Coarse	#4	75	93	75	71	57	78	95
Sand	Coarse	#8	64	85	66	59	47	74	86
Sand	Medium	#10	62	82	64	56	45	74	84
Sand	Medium	#16	55	73	58	47	36	72	75
Sand	Medium	#30	49	63	53	39	27	68	65
Sand	Fine	#40	46	59	50	36	23	66	60
Sand	Fine	#50	44	56	47	33	19	61	56
Sand	Fine	#100	37	49	42	28	14	49	46
Clay or Silt		#200	29	40	35	23	11	34	32

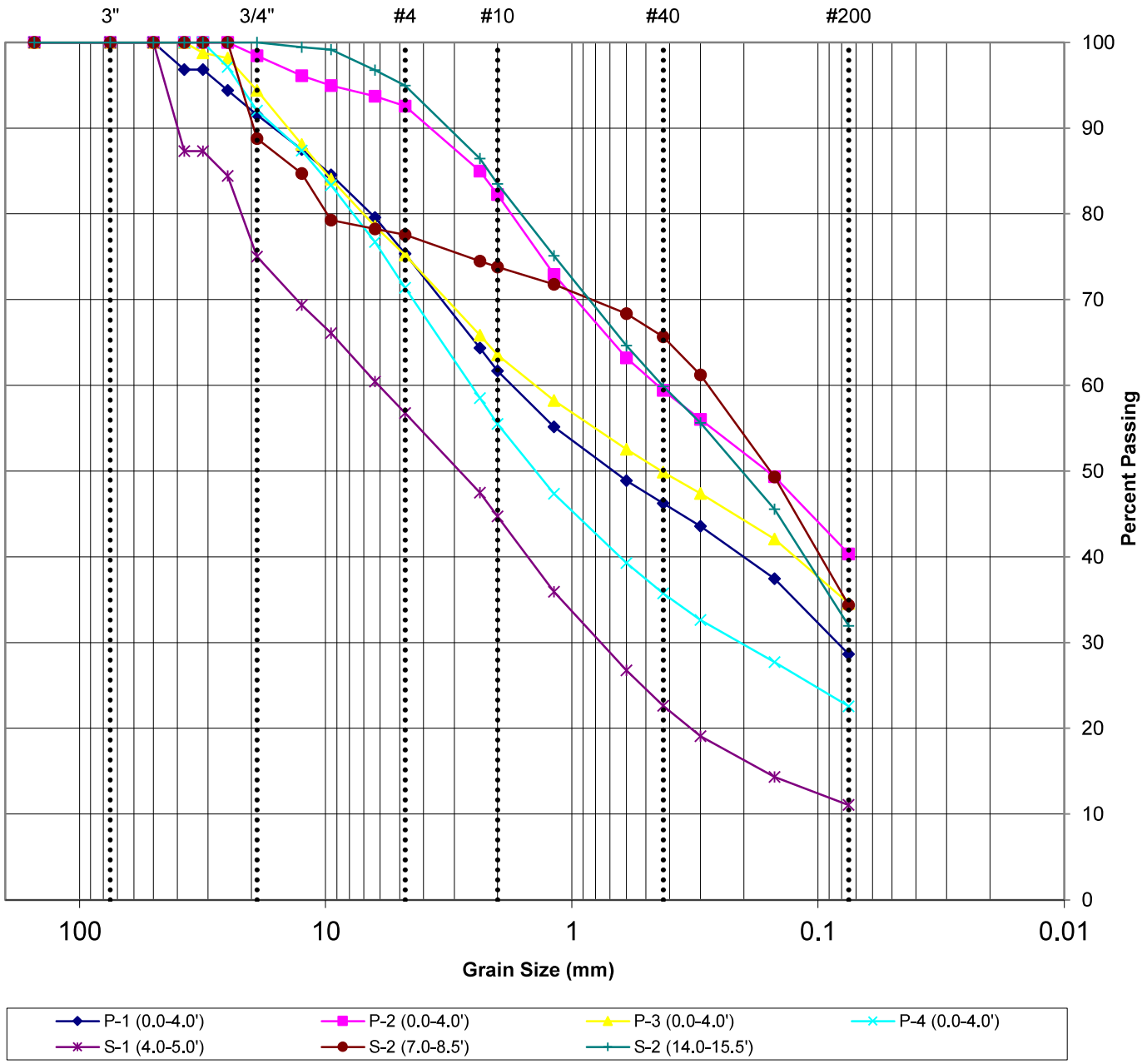
Reviewed By: _____

MECHANICAL SIEVE ANALYSIS GRAPHS

Client: Ethos Engineering
Project: Jomax Road, Dysart to 126th Drive
Location: Surprise and Peoria, AZ
Material: See Boring Logs

