

GEOTECHNICAL INVESTIGATION REPORT

CITY OF SPARKS FY26 UNIT 1 STREET
REHABILITATION
SPARKS, NEVADA

JN: 12421.001
DECEMBER 2025

PREPARED FOR:
CITY OF SPARKS
DEPARTMENT OF PUBLIC WORKS
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GEOTECHNICAL INVESTIGATION REPORT

CITY OF SPARKS FY26 UNIT 1 STREET REHABILITATION

SPARKS, NV

1.0 INTRODUCTION

Submitted herewith are the results of Lumos and Associates, Inc. (Lumos) geotechnical investigation for the proposed roadway rehabilitation project located in Sparks, NV. A vicinity map is included as Plate 1 and a site map is included as Plate 2.

It is our understanding that the proposed project will consist of roadway reconstruction. Roadway reconstruction operations include asphalt pavement replacement and roadbed modification on the existing asphalt, aggregate base, and/or underlying soils. Plate 2 shows the project streets scheduled for reconstruction. We have assumed that final grades at the site will be approximately the same as the existing grades.

The purpose of our investigation was to characterize the site geology and soil conditions, describe the native soils and determine their engineering properties as they relate to the proposed construction. The investigation was also intended to identify possible adverse geologic, soil, and/or water table conditions. However, this study did not include an environmental assessment or an evaluation for soil and/or groundwater contamination at the site.

This report concludes with recommendations for pavement design. In addition, information such as logs of all explorations (Appendix A) and laboratory test data (Appendix B) are provided in this report.

2.0 GEOLOGIC SETTING

The proposed project is located in the northeastern section of the Truckee Meadows, a broad valley bounded on the west by the tall granitic and volcanic peaks of the Sierra Nevada Mountains (Carson Range), and on the east by the by the lower volcanic peaks of the Virginia and Pah Rah Range. Younger volcanic hills also bound the valley on the north and south. Faults bound the valley from the mountains as is typical of the Basin and Range province. Sediments have filled the valley from a number of tributaries and ancestral lakes during the Quaternary period (2 million years ago to present day). The dominant sediment source has been and continues to be, the Truckee River and its ancestral counterparts. Stream deposits were particularly voluminous after glacial periods. Since the end of the last glacial period, some 10,000 years ago, arid erosional forces combined with faulting have been the predominant processes to shape the region. These processes have created large alluvial fans that surround the valley floor of the Truckee Meadows.

In 2011 the near surface geology of the Reno/Sparks area was mapped by Ramelli, Henry, and Walker. Their mapping shows undivided younger, intermediate, and older alluvial deposits (Qay, Qai, Qao) underlie the site. These deposits are Truckee River deposits which generally are comprised of poorly bedded gravels, sands, and fine-grained soils. Plate 3 shows their mapping.

3.0 SITE CONDITIONS AND FIELD EXPLORATION

At the time of our investigation the project roadways had been previously paved with asphalt concrete. Where visible, the project streets generally had moderate alligator cracking, moderate surface wear, and moderate block cracking.

The current field investigation included a subsurface exploration. The location of the subsurface explorations were determined by using existing features at the site. Therefore, the approximate location of the subsurface explorations should be considered accurate only to the degree implied by the methods used.

Our subsurface investigation included six (6) test pits located within the project streets. Test pit explorations were excavated to a maximum depth of five (5) feet below existing grade (b.e.g.). Additionally, five (5) core hole explorations were conducted within the existing project streets. Core hole explorations were dug to a maximum depth of two (2) feet. The locations of the exploratory excavations within the proposed site are shown on Plate 2. The subsurface soils were continuously logged and visually classified in the field by our Geotechnician in accordance with the Unified Soil Classification System (USCS). Representative soil samples were collected at each material change within the test pit and core hole locations. Soil samples were subsequently transported to our Carson City geotechnical laboratory for testing and additional analysis.

The native soils encountered consisted generally of clayey sands (SC), poorly graded sands (SP), and poorly graded sand with silt (SP-SM). Aggregate base was encountered in nine of the eleven explorations. The direct asphalt supporting material varied between aggregate base, poorly graded sand with silt, and clayey sand materials. Table 1 on the next page presents the existing pavement sections within the project streets.

**TABLE 1
THICKNESS OF EXISTING PAVEMENT SECTIONS**

Exploration	Asphalt (inches)	Direct Supporting Layer (inches)	Subgrade	Exploration	Asphalt (inches)	Direct Supporting Layer (inches)	Subgrade
Core #1	4	6 (Base)	SC	Test Pit #1	5	4 (Base)	SC
Core #2	4.5	6.5 (Base)	SC	Test Pit #2	5	5 (Base)	SC
Core #3	3.5	5.5 (Base)	SC	Test Pit #3	5	43 (SP-SM)	SP-SM
Core #4	3.5	6.5 (Base)	SC	Test Pit #4	4	5 (Base)	SC
Core #5	3	8 (Base)	SC	Test Pit #5	3.5	54 (SC)	SC
-	-	-	-	Test Pit # 6	5	5.5 (Base)	SP

4.0 FIELD AND LABORATORY TEST DATA

Laboratory tests performed on representative samples included sieve analysis (including fines), Atterberg limits, R-value, expansion index, standard proctor, and sulfate content. Much of this data is displayed on the “logs” of the subsurface explorations to facilitate correlation. Field descriptions presented on the logs have been modified, where appropriate, to reflect laboratory test results. The logs of the subsurface explorations are included in Appendix A of this report as Plates A-1 through A-11. A key to the logs, explaining the symbols and nomenclature, is included as Plate A-12.

Individual laboratory test results are presented in Appendix B as Plates B-1 through B-5. Laboratory testing was performed per ASTM standards, except when test procedures are briefly described and no ASTM standard is specifically referenced in the report. Atterberg limits were determined using the dry method of preparation.

4.1 Analytical Testing: Western Environmental Testing Laboratory (WET Lab) of Sparks, Nevada conducted the sulfate content laboratory testing. Test results are included (on WET Lab letterhead) in Appendix B on Plate B-5.

Laboratory prepared cement treated pulverized asphalt/base/subgrade compression specimens were compacted and tested. Specimens were comprised of forty percent (40%) pulverized asphalt, forty five percent (45%) aggregate base and fifteen percent (15%) clayey sand in order to simulate the existing pavement section. Specimen cement contents were 4%, 6%, and 8% by dry weight of the maximum dry density. Cement treated materials compression results are provided in Appendix C.

The soil samples obtained during this investigation will be held in our laboratory for 30 days from the date of this report. The samples may be retained longer at an additional cost to the client or obtained from this office upon request.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 General

The following recommendations are based upon the construction and our understanding and assumptions of the proposed improvements, as outlined in the introduction of this report, and based on our findings during the field exploration and laboratory testing phases of this project. If changes in the construction project are proposed, they should be presented to Lumos & Associates, Inc. Geotechnical Department, so that the recommendations provided herein can be reviewed and modified, as necessary. As a minimum, final construction drawings should be submitted to the Lumos Geotechnical Department for review prior to actual construction and verification that our geotechnical design recommendations have been implemented.

5.2 General Site Grading

5.2.1 Clearing and Grubbing

Prior to placement of fill and/or the proposed improvements, the areas to receive fill and/or improvements shall be cleared and grubbed. Clearing and grubbing is not anticipated under the existing roadway. Clearing and grubbing may be required if improvements will be placed outside of the existing roadway. Where required, clearing and grubbing is anticipated to be as much as six (6) inches, or more, where thicker vegetation/roots are present.

Root- or organic-laden soils encountered during excavations, should be stockpiled in a designated area on site for later use in landscaping, or removed off site as directed by the owner. Excavated soils free from any organics, debris, or otherwise unsuitable material and with particles no larger than four (4) inches in maximum dimension may be stockpiled and moisture conditioned for later use as compacted fill provided it meets the criteria for structural fill soils.

Exposed excavation surfaces to support any of the proposed improvements should be observed and approved by a Lumos representative. Upon re-compaction and prior to placing any fill, the re-compacted surface should be proof-rolled to identify any possible yielding surfaces. Proof-

rolling should be conducted with a heavy rubber-tire loader with a fully loaded bucket, or a fully loaded water truck, and observed and approved by a Lumos representative.

5.2.2 Unsuitable Subgrade Mitigation

Unstable conditions due to yielding and/or pumping soils may be encountered on site. Additionally, the exposed soils may yield or pump under heavy equipment loads or where vibratory equipment draws up water. If yielding or pumping conditions are encountered, the soils should be scarified in place, allowed to dry as necessary and re-compacted, where applicable. Alternatively, the unsuitable or saturated soil should be removed, the exposed surface leveled and compacted/tamped as much as practical without causing further pumping, and covered (including the sides) with geotextile stabilizing fabric (Mirafi HP370 or other equivalent). The fabric should then be covered with at least twelve (12) inches of four (4) to six (6) inch **angular rock fill** with enough fines to fill the inter-rock pore spaces. Placement should be by end dumping. No traffic or other action should be allowed over the fabric, which may cause it to deflect/deform prior to cobble placement. Test sections should be used to determine the minimum thickness and/or number of layers required for stabilization.

Stabilization should be evaluated by proof-rolling standards commensurate with the equipment used, and approved by a Lumos representative. The placement of the stabilizing rock-fill may require additional over-excavation to maintain appropriate grading elevations. A filter fabric (Mirafi 180N or equal) should also be placed over the cobble rock fill to prevent piping of fines from covering soils into the stabilizing rock matrix.

5.2.3 Structural Fill

Properly compacted structural fill soils to be used on site should consist of non-expansive materials (LL less than 35 and/or a PI less than 12 and/or Expansion Index less than 20), have an R-Value of at least 30, should be free of contaminants, organics (less than two percent (2%)), rubble, or natural rock larger than three inches in largest dimension. All structural fill soils shall also be non-corrosive and have a water soluble sulfate content of less than 0.1%. Structural fill soils shall also meet the following gradation requirements (Table 1):

TABLE 2
STRUCTURAL FILL GRADATION

Sieve Size	% Passing
4"	100
3/4"	70 - 100
#40	15 - 65
#200	5 - 20

Import structural fill soils should be tested and approved prior to being placed or delivered on-site (**seven-day advanced notice**).

Prior to placement of structural fill, the site subgrade shall be scarified to a depth of twelve (12) inches, moisture conditioned to within two percent (2%) of optimum, and re-compacted to a minimum of **ninety percent (90%)** as determined by the ASTM D1557 Standard.

Structural fill should be placed only on compacted sub-grade or on compacted fill in loose lifts not exceeding eight (8) inches, moisture conditioned to within two percent (2%) of optimum and compacted to at least **ninety percent (90%)** relative compaction as determined by the ASTM D1557 Standard. Lift thickness may be increased, at the discretion of the Geotechnical Engineer, provided the contractor can demonstrate that adequate compaction is being achieved.

Fill material should not be placed, spread, or compacted while the ground is frozen or during unfavorable weather conditions. When site grading is interrupted by heavy rain or snow, grading or filling operations should not resume until a Lumos representative approves the moisture content and density conditions of the subgrade or previously placed fill.

Landscape areas should be cleared of all objectionable material. In cut areas, no other work is necessary except grading to proper elevation. In landscape areas, fill should be placed in loose lifts not exceeding eight inches and compacted to at least **ninety percent (90%)** relative compaction to prevent erosion.

Water should not be allowed to pond on pavements or adjacent to structures, and measures should be taken to reduce surface water infiltration into the subgrade soils. A representative of

Lumos should be present during site grading operations to ensure any unforeseen or concealed conditions within the site are identified and properly mitigated, and to test and observe earthwork construction. This testing and observation is an integral part of our service as acceptance of earthwork construction is dependent upon compaction and stability of the subgrade soils. The soils engineer may reject any material that does not meet engineering characteristics, compaction, and stability requirements. Further, recommendations of