Geotechnical Engineering Report

Bergin Lane Improvements
US 64 to W. Blanco Boulevard
Bloomfield, New Mexico

August 15, 2022

Terracon Project No. 66225029

Prepared for:
Souder, Miller & Associates
Albuquerque, New Mexico

Prepared by:
Terracon Consultants, Inc.
Albuquerque, New Mexico

August 15, 2022

Terracon

Souder, Miller & Associates
5454 Venice Avenue NE, Suite D
Albuquerque, New Mexico 87113

Attn: Mr. Matthew A. Nighbert, P.E.
P: (505) 299-0942
E: matthew.nighbert@soudermiller.com

Re: Geotechnical Engineering Report
Bergin Lane Improvements
US 64 to W. Blanco Boulevard
Bloomfield, New Mexico
Terracon Project No. 66225029

Dear Mr. Nighbert:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. These services were performed in general accordance with our proposal number P66225029 dated February 1, 2022 and the Souder, Miller & Associates Master Subconsultant Agreement Amendment No. 7130699-T1 dated March 24, 2022. This geotechnical engineering report presents the results of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of proposed improvements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

MICHAEL E. ANDERSON
NEW MEXICO
12132
PROFESSIONAL ENGINEER

Anderson, Mike
Oct 10 2022 6:21 AM

For Stenson D. Lee
Staff Engineer

Michael E. Anderson, P.E.
Principal
10/10/2022

Copies to: Addressee (1 via email)

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Exhibit No.

EXECUTIVE SUMMARY

This geotechnical executive summary should be used in conjunction with the entire report for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled General Comments should be read for an understanding of the report limitations.

A geotechnical exploration has been performed for the proposed Bergin Lane Improvements project located from US 604 to W. Blanco Boulevard in Bloomfield, New Mexico. Terracon's geotechnical scope of work included the advancement of 3 test borings to approximate depths of 6 to 6.5 feet below existing site grades.

Based on the information obtained from our subsurface exploration, the project alignment is suitable for the proposed improvements. The following geotechnical considerations were identified:

Site Soils: The site soils consisted of sands with varying amounts of silt and gravel. Groundwater was not encountered in the borings during the field exploration. However, elevated moisture contents of the subgrade soils were encountered in some of the borings. The existing sand subgrade soils were loose in relative density and are considered to be fair to good quality pavement support subgrade materials. On-site soils can be considered for use as structural/engineered fill beneath the pavements.

Subgrade Stability: Based upon the loose nature of the subgrade soils, and some elevated moisture contents of the subgrade soil, it is our opinion that existing subgrade soils may require some densification and/or drying during construction.

Pavement Sections: New pavements were designed to New Mexico Department of Transportation (NMDOT) Specifications.

Location	Recommended Pavement Section Thickness (inches)		
	Hot Mix Asphalt (HMA)	Base Course (BC)	Total
Bergin Lane	3.5	6	9.5

Earthwork: Approximately 2 to 3 inches of asphalt concrete overlying 4 to 6 inches of base course were encountered at the boring locations and will require removal prior to new construction. If grades permit, the existing pavement materials could be adequately processed and reused beneath the new pavement section, to assist in stabilizing the existing subgrade (if required). It is our opinion that excavations for the planned construction can be accomplished with conventional earthwork equipment.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, and other geotechnical conditions exposed during construction.

GEOTECHNICAL ENGINEERING REPORT
BERGIN LANE IMPROVEMENTS
US 64 TO W. BLANCO BOULEVARD
BLOOMFIELD, NEW MEXICO

Terracon Project No. 66225029
August 15, 2022

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering services performed for the proposed Bergin Lane Improvements project located from US 64 to W. Blanco Boulevard in Bloomfield, New Mexico. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Earthwork
- Pavement design and construction
- groundwater conditions
- pavement materials specifications
- subgrade conditions

Our geotechnical engineering scope of work for this project included the advancement of 3 test borings to depths of approximately 6 to 6.5 feet below existing site grades.

Logs of the borings along with a Site Location Map and Exploration Location Plan (Exhibit A1 and A2) are included in Appendix A of this report. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included in Appendix B of this report. Descriptions of the field exploration and laboratory testing are included in their respective appendices.

2.0 PROJECT INFORMATION

2.1 Site Location and Description

ITEM	DESCRIPTION
Location	Bergin Lane from US 64 to W. Blanco Boulevard in Bloomfield, New Mexico.
Length of improvements	Approximately 0.5 miles

ITEM	DESCRIPTION
Existing improvements	Existing two-lane asphalt paved roadway with some paved and unpaved shoulders, and limited curb, gutter, and sidewalks. Road provides access to commercial/retail, Mesa Alta Junior High School, senior living facilities, and Bloomfield Schools Administration offices.
Pavement condition	Not Provided. Based upon review of aerial photos, the pavement condition appears to be poor to fair
Highway classification	Collector (assumed)
Current ground cover	Paved roadway and exposed earth with vegetation common to the area located adjacent to the road.
Existing topography	Road constructed on relatively level terrain.

2.2 Project Description

ITEM	DESCRIPTION
Proposed Improvements	The project will include improvements to this section of roadway. The improvements addressed as part of this phase of the project include pavement reconstruction/rehabilitation and drainage.
Cut and Fill Slopes	At or near existing alignment grade along majority of alignment.
Slope configuration	Not Applicable
Proposed pavement wearing surface	Hot mix asphalt (HMA) over base course (BC)
Geotechnical Issues	Poor quality and potentially expansive subgrade soils
Traffic Conditions	Average Daily Traffic (ADT) - 958 Trucks = 14 percent
Specifications	2020 New Mexico Department of Transportation (NMDOT) Design Manual 2019 NMDOT Standard Specifications for Highway and Bridge Construction

3.0 SUBSURFACE CONDITIONS

3.1 Existing Pavement Conditions

Based on limited field observations, the existing pavement appears to be in poor to fair condition along this segment of Bergin Lane.

Pavement distress was observed and included low to moderate severity alligator cracking, low to medium severity longitudinal and transverse cracking, low to moderate severity potholes and patching, and low severity block cracking.

The approximate existing pavement materials thickness along the project alignment are summarized as follows:

Boring Designation	Portion of Street	Asphalt Thickness (inches)	Base Course Thickness (inches)
P-01	Northbound	2.5	4
P-02	Southbound	2	6
P-03	Northbound	3	5

3.2 Typical Subsurface Profile

Specific conditions encountered at the boring locations are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the borings can be found on the boring logs included in Appendix A of this report. Based on the results of the borings, subsurface soil conditions on the project site can be generalized as follows:

Description	Approximate Depth to Bottom of Stratum (feet)	Material Encountered	Consistency
Stratum 1	0.5 to 0.7	Asphalt Concrete – 2 to 3" Base Course – 4 to 6"	N/A
Stratum 2	6 to 6.5	Sand. The silt and gravel content varied	Loose

Laboratory tests were conducted on selected soil samples and the test results are presented in Appendix B.

The sand subgrade soils were non-plastic in plasticity.

The sand subgrade soils classify as SP-SM and SM in accordance with the Unified Soil Classification System (USCS) and A-1-b, A-2-4 and A-4 in accordance with the American Association of State Highway and Transportation Officials (AASHTO) Classification System.

Based on the laboratory test results, elevated moisture contents were observed in the subgrade. The soil classifications, field penetration resistance, and in-situ moisture contents are summarized below:

Boring No.	USCS Classification	AASHTO Classification	Field Penetration Resistance (blows/foot)	In-situ Moisture Content (%)
P-01	SM	A-2-4 and A-4	5 to 7	7 to 15
P-02	SP-SM	A-1-b	7 to 9	2 to 3
P-03	SM	A-2-4	5 to 7	7 to 10

Based on the laboratory test results and the AASHTO classifications, NMDOT correlated R-values were determined. In addition, three (3) laboratory resistance value (R-Value) tests were performed on a representative sample of the clay and sand subgrade soils obtained from the ground surface to a depth of about 5 feet below existing site grades. The soil classifications and R-values at the boring locations are as follows:

Boring No.	USCS Classification	AASHTO Classification	NMDOT Correlated R-value	Laboratory Tested R-value
P-01	SM	A-2-4 and A-4	55/46	55
P-02	SP-SM	A-1-b	69	N/A
P-03	SM	A-2-4/A-4	55/46	33

3.3 Groundwater

Groundwater was not observed in the test borings at the time of field exploration, nor when checked upon completion of drilling. However, moisture contents as high as 15 percent were determined from the subgrade soils and may represent near saturated conditions. These observations represent groundwater conditions at the time of the field exploration and may not be indicative of other times, or at other locations. Groundwater conditions can change with varying seasonal and weather conditions, and other factors.

Fluctuations in groundwater levels can best be determined by implementation of a groundwater monitoring plan. Such a plan would include installation of groundwater monitoring wells, and periodic measurement of groundwater levels over a sufficient period of time. Potential seasonal groundwater conditions should be considered in the design and construction of the project.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

The project alignment site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings. The site soils consisted of sands with varying amounts of silt and gravel. Groundwater was not encountered in the borings during the field exploration. However, elevated moisture contents of the subgrade soils were encountered in some of the borings. The existing sand subgrade soils were loose in relative density and are considered to be fair to good quality pavement support subgrade materials. On-site soils can be considered for use as structural/engineered fill beneath the pavements.

Based upon the loose nature of the subgrade soils, and elevated moisture contents of the subgrade soil in some area , it is our opinion that existing subgrade soils may require some densification and/or drying out prior to construction.

It is our opinion that excavations for the planned construction can be accomplished with conventional earthwork equipment.

Approximately 2 to 3 inches of asphalt concrete and 4 to 6 inches of base course were encountered at the boring locations and will require removal prior to new construction. If grades permit, the existing asphalt could be adequately processed and reused beneath the new pavement section, to assist in stabilizing the existing subgrade (if required).

Pavement thickness and design recommendations were performed in general accordance with the NMDOT Design Directive and AASHTO as approved by NMDOT. Pavement construction and general earthwork recommendations provided herein are in general accordance with the NMDOT Standard Specifications for Highway and Bridge Construction 2019 Edition (NMDOT Specifications).

Geotechnical engineering recommendations for pavements and other earth connected phases of the project are outlined below. The recommendations contained in this report are based upon the results of field and laboratory testing (which are presented in Appendices A and B), engineering analyses, and our current understanding of the proposed project.

4.2 Earthwork

The following presents recommendations for site preparation, excavation, subgrade preparation and placement of engineered fills on the project. The recommendations presented for design and construction of earth supported elements including foundations and pavements are contingent upon following the recommendations outlined in this section.

Earthwork, site preparation, and excavations should be performed in accordance with Section 200, *Earthwork* of the NMDOT Specifications.

Earthwork on the project should be observed and evaluated by Terracon. The evaluation of earthwork should include observation and testing of engineered fill, subgrade preparation, foundation bearing soils, and other geotechnical conditions exposed during the construction of the project.

4.2.1 Site Preparation

Site preparation should be performed in accordance with Section 201, *Clearing and Grubbing,* and Section 213, *Obliterating Old Road*, of the NMDOT Specifications.

Strip and remove existing asphalt, Portland cement concrete, aggregate base course, vegetation, debris, and other deleterious materials from proposed new pavement areas. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction.

Stripped materials consisting of landscaping, vegetation and organic materials (if encountered) should be wasted from the site, or used to revegetate landscaped areas or exposed slopes after completion of grading operations. If it is necessary to dispose of organic materials on-site, they should be placed in non-structural areas, and in fill sections not exceeding 5 feet in height.

The site should be initially graded to create a relatively level surface to receive fill, and to provide for a relatively uniform thickness of fill beneath proposed pavements and foundations.

Evidence indicating the potential presence of underground utilities on-site and adjacent to the project alignment was observed during the field operations. If utilities or fills or other underground facilities are encountered, such features should be removed and the excavation thoroughly cleaned prior to backfill placement and/or construction.

4.2.2 Excavation

Excavations should be performed in accordance with Section 203, *Excavation, Borrow, and Embankment*, of the NMDOT Specifications.

It is anticipated that excavations for the proposed construction can be accomplished with conventional earthmoving equipment.

Based on the results from the soil borings, groundwater is not anticipated to be encountered during construction. However, groundwater control measures may be necessary during construction depending upon actual conditions encountered during construction. Furthermore, soft/very loose soil conditions and significantly elevated/high moisture contents of the subgrade were encountered in the borings. The existing soils will require stabilization during construction.

The individual contractor(s) is responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottom. Excavations should be sloped or shored in the interest of safety following local and federal regulations, including current OSHA excavation and trench safety standards.

4.2.3 Subgrade Preparation

Subgrade preparation should be conducted in accordance with Section 207, *Subgrade Preparation,* of NMDOT Specifications.

Subgrade soils beneath pavements should be scarified, moisture conditioned (if necessary) and compacted to a minimum depth of 6 inches. The moisture content and compaction of subgrade soils should be maintained until pavement construction.

4.2.4 Fill Materials and Placement

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than six inches in size. Pea gravel or other similar non-cementitious, poorly-graded materials should not be used as fill or backfill without the prior approval of the geotechnical engineer.

Clean on-site soils or approved imported materials may be used as fill material for the following:

- General Site Grading
- Pavements

It should be noted that existing subgrade soils may requiring drying out prior to use as site grading and for the installation of utilities.

On-site or imported soils for use as fill material should conform to low volume change materials as indicated in the following specifications:

Gradation	Percent Finer by Weight (ASTM C 136)
6"	100
3"	70-100

No. 4 Sieve 50-100
No. 200 Sieve .... 40 (max)

- Liquid Limit .... 0 (max)
- Plasticity Index .... 0 (max)
- Minimum R-value 33

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed eight (8) inches loose thickness.

4.2.5 Compaction Requirements

Recommended compaction and moisture content criteria for engineered fill materials per Sections 203, 206, and 207 of NMDOT Specifications are as follows:

Material Type and Location	Per the Modified Proctor Test (AASHTO T 180/ASTM D 1557)		
	Minimum Compaction Requirement (%)	Range of Moisture Contents for Compaction	
		Minimum	Maximum
On-site soils or approved imported fill soils (beneath pavements)	95	-3%	+3%
Aggregate base (beneath pavements)	96	-3%	+3%
Miscellaneous backfill	95	-3%	+3%

4.2.6 Grading and Drainage

Positive drainage should be provided during construction and maintained throughout the life of the project. Infiltration of water into utility trenches or excavations should be prevented during construction. Features which could retain water in areas adjacent to the pavements should be sealed or eliminated. In areas where sidewalks do not immediately adjoin the pavement, we recommend that protective slopes be provided with a minimum grade of approximately 2 percent for at least 5 feet from the edge of the pavement. Backfill in utility trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration.

4.2.7 Corrosion Potential

Results of soluble sulfate testing indicate along the project alignment indicate concentrations ranging from 143 to 222 mg/kg. Based upon the test results, we recommend that ASTM Type I-II or II Portland cement be specified for all concrete on and below grade. Foundation concrete should be designed in accordance with the provisions of the ACI Design Manual, Section 318, Chapter 4.

Laboratory test results indicate that on-site subgrade soils exhibit soluble chlorides concentrations of 73 and 88 mg/kg, resistivities of 698 to 2,522 ohm-centimeters and pH values of about 8.34 to 8.75.

Criteria published by the Cast Iron Pipe Research Institute indicates that the near surface subgrade soils generally have a moderate to severe corrosive potential to cause corrosion to buried ferrous materials. Review of data published by the National Association of Corrosion Engineers indicates that the resistivity values concentrations places the soil in the mildly corrosive to corrosive category. Therefore, the use of metals that possess corrosion resistance such as aluminum, galvanized steel and/or HDPE or wrapping or coating of pipes/conduits should be considered. These values should be used to determine potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction. Per Table 570.2.3.1 of the NMDOT Specifications, the site soils should be considered as Corrosion Resistance No. CR1 for this project.

Refer to Summary of Laboratory Results contained in Appendix B for the complete results of the corrosivity testing conducted on the site soils in conjunction with this geotechnical exploration.

4.2.8 Construction Considerations

Based upon the subsurface conditions determined from the geotechnical exploration, excavations into the on-site soils will encounter loose sand subgrade soils that may require densification. In addition, elevated moisture contents of the subgrade were encountered in some of the borings. Therefore, some drying of the subgrade may be required during construction

4.3 Pavements

4.3.1 Design Recommendations

Design of the pavement thickness for the intersection has been performed based on procedures outlined in the New Mexico Department of Transportation (NMDOT) Design Directive, AASHTO, and our local experience and understanding of the project.

The traffic data is based upon information provided by SMA and is summarized below:

Location	Average Daily Traffic (ADT)	% Autos	% Heavy Trucks and Busses
Bergin Lane	958	86	14

Using the traffic data outlined above, 18-kip equivalent single-axle load (ESAL) for pavement design was calculated and summarized below:

Location	Total ESALs
Bergin Lane	178,114

A detailed summary of the ESAL calculations are included in Appendix C.

The following parameters were used in the design of the hot mix asphalt (HMA) pavement:

- Street Classification: Collector
- Local drainage characteristics were classified as good, resulting in an overall design drainage coefficient (C_d) of 1.0,
- Initial serviceability of 4.2 along with terminal serviceability index of 2.0 was utilized with an inherent reliability of 65% for hot mix asphalt
- Standard deviation for asphalt of 0.45,
- Layer structural coefficients of 0.44 for new hot mix asphalt and 0.11 untreated base course materials
- R-value of 33 for sand subgrade
- 20-year design life

Based upon the parameters outlined above, the AASHTO program, the recommended pavement section thickness is as follows:

Location	Recommended Pavement Section Thickness (inches)		
	Hot Mix Asphalt (HMA)	Base Course (BC)	Total
Bergin Lane	3.5	6	9.5

The AASHTO pavement structural design computation forms are included in Appendix C.

4.3.2 Materials Specifications

Based upon the design directive, the recommended pavement sections should consist of Hot Mix Asphalt (HMA), meeting the gradation and properties of SP-III and SP-IV with performance graded (PG) asphalt binder of 70-22. Pavement materials should conform to NMDOT Specifications Sections 402 (*Asphalt Materials, Hydrated Lime, and Anhydrite Based Material*) and 423 (*Hot-Mix Asphalt – Superpave QLA & non-QLA*).

The hot mix asphalt should be compacted to a density of at least 93% and not greater than 97% of the theoretical maximum density as determined by ASTM D2041. The pavement sections should be constructed according to NMDOT Specifications Section 423.

The hot mix asphalt mix design should be submitted prior to construction to verify its adequacy and should be placed and compacted in accordance with procedures outlined in the NMDOT Specifications.

The aggregate base course should consist of a blend of sand and gravel, which meets strict specifications for quality and gradation. Use of materials meeting Sections 303 (*Base Course*) of NMDOT Specifications is required. Aggregate base course material should be tested to determine compliance with these specifications prior to importation to the site.

Aggregate base course should be compacted to a minimum 96% of maximum dry density and within 2 percent of optimum moisture content as determined by AASHTO T180/ASTM D1557. Aggregate base course should be placed and compacted in accordance with Section 303 of NMDOT Specifications.

4.3.3 Pavement Maintenance

Service life of the pavement is based on periodic pavement maintenance, adequate drainage, and traffic consistent with the stated assumptions in this report. Preventive maintenance should be planned and provided for through an on-going pavement management program. Preventive maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Preventive maintenance consists of both localized maintenance (e.g. crack and joint sealing and patching) and global maintenance (e.g. surface sealing). Preventive maintenance is usually the first priority when implementing a planned pavement maintenance program and provides the highest return on investment for pavements. Prior to implementing any maintenance, additional engineering observation is recommended to determine the type and extent of preventive maintenance.

Long term pavement performance depends on several factors, including maintaining subgrade moisture levels and providing for preventive maintenance. The following recommendations should be considered the minimum:

- Site grading at a minimum 2% grade away from the pavements;
- The subgrade and the pavement surface have a minimum ¾ inch per foot slope to promote proper surface drainage.
- Consider appropriate edge drainage and pavement under drain systems,
- Install joint sealant and seal cracks immediately

5.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A

FIELD EXPLORATION

SITE LOCATION

Bergin Lane - US 64 to W. Blanco Boulevard, Bloomfield, NM ■ Bloomfield, NM
August 10, 2022 ■ Terracon Project No. 66225029

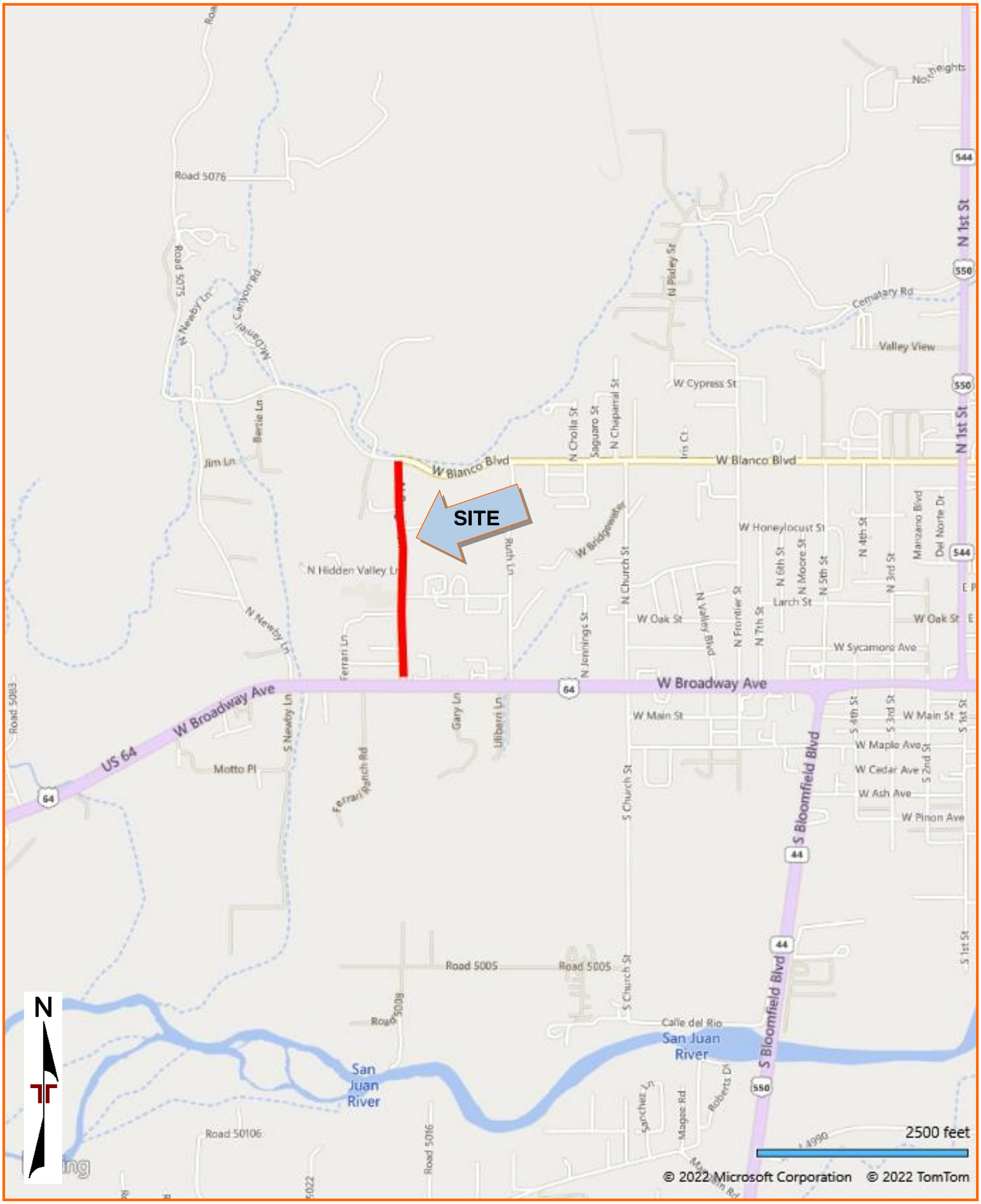

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

ROAD MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Bergin Lane - US 64 to W. Blanco Boulevard, Bloomfield, NM ■ Bloomfield, NM
August 10, 2022 ■ Terracon Project No. 66225029

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Field Exploration Description

Three (3) test borings were drilled along the project alignment June 16, 2022. The borings were drilled to depths of approximately 6 to 6.5 feet below the ground surface at the approximate locations shown on the attached Site Location Map and Exploration Location Plan, Exhibits A1 and A2. The test borings are summarized below:

Boring Designation	Location	Depths (feet)
P-01 through P-03	Bergin Lane	6 to 6.5

The test borings were advanced with a truck-mounted CME-75 drill rig utilizing 7-½ inch outside diameter hollow-stem augers.

The borings were located in the field by pacing from existing site features. Latitude and longitude and approximate elevation were determined at each boring location using a hand-held GPS unit. The accuracy of boring locations and elevations should only be assumed to the level implied by the methods used.

Lithologic logs of the borings were recorded by the Terracon representative during the drilling operations. At selected intervals within the hollow-stem auger borings, samples of the subsurface materials were taken by driving split-spoon or ring-barrel samplers. Bulk samples of subsurface materials were also obtained at selected intervals in the borings.

Within the hollow-stem auger borings, penetration resistance measurements were obtained by driving the split-spoon and ring-barrel samplers into the subsurface materials with a 140-pound automatic hammer falling 30 inches. The penetration resistance value is a useful index in estimating the consistency or relative density of materials encountered.

A CME automatic SPT hammer was used to advance the split-barrel sampler in the hollow-stem auger borings performed on this site. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

Groundwater conditions were evaluated in the borings at the time of site exploration. Due to safety considerations, the borings were backfilled with native soils and patched with an asphalt cold mix after the completion of drilling operations.

BORING LOG NO. P-01

PROJECT:

CLIENT: **Souder Miller & Associates**
Albuquerque, NM

SITE: **Bergin Lane Improvements-US 64 to W. Blanco Blvd**
Bloomfield, NM

LOCATION See Exploration Plan

Latitude: 36.7118° Longitude: -108.0015°

Surface Elev.: 5435 (Ft.)

MODEL LAYER	DEPTH	DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	SWELL (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1	0.2	**ASPHALT CONCRETE - 2.5"**	5434.8									
2	0.5	**AGGREGATE BASE COURSE - 4"**	5434.5									
3		**SILTY SAND (SM)**, trace gravel, brown, loose, AASHTO Classification A-2-4 and A-4				Bulk (approx. 2.5 ft)			11.3		NP	38
				2.5–3.5		Ring sample	2-5		7.0	98	NP	18
	6.5		5428.5	5–6.5		SPT	1-2-3 N=5		15.7			

Boring Terminated at 6.5 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.5" Solid Stem Augers

Abandonment Method:
Boring backfilled with Auger Cuttings
Surface capped with asphalt

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

Terracon
6805 Academy Pkwy West NE
Albuquerque, NM

Boring Started: 06-16-2022	Boring Completed: 06-16-2022
Drill Rig: CME 55	Driller: ABQ TERRACON
Project No.: 66225029	

BORING LOG NO. P-02

PROJECT:

CLIENT: Souder Miller & Associates
Albuquerque, NM

SITE: Bergin Lane Improvements-US 64 to W. Blanco Blvd
Bloomfield, NM

LOCATION See Exploration Plan

Latitude: 36.7148° Longitude: -108.0016°

Surface Elev.: 5435 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH	MATERIAL DESCRIPTION	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	SWELL (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0.2	**ASPHALT CONCRETE - 2"**	5434.8									
2		0.7	**AGGREGATE BASE COURSE - 6"**	5434.3									
3			**POORLY GRADED SAND WITH SILT (SP-SM)**, trace gravel, brown, loose, AASHTO Classification A-1-b		1								
					2								
					3			3-4-3 N=7		3.4		NP	8
					4								
					5			4-5		1.9	99		
		6.0		5429	6								

Boring Terminated at 6 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.5" Solid Stem Augers

Abandonment Method:
Boring backfilled with Auger Cuttings
Surface capped with asphalt

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS
Groundwater not encountered

Terracon
6805 Academy Pkwy West NE
Albuquerque, NM

Boring Started: 06-16-2022	Boring Completed: 06-16-2022
Drill Rig: CME 55	Driller: ABQ TERRACON
Project No.: 66225029	

BORING LOG NO. P-03

PROJECT:

CLIENT: **Souder Miller & Associates Albuquerque, NM**

SITE: **Bergin Lane Improvements-US 64 to W. Blanco Blvd Bloomfield, NM**

LOCATION See Exploration Plan

Latitude: 36.7183° Longitude: -108.0017°

Surface Elev.: 5435 (Ft.)

MODEL LAYER	GRAPHIC LOG	DEPTH / DESCRIPTION / ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	SWELL (%)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		**ASPHALT CONCRETE - 3"** 0.3 / 5434.8									
2		**AGGREGATE BASE COURSE - 5"** 0.7 / 5434.3									
3		**SILTY SAND (SM)**, trace gravel, brown, loose, AASHTO Classification A-2-4	1								
			2								
					Grab			10.1		NP	35
			3		Ring	3-4		9.3	105		
			4								
			5–6		SPT	2-2-3 N=5		7.0			
		6.5 / 5428.5									
		Boring Terminated at 6.5 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4.5" Solid Stem Augers

Abandonment Method:
Boring backfilled with Auger Cuttings
Surface capped with asphalt

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Elevations measured in the field

Notes:

WATER LEVEL OBSERVATIONS

Groundwater not encountered

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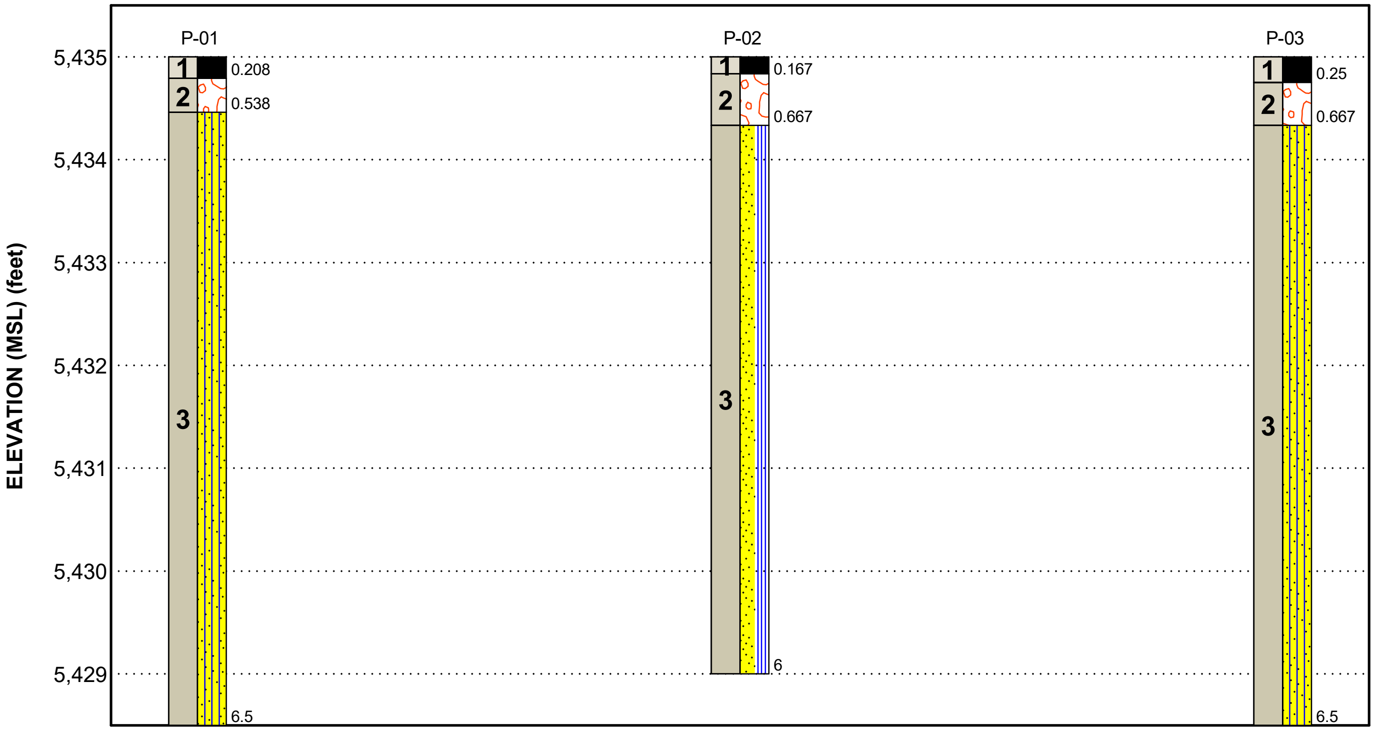
Albuquerque, NM

Boring Started: 06-16-2022	Boring Completed: 06-16-2022
Drill Rig: CME 55	Driller: ABQ TERRACON
Project No.: 66225029	

GEOMODEL
Bloomfield, NM
Terracon Project No. 66225029

Terracon GeoReport



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	**Asphalt**	Aspalt Concrete with 2 to 3 inches in thickness.
2	**Base Course**	Aggregate Base Course ranging in 4 to 6 inches in thickness.
3	**Loose Coarse Grained Soils**	Sand soils with variable amounts of silt and gravel.

LEGEND

- Asphalt Concrete
- Aggregate Base Course
- Silty Sand
- Poorly-graded Sand with Silt

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING

- Auger
- Shelby Tube
- Split Spoon
- Rock Core
- Macro Core
- Modified California Ring Sampler
- Grab Sample
- No Recovery
- Modified Dames & Moore Ring Sampler

WATER LEVEL

- Water Initially Encountered
- Water Level After a Specified Period of Time
- Water Level After a Specified Period of Time

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	Hand Penetrometer
(T)	Torvane
(b/f)	Standard Penetration Test (blows per foot)
N	N value
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength, Qu, psf**	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**
Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15	10 - 18
Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30	19 - 42
			Hard	> 8,000	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

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UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification: Group Symbol	Soil Classification: Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]	GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]	SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G,H,I]
			Fines classify as CL or CH	SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	$PI > 7$ and plots on or above "A" line [J]	CL	Lean clay [K,L,M]
			$PI < 4$ or plots below "A" line [J]	ML	Silt [K,L,M]
		Organic:	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OL	Organic clay [K,L,M,N]
					Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line	CH	Fat clay [K,L,M]
			PI plots below "A" line	MH	Elastic Silt [K,L,M]
		Organic:	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OH	Organic clay [K,L,M,P]
					Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10} \qquad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains $\geq$ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains $\geq$ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains $\geq$ 30% plus No. 200 predominantly sand, add "sandy" to group name.

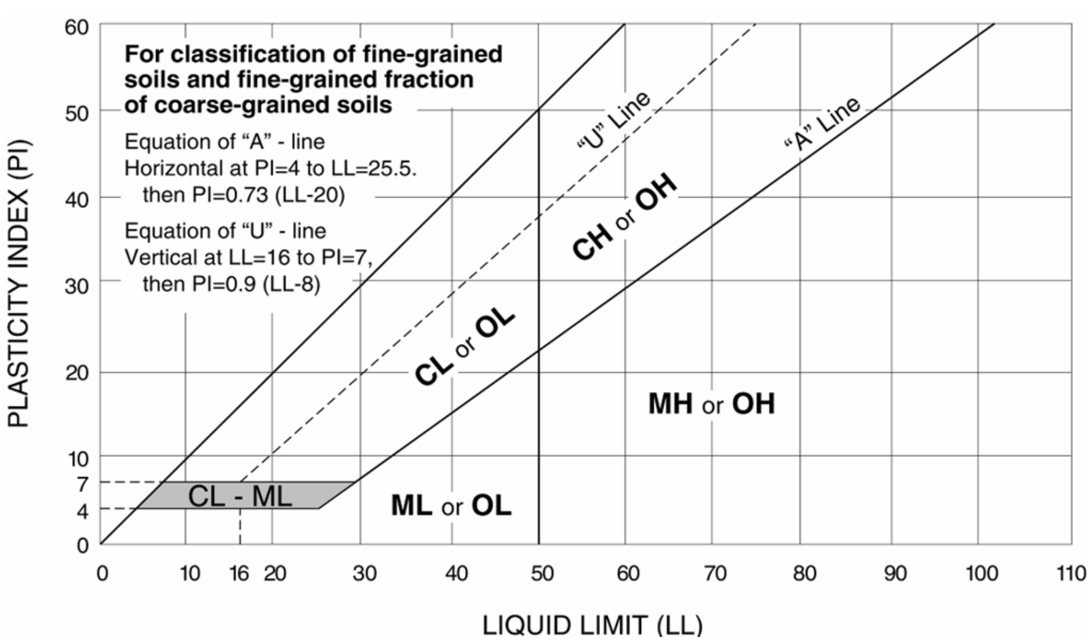
[M] If soil contains $\geq$ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] $PI \geq 4$ and plots on or above "A" line.

[O] $PI < 4$ or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



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APPENDIX B

LABORATORY TESTING

Laboratory Testing

Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in accordance with the Unified Soil Classification System (USCS) described in Appendix A. At that time, the field descriptions were confirmed or modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

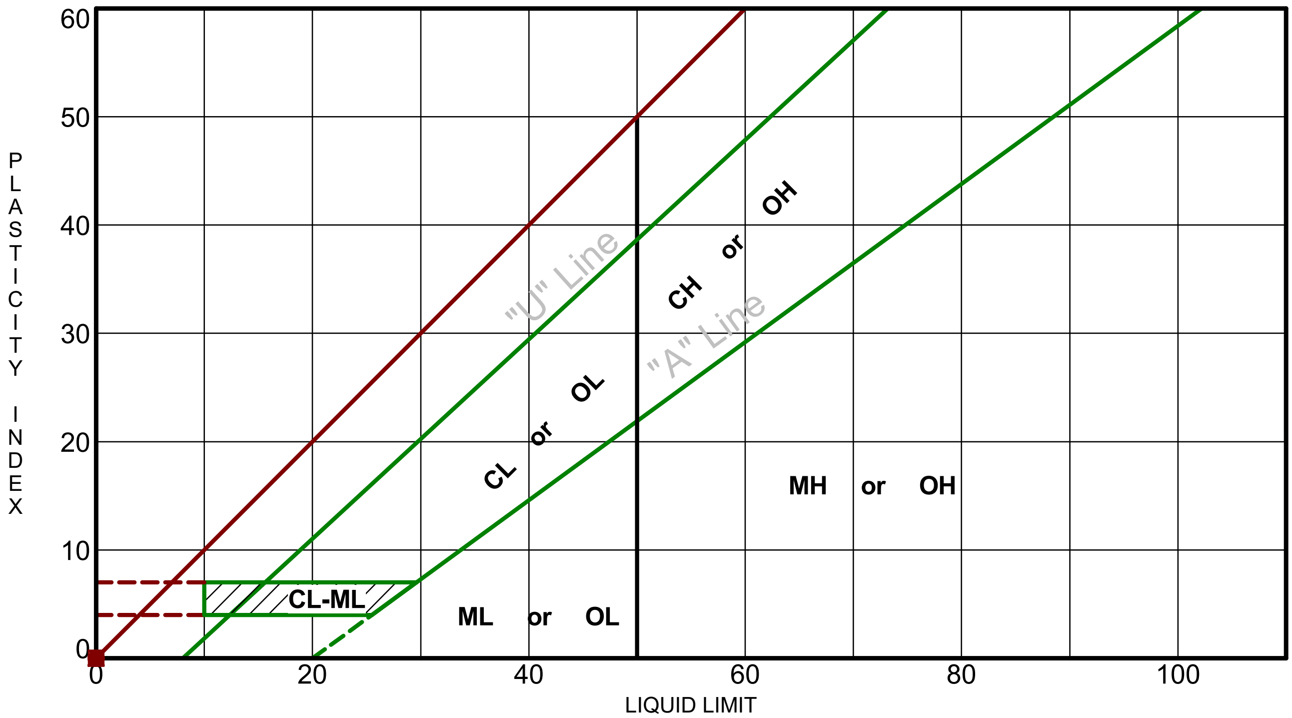
Laboratory tests were conducted on selected soil samples and the test results are presented in this appendix. The laboratory test results were used for the geotechnical engineering analyses, and the development of foundation and earthwork recommendations. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- Sieve Analysis
- Atterberg Limits
- R-value
- pH
- Chlorides
- In-situ Water Content
- In-situ Dry Density
- Soluble Sulfates
- Resistivity

ATTERBERG LIMITS RESULTS

ASTM D4318



	Boring ID	Depth	LL	PL	PI	Fines	AASHTO	Description
●	P-01	0 - 5	NP	NP	NP	37.6	A-4 (0)	SILTY SAND (SM)
⊠	P-01	2.5 - 3.5	NP	NP	NP	18.0	A-2-4 (0)	SILTY SAND (SM)
▲	P-02	2.5 - 4	NP	NP	NP	8.0	A-1-b (0)	POORLY GRADED SAND with SILT (SP-SM)
★	P-03	0 - 5	NP	NP	NP	35.3	A-2-4 (0)	SILTY SAND (SM)

PROJECT: Bergin Lane - US 64 to W. Blanco Boulevard

SITE: Bergin Lane Improvements-US 64 to W. Blanco Boulevard
Bloomfield, NM

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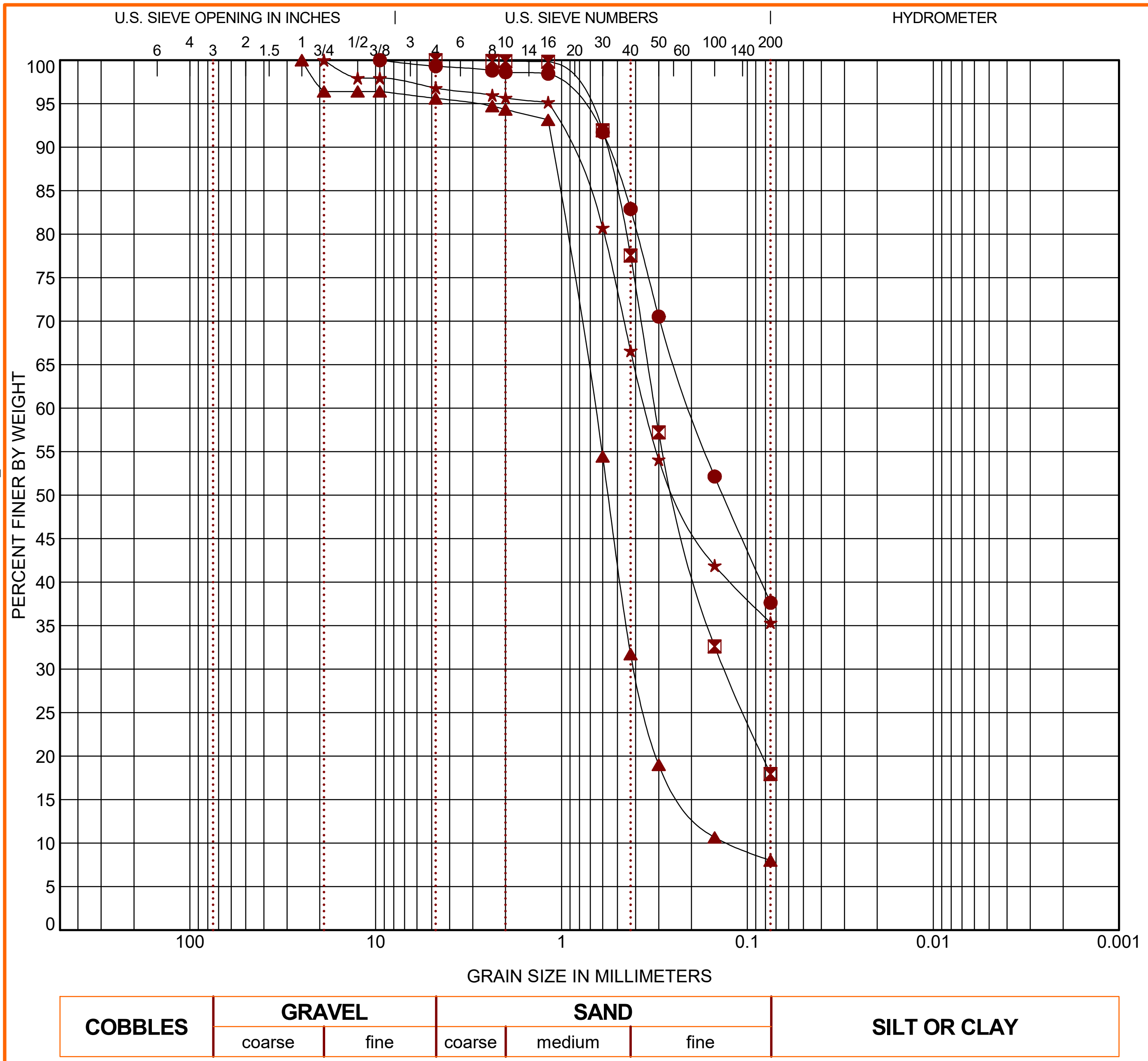
6805 Academy Pkwy West NE
Albuquerque, NM

PROJECT NUMBER: 66225029

CLIENT: Souder Miller & Associates
Albuquerque, NM

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



	Boring ID	Depth	USCS Classification	AASHTO Classification	WC (%)	LL	PL	PI	Cc	Cu
●	P-01	0 - 5	SILTY SAND (SM)	A-4 (0)	11.3	NP	NP	NP		
⊠	P-01	2.5 - 3.5	SILTY SAND (SM)	A-2-4 (0)	7.0	NP	NP	NP		
▲	P-02	2.5 - 4	POORLY GRADED SAND with SILT (SP-SM)	A-1-b (0)	3.4	NP	NP	NP	1.97	5.23
★	P-03	0 - 5	SILTY SAND (SM)	A-2-4 (0)	10.1	NP	NP	NP		

	Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	P-01	0 - 5	9.5	0.202			0.7	61.7		37.6	
⊠	P-01	2.5 - 3.5	4.75	0.315	0.133		0.0	82.0		18.0	
▲	P-02	2.5 - 4	25	0.661	0.405	0.126	4.4	87.6		8.0	
★	P-03	0 - 5	19	0.354			3.2	61.5		35.3	

PROJECT: Bergin Lane - US 64 to W. Blanco Boulevard

SITE: Bergin Lane Improvements-US 64 to W. Blanco Boulevard
Bloomfield, NM

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Albuquerque, NM

PROJECT NUMBER: 66225029

CLIENT: Souder Miller & Associates
Albuquerque, NM

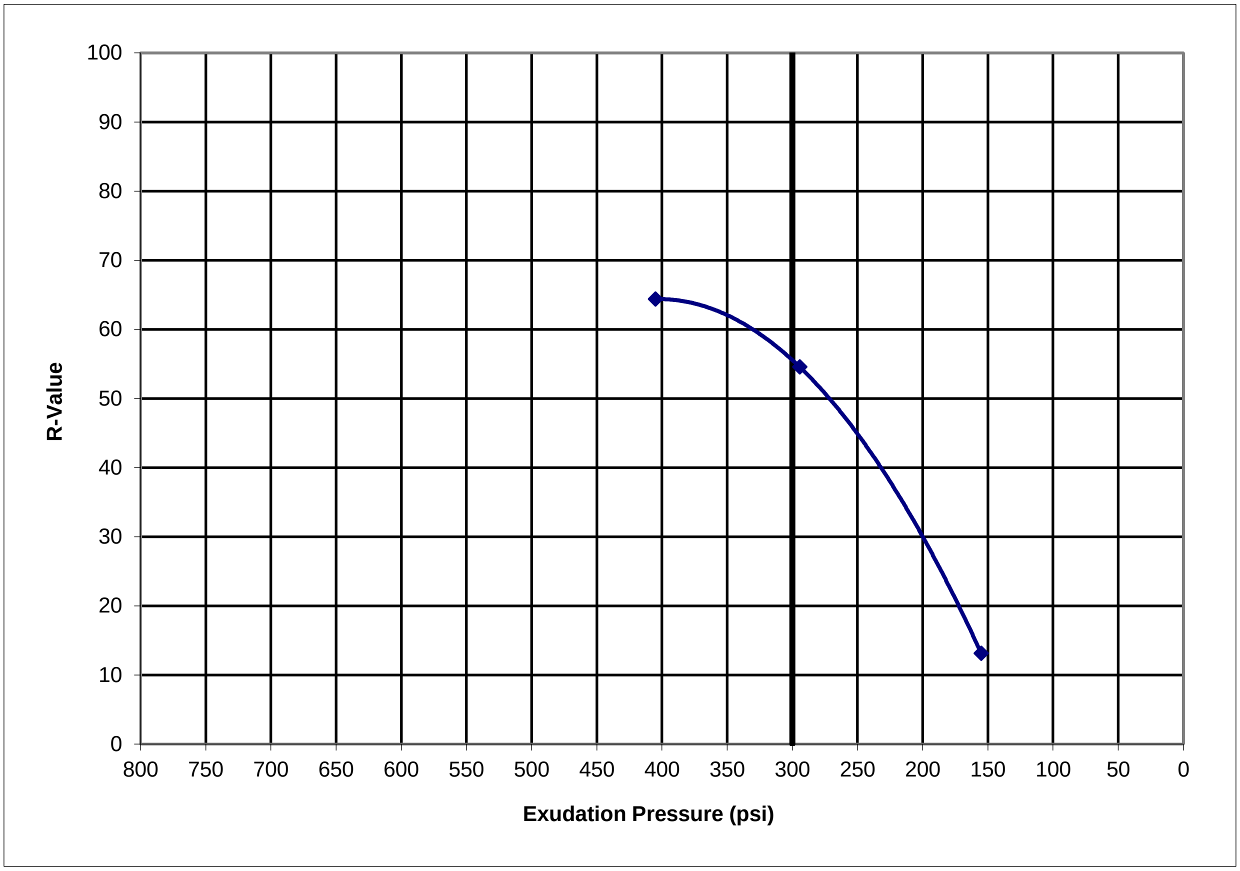
LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS & AASHTO DESC COMBINED 66225029 BERGIN LANE - US.GPJ TERRACON_DATATEMPLATE.GDT 6/27/22

PROJECT:	Bergin Ane - US 64 to W. Blanco Blvd	**JOB NO:**	66225029
LOCATION:	Bloomfield, NM	**WORK ORDER NO:**	
MATERIAL:	Silty Sand (SM), A-2-4	**LAB NO:**	P-01@0-5
SAMPLE SOURCE:	P-01@0-5	**DATE RECEIVED:**	06/29/22

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

SPECIMEN I. D.	**A**	**B**	**C**
Moisture Content	13.6%	11.7%	10.8%
Compaction Pressure (psi)	*	350	350
Specimen Height (inches)	2.50	2.50	2.49
Dry Density (pcf)	111.5	114.7	115.9
Horiz. Pres. @ 1000lbs (psi)	53.0	23.0	19.0
Horiz. Pres. @ 2000lbs (psi)	121.0	51.0	40.0
Displacement	5.33	4.45	4.15
Expansion Pressure (psi)	0.0	0.1	0.1
Exudation Pressure (psi)	155	294	405
R Value	13	55	64

* HAND TAMPED



R Value at 300 PSI = 55.6

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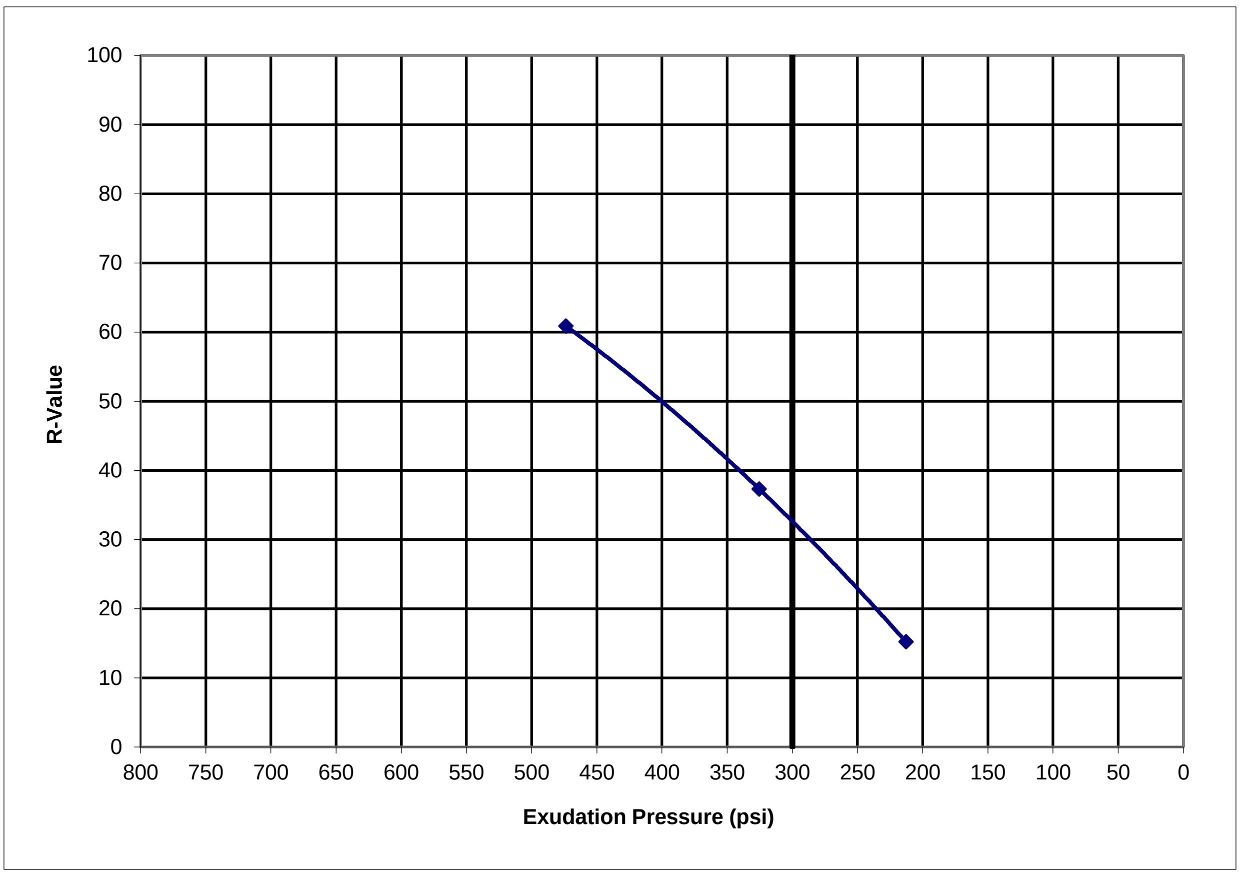
PROJECT:	Bergin Ane - US 64 to W. Blanco Blvd	**JOB NO:**	66225029
LOCATION:	Bloomfield, NM	**WORK ORDER NO:**	
MATERIAL:	Silty Sand (SM), A-2-4	**LAB NO:**	P-03@0-5
SAMPLE SOURCE:	P-03@0-5	**DATE RECEIVED:**	06/29/22

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

SPECIMEN I. D.	**A**	**B**	**C**
Moisture Content	11.6%	10.7%	9.8%
Compaction Pressure (psi)	75	150	250
Specimen Height (inches)	2.48	2.45	2.43
Dry Density (pcf)	115.1	118.3	120.0
Horiz. Pres. @ 1000lbs (psi)	55.0	36.0	20.0
Horiz. Pres. @ 2000lbs (psi)	124.0	81.0	43.0
Displacement	4.05	4.10	4.08
Expansion Pressure (psi)	0.0	0.1	0.3
Exudation Pressure (psi)	213	325	474
R Value	15	37	61



AAP AASHTO R18

R Value at 300 PSI = 32.6

750 Pilot Road, Suite F
Las Vegas, Nevada 89119
(702) 597-9393

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Client

Souder Miller & Associates

Project

Bergin Lane - US 64 to W. Blanco Boulevard
Bloomfield, NM

Sample Submitted By: Terracon (66) **Date Received:** 6/23/2022 **Lab No.: 22-0457**

Results of Corrosion Analysis

Sample Number	--	--
Sample Location	P-01	P-03
Sample Depth (ft.)	0.0-5.0	0.0-5.0
pH Analysis, AASHTO T 289	8.75	8.34
Water Soluble Sulfate (SO4), AASHTO T 290 (mg/Kg)	143	222
Chlorides, AASHTO T 291 (mg/kg)	73	88
Minimum Resistivity (Saturated), AASHTO T 288, (ohm-cm)	2522	698

Analyzed By: N. Campo

Nathan Campo
Engineering Technician II

SUMMARY OF LABORATORY RESULTS

Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification	Atterberg Limits			Expansion Testing					Corrosivity				Remarks
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	LL	PL	PI	Dry Density (pcf)	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI_{50}	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)	
P-01	0.0 - 5.0	SM		11	38	NP	NP	NP						8.8	2522	143	73	
P-01	2.5 - 3.5	SM	98	7	18	NP	NP	NP										1
P-01	5.0 - 6.5	SM		16														2
P-02	2.5 - 4.0	SP-SM		3	8	NP	NP	NP										
P-02	5.0 - 6.0	SP-SM	99	2														1, 2
P-03	0.0 - 5.0	SM		10	35	NP	NP	NP						8.3	698	222	88	
P-03	2.5 - 3.5	SM	105	9														1, 2
P-03	5.0 - 6.5	SM		7														2

REMARKS

1. Dry Density and/or moisture determined from one or more rings of a multi-ring sample.
2. Visual Classification.
3. Submerged to approximate saturation.
4. Expansion Index in accordance with ASTM D4829-95.
5. Air-Dried Sample

PROJECT:

SITE: Bergin Lane Improvements-US 64 to W. Blanco Blvd
Bloomfield, NM

Terracon

6805 Academy Pkwy West NE
Albuquerque, NM
PH. 505-797-4287 FAX. 505-797-4288

PROJECT NUMBER: 66225029

CLIENT: Souder Miller & Associates
Albuquerque, NM

APPENDIX C

PAVEMENT DESIGN CALCULATIONS

AASHTO 1993 ESAL Calculator for Flexible Pavements

Vehicle Description	Traffic Volume: Quantity in the Design Lane	Traffic Volume: Days per Week	Traffic Volume: Weeks per Year	Analysis Period (years)	Axle Load and Type: Axle 1 (kips)		Axle Load and Type: Axle 2 (kips)		Axle Load and Type: Axle 3 (kips)		Gross Weight (pounds)	Equivalency Factors: Axle 1	Equivalency Factors: Axle 2	Equivalency Factors: Axle 3	ESAL's
Passenger car	**206**	**7**	**52**	**20**	2	S	2	S			4,000	0.0002	0.0002	0	600
Pick-up truck or van	**206**	**7**	**52**	**20**	2	S	4	S			6,000	0.0002	0.002	0	3,299
Recreational vehicle					4	S	4	S			8,000	0.002	0.002	0	0
School bus	**4**	**7**	**52**	**20**	6	S	14	S			20,000	0.011	0.354	0	10,629
TARC bus					8	S	14	S			22,000	0.036	0.354	0	0
Greyhound MC-12 bus					13.4	S	18.4	S	6	S	37,800	0.3045	1.112	0.011	0
Package delivery truck	**62**	**7**	**52**	**20**	4	S	14	S			18,000	0.002	0.354	0	160,684
Beverage delivery truck					6	S	12	S	12	S	30,000	0.011	0.189	0.189	0
Garbage/dumpster truck	**1**	**1**	**52**	**20**	20	S	35	T			55,000	1.56	1.23	0	2,902
Concrete truck (full)					20	S	48	R			68,000	1.56	1.015	0	0
Dump truck (full)					20	S	48	R			68,000	1.56	1.015	0	0
Semi-tractor (no trailer)					8	S	2	T			10,000	0.036	0	0	0
Semi-tractor trailer (empty)					8	S	8	T	6	T	22,000	0.036	0.003	0.001	0
Semi-tractor trailer					12	S	34	T	34	T	80,000	0.189	1.08	1.08	0
User Defined					6	S	29	s	20	T	55,000	0.011	7.99	0.124	0
User Defined					8	S	8	T		T	16,000	0.036	0.003	0	0
Vehicle type H10					4	S	16	S			20,000	0.002	0.613	0	0
Vehicle type H15					6	S	24	S			30,000	0.011	3.43	0	0
Vehicle type H20					8	S	32	S			40,000	0.036	12.4	0	0
Vehicle type 3					16	S	34	T			50,000	0.613	1.08	0	0
Vehicle type HS15					6	S	24	S	24	S	54,000	0.011	3.43	3.43	0
Vehicle type HS20					8	S	32	S	32	S	72,000	0.036	12.4	12.4	0
Vehicle type 3S2					10	S	31	T	31	T	72,000	0.09	0.7445	0.7445	0

Terminal Serviceability, r_t	**2.0**
Assumed Structural Number, SN	**3**
Traffic Growth Rate, %/yr	**0**

Summary:		
	Total AASHTO ESAL's	**178,114**
	Superpave	**ESAL Class 1**
	Traffic Category	**Light Duty Pavement**

Project: Bergin Lane Location: Bloomfield, NM

Job No.: 66225029 Date: 7/23/2022

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Pavement Design
(AASHTO 1993 Method)

Design Inputs		**Asphalt**			**Concrete**	
Sugrade Support	CBR =	5.5				
	Mr =	7600	psi	k =	140	pci
Reliability		65	%		65	%
Standard Deviation	So =	0.45			0.35	
Initial Serviceability	Po =	4.2			4.5	
Terminal Serviceability	Pt =	2.0			2.5	
Design Serviceability Loss,	ΔPSI =	2.2			2.0	

Layer Coefficients:

AC Surface and Binder	a_1 =	0.44
Aggregate Base	a2 =	0.11

Concrete Compressive Strength	=	4000	psi
Modulus of Elasticity of Concrete	=	3,600	ksi
Modulus of Rupture of Concrete:	=	580	
Load Transfer ("J" Factor)	=	4.2	
Drainage Coefficient	=	1.2	

Light Duty Pavement

Asphalt Section Traffic (18 kip ESAL) = 178,114

Asphalt Pavement Section	Drainage, m		
AC Surface + Binder		**3.5**	in.
			in.
Aggregate Base	1.0	**6.0**	in.

Structural Number: **2.20**

Structural Number - Required ***2.19***

Rigid - Heavy Duty Pavement

Concrete Section Traffic (18 kip ESAL) = 0

Concrete Pavement Section **5.0** in.

Project: Bergin Lane Location: Bloomfield, NM

Project No. 66225029 Date: 07/23/22

Terracon