Job No.: 25-37001
Work Order No.: 1
Date Sampled: 4/15/2026
Date Reported: 4/20/2026

MECHANICAL SIEVE ANALYSIS GRAPHS



MOISTURE TEST REPORT

Client:	Ethos Engineering	**Job No.:**	25-37001
Project:	Jomax Road, Dysart to 126th Drive	**Work Order No.:**	1
Location:	Surprise and Peoria, AZ	**Date Sampled:**	4/15/2026
Material:	See Boring Logs	**Date Reported:**	4/20/2026

MOISTURE CONTENT (ASTM D2216)

Lab No.	Sample Source	Wet Wt (g)	Dry Wt. (g)	Moisture (%)
26-0088-01	P-1 (0.0-4.0')	828.1	802.2	3.2%
26-0088-04	P-2 (0.0-4.0')	663.6	645.0	2.9%
26-0088-07	P-3 (0.0-4.0')	709.4	680.7	4.2%
26-0088-09	P-4 (0.0-4.0')	1,050.8	1010.7	4.0%

Reviewed By: _____

RING DENSITY TEST REPORT

Client: Ethos Engineering
Project: Jomax Road, Dysart to 126th Drive
Location: Surprise and Peoria, AZ
Material: See Boring Logs

Job No.: 25-37001
Work Order No.: 1
Date Sampled: 4/15/2026
Date Reported: 4/20/2026

DENSITY OF SOIL IN PLACE BY THE DRIVE-CYLINDER METHOD (ASTM D2937)

Lab No.	Boring	Moisture Content	Dry Density (pcf)
26-0088-17	S-1 (4.0-5.0')	2.3%	109.1
26-0088-26	S-2 (1.0-2.0')	3.8%	102.7
26-0088-27	S-2 (4.0-5.0')	4.6%	96.9

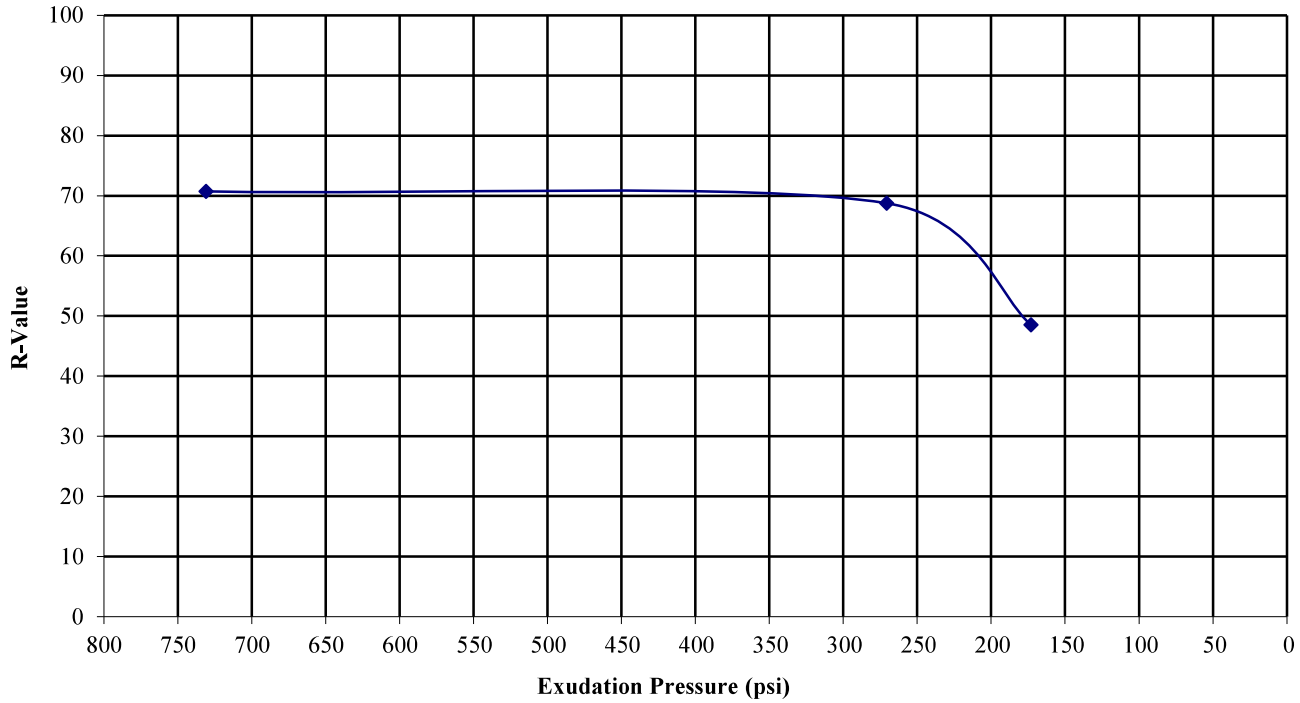
Reviewed By: _____

R-VALUE TEST REPORT

Client:	Ethos Engineering	**Job No.:**	25-37001
Project:	Jomax Road, Dysart to 126th Drive	**Work Order No.:**	1
Location:	Surprise and Peoria, AZ	**Lab No.:**	26-0088-01
Material:	See Boring Logs	**Date Sampled:**	4/15/2026
Sample Source:	P-1 (0.0-4.0')	**Date Reported:**	4/20/2026

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (ASTM D2844)

Specimen:	A	B	C
Moisture Content:	13.4%	11.7%	10.0%
Compaction Pressure (psi):	150	200	250
Specimen Height (inches):	2.46	2.50	2.58
Dry Density (pcf):	119.2	119.3	118.5
Horizontal Pressure @ 1000lbs (psi):	28.0	17.0	16.0
Horizontal Pressure @ 2000lbs (psi):	56.0	30.0	28.0
Displacement:	4.92	4.92	5.29
Expansion Pressure (psi):	0.0	0.0	0.0
Exudation Pressure (psi):	173	271	731
R-Value:	**49**	**69**	**71**



R-Value at 300 PSI = 70

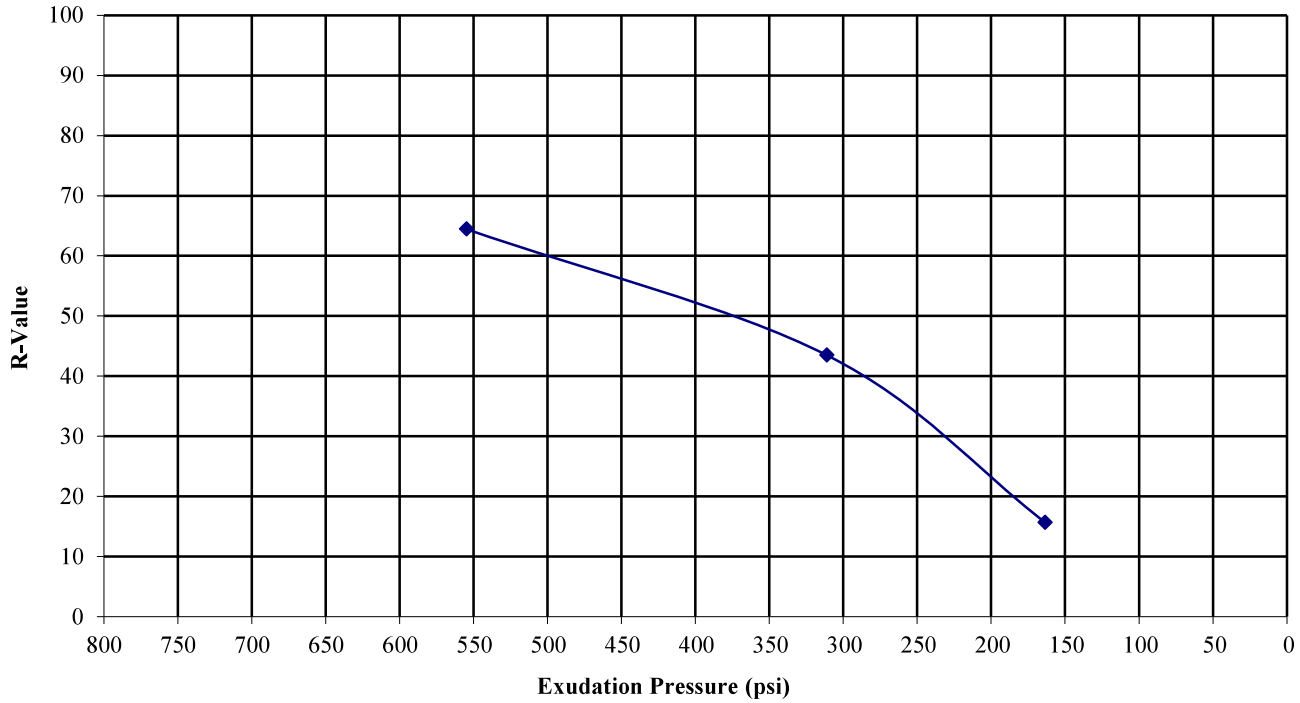
Reviewed By: _____

R-VALUE TEST REPORT

Client:	Ethos Engineering	**Job No.:**	25-37001
Project:	Jomax Road, Dysart to 126th Drive	**Work Order No.:**	1
Location:	Surprise and Peoria, AZ	**Lab No.:**	26-0088-09
Material:	See Boring Logs	**Date Sampled:**	4/15/2026
Sample Source:	P-4 (0.0-4.0')	**Date Reported:**	4/20/2026

RESISTANCE R-VALUE AND EXPANSION PRESSURE OF COMPACTED SOILS (ASTM D2844)

Specimen:	A	B	C
Moisture Content:	12.6%	11.7%	10.8%
Compaction Pressure (psi):	100	150	200
Specimen Height (inches):	2.49	2.45	2.39
Dry Density (pcf):	123.9	126.0	128.4
Horizontal Pressure @ 1000lbs (psi):	51.0	33.0	20.0
Horizontal Pressure @ 2000lbs (psi):	117.0	68.0	38.0
Displacement:	4.94	4.39	3.97
Expansion Pressure (psi):	0.0	0.0	0.0
Exudation Pressure (psi):	163	311	555
R-Value:	**16**	**44**	**64**



R-Value at 300 PSI = 42

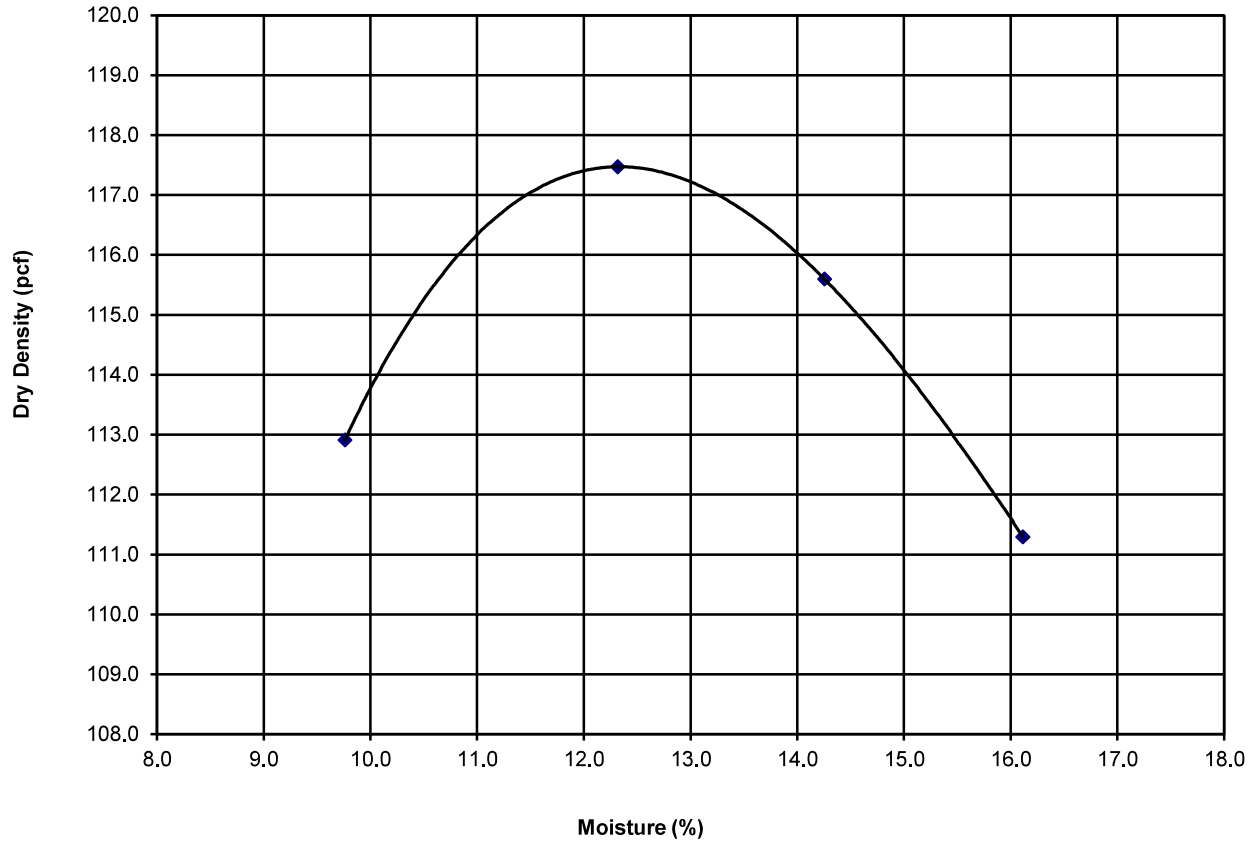
Reviewed By: _____

MOISTURE / DENSITY TEST REPORT

Client:	Ethos Engineering	**Job No.:**	25-37001
Project:	Jomax Road, Dysart to 126th Drive	**Work Order No.:**	1
Location:	Surprise and Peoria, AZ	**Lab No.:**	26-0088-07
Material:	See Boring Logs	**Date Sampled:**	4/15/2026
Sample Source:	P-3 (0.0-4.0')	**Date Reported:**	4/20/2026

LABORATORY COMPACTION CHARACTERISTICS OF SOILS USING STANDARD EFFORTS (12,400ft-lb-ft/cu.ft) (ASTM D698 METHOD A)

Maximum Dry Density (pcf):	117.5
Optimum Moisture (%):	12.4



Reviewed By: _____

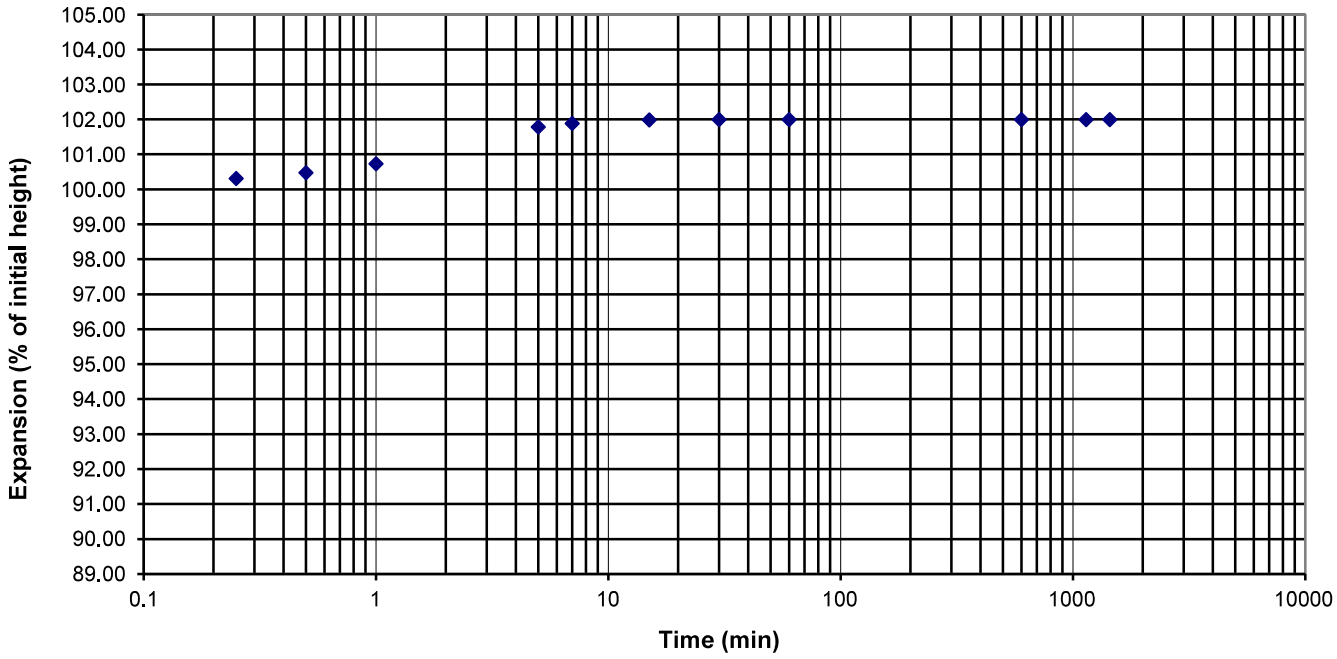
ONE DIMENSIONAL SWELL / SETTLEMENT TEST REPORT

Project:	Jomax Road, Dysart to 126th Drive	**Job No.:**	25-37001
Location:	Surprise and Peoria, AZ	**Work Order No.:**	1
Material:	See Boring Logs	**Lab No.:**	26-0088-07
Sample Source:	P-3 (0.0-4.0')	**Date Sampled:**	4/15/26
Sample Preparation:	Remolded to 95% max dry density and 2% below optimum moisture	**Date Reported:**	4/20/26
	Max dry density D698A 117.5 pcf @ 12.3% opt. moisture	**Load:**	144 psf

ONE DIMENSIONAL SWELL OR SETTLEMENT POTENTIAL OF COHESIVE SOILS (ASTM D-4546)

INITIAL DRY DENSITY (PCF):	112.1
FINAL DRY DENSITY (PCF):	114.3
INITIAL MOISTURE CONTENT:	10.3%
FINAL MOISTURE CONTENT:	18.6%
MOIST. PICK-UP (% DRY WT.):	8.4%
MOIST. PICK-UP (% IN. VOL.):	15.0%
SWELL (% INITIAL HT.)	2.0%

Expansion - Log Time Curve



Reviewed By: _____

pH / RESISTIVITY TEST REPORT

Client:	Ethos Engineering	**Job No.:**	25-37001
Project:	Jomax Road, Dysart to 126th Drive	**Work Order No.:**	1
Location:	Surprise and Peoria, AZ	**Date Sampled:**	4/15/2026
Material:	See Boring Logs	**Date Reported:**	4/20/2026

pH & RESISTIVITY (AZ 236)

Lab No	Sample Source	Resistivity (Ohm-cm)	pH
26-0088-15	S-1 (0.0-4.0')	1,027	8.5
26-0088-25	S-2 (0.0-4.0')	860	8.1

Reviewed By: _____

MOTZZ LABORATORY, INC.

Report: 961264
Reported: 4/18/2026
Received: 4/15/2026
PO: 25-37001WO1

Laboratory Analysis Report

Veritas Materials Testing
3707 E. Broadway Rd. Ste 1
Phoenix, AZ 85040

Project: Jomax Road, Dysart to 126th Drive

Lab Number	Sample ID	
961264-1	26-0088-16	S-1 (1-2')

Test Parameter

Test	*Method*	*Result*	*Units*
Sulfate	ARIZ 733b	108	ppm
Chloride	ARIZ 736b	183	ppm

Lab Number	Sample ID	
961264-2	26-0088-27	S-2 (4-5')

Test Parameter

Test	*Method*	*Result*	*Units*
Sulfate	ARIZ 733b	32	ppm
Chloride	ARIZ 736b	39	ppm

APPENDIX C

Pavement Design Supporting Calculations

Estimate of ESALs Input Sheet

Project Name	Jomax Road, Dysart Road to 126th Drive
Ethos Project No.	2026057
Designed by	J. Huston

Design Procedure: ADOT Pavement Design Manual 2017

Roadway Information

Roadway Name	Jomax Road	
Roadway Functional Classification	Minor Arterial	per Figure A-2/Table A-4
Roadway Type	Urban	
Roadway Segment	Dysart Rd. to 126th Dr.	
Construction Type	New Construction	per Table A-2
Number of Design Lanes	1	
Design Life	20	
Build Year	2030	
End Design Period	2049	

Traffic Information

AADT

Data Source	TY Lin
Data Year	2030
Data Year AADT	23,244
Future Year (if available)	2050
Future AADT (if available)	42,493
Directional Distribution	0.5

Growth Rate

Growth Rate Provided?	No	
Growth Rate		
Growth Rate Calculated	3.1%	
Design Growth Rate	3.06%	
Cluster Number from Table	2/3	per Table A-4
Cluster Number for Design	3	

Truck Traffic Info

Data Source	TY Lin
Singles (Count)	232
Combos (Count)	232

Percent Trucks

Percent Trucks Provided?	No
Percent Trucks	2.0%
Percent Trucks Calculated	2.0%

Lane Distribution Factor

Predicted Lane Distribution Factor	1	Per Table A-2
Design Lane Distribution Factor	1	

Jomax Road, Dysart Road to 126th Drive - Calculated Design ESALs 2030 to 2049

Traffic Information				
Functional Class:	Minor Arterial		Cluster Number:	3
Design Life:	20		Percent Trucks:	2.0%
Growth Rate:	3.06%		Design Year:	2030

AADT				
Data Location	Data Year	Future Year	Growth Rate	Build Year
Jomax Road	2030	2050		2030
Dysart Rd. to 126th Dr.	23,244	42,493	3.06%	23,244

Truck Traffic Information						
Truck Volumes		% of Total AADT		% of Total Trucks		
Singles (Count)	Combos (Count)	Singles (%)	Combos (%)	Singles	Combos	TTC
232	232	1.0	1.0	50	50	AZ-4

FLEXIBLE												
Vehicle Class	1-3	4	5	6	7	8	9	10	11	12	13	**Total**
Distribution (%)	N/A	5.3	38.6	6.2	0.2	9	36.9	1.8	1.3	0.3	0.4	100
Class Volume (daily)	22,779	25	179	29	1	42	172	8	6	1	2	**23,244**
Growth Factor (G)	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	
Class Volume (total)	224,834,360	243,188	1,771,144	284,484	9,177	412,961	1,693,140	82,592	59,650	13,765	18,354	
Truck Load Factor (T_{LF})	0.0008	1.2	0.13	0.86	0.64	0.52	1.93	1.78	2.25	1.17	2.07	
Class ESAL's	179,867	291,826	230,249	244,656	5,873	214,740	3,267,761	147,014	134,212	16,105	37,992	4,770,297

Total number of vehicles	4,588,456
Directional Distribution Factor	0.50
Lane Distribution Factor	1.00
Design ESAL's (Flexible)	**2,385,148**

RIGID												
Vehicle Class	1-3	4	5	6	7	8	9	10	11	12	13	**Total**
Distribution (%)	N/A	5.3	38.6	6.2	0.2	9	36.9	1.8	1.3	0.3	0.4	100
Class Volume (daily)	22,779	25	179	29	1	42	172	8	6	1	2	**23,244**
Growth Factor (G)	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	27.04	
Class Volume (total)	224,834,360	243,188	1,771,144	284,484	9,177	412,961	1,693,140	82,592	59,650	13,765	18,354	
Truck Load Factor (T_{LF})	0.0008	1.48	0.12	1.15	0.9	0.55	2.8	2.94	2.09	1.12	3.2	
Class ESAL's	179,867	359,919	212,537	327,157	8,259	227,129	4,740,793	242,821	124,668	15,417	58,732	6,497,300

Total number of vehicles	4,588,456
Directional Distribution Factor	0.5
Lane Distribution Factor	1.00
Design ESAL's (Rigid)	**3,248,650**

Mean R-Value and Modulus Calculations

Project Name:	Jomax Road, Dysart Road to 126th Drive
Roadway Name	Jomax Road
Roadway Segment:	Dysart Rd. to 126th Dr.

Mean R-Value Equation

$$R_{mean} = \frac{N_t \overline{R_t} \sigma_c^2 + N_c \overline{R_c} \sigma_t^2}{N_t \sigma_c^2 + N_c \sigma_t^2}$$

Tested R-Values

Boring ID	Depth	R-Value
P-1	0-4	70
P-2	0-4	
P-3	0-4	
P-4	0-4	42
Number of R-Value Tests (N_t):		2
Mean R-Value Tests (R_t):		56.0
Std Dev. of R-Values (σ_t):		19.8
Adjusted Mean R-Value (R_t'):		46.2

Correlated R-Values

Boring ID	Depth	PI	-#200	R-Value
P-1	0-4	7	29	51
P-2	0-4	8	40	42
P-3	0-4	16	35	33
P-4	0-4	13	23	44
Number of Correlated R-Values (N_c):				4
Mean of Correlated R-Value Results (R_c):				42.4
Std Dev. of Correlated R-Values (σ_c):				7.4
Adjusted Mean of Correlated R-Value (R_c'):				42.4

Calculated R_{mean}	42.7
Design R_{mean}	**30**
Calculated Control R_c	30.3
Design Control R_c	**30**

Resilient Modulus Equation

$$M_R = \frac{1815 + 225(R_{mean}) + 2.40(R_{mean})^2}{0.6(SVF)^{0.6}}$$

Maximum Allowable Resilient Modulus $(M_R)_{max}$	26,000
Seasonal Variation Factor, SVF	1.0
Calculated Resilient Modulus M_R (adjusted for SVF) (psi)	17,875
Design Resilient Modulus M_R (psi)	**17,875**

New Flexible Pavement Design Analysis

Project Name:	Jomax Road, Dysart Road to 126th Drive
Roadway Name:	Jomax Road
Roadway Segment:	Dysart Rd. to 126th Dr.
Ethos Project No.	2026057
Designed by:	J. Huston

Structural Number Design Equation

$$log_{10}(W_{18}) = Z_R S_O + 9.36 log_{10}(SN+1) - 0.20 + \left\{ \frac{log_{10}\left[\frac{\Delta PSI}{4.2-1.5}\right]}{0.40 + \frac{1094}{(SN+1)^{5.19}}} \right\} + 2.32 log_{10}(M_R) - 8.07$$

18-k Equivalent Single Axle Load, W_{18}	2,385,148
Standard Error, S_0	0.45
Standard Normal Deviate, Z_R	-1.645
Design Sevicability Loss, ΔPSI	1.4

Mean R-value	30.0
Seasonal Variation Factor, *SVF*	1.0
Maximum Resilient Modulus (psi)	26,000
Design Resilient Modulus, M_R (psi)	17,875

Required Structural Number, *SN* **3.15**

Pavement Thickness Design Equation

$$SN \leq a_1 D_1 + a_2 D_2 m_2 + a_3 D_3 m_3$$

Material Type	Layer Coefficient (a_i)	Layer Drainage Coefficient (m_i)	Layer Thickness (D_i) [Inches] Option 1	Option 2	Option 3	Option 4
Asphalt Concrete	0.44		5.0			
Cement Treated or Bituminous Treated Base	0.28	1.00				
Cement or Lime Treated Subgrade	0.16	1.00				
Aggregate Base	0.14	1.00	12.0			
Aggregate Subbase	0.11	0.93				
		Structural Number	3.88	0.00	0.00	0.00
		Acceptable?	Yes	No	No	No

Total Pavement Thickness [Inches]	17.0
Depth of Frost Penetration [Inches]	0
Potential Frost Concern	No

New Rigid Pavement Design Analysis

Project Name	Jomax Road, Dysart Road to 126th Drive
Roadway Nar	Jomax Road
Roadway Seg	Dysart Rd. to 126th Dr.
Ethos Project	2026057
Designed by:	J. Huston

Rigid Pavement Design Equation

$$log_{10}(W_{18}) = Z_R S_O + 7.35 log_{10}(D+1) - 0.06 + \left\{ \frac{log_{10}(}{1+} \right. + (4.22 - 0.32 p_t)\, log_{10} \left\{ \frac{[S_c' C_d (D^{0.75} - 1.1}{215.63\, J\, [D^{0.75} - 18.42/(} \right.$$

18-k Equivalent Single Axle Load, W	3,248,650
Standard Normal Deviate, Z_R	-1.645
Standard Error, S_0	0.25
Delta Serviceability Index, ΔPSI	1.4
Design Terminal Seviceability, P_t	2.8
Avg. Modulus of Rupture, S_c'	670
Drainage Coefficient, C_d	1.07
Load Transfer Coefficient, J	3.9

Modulus of Elasticity, E_c	########	[psi]
Maximum Resilient Modulus	26,000	[psi]
Design Resilient Modulus, MR	17,875	[psi]
Eff. Modulus of Subgrade Reaction	921	[pci]
Potential Loss of Subbase Support	0.00	

$Log_{10}(k_{corr}) = A_o + A_1 Log_{10}(k)$

Where: $A_o = -0.0844 LS^{0.6924}$

$A_1 = 1.0 - 0.1566 LS$

LS = Loss of Support

Design Modulus of Subgrade React 921 [pci]

(Figures 202.03-1 & 2 and Table 202.03-2)

Slab Thickness Determination

Slab Thickness, *D* 7.78 [inches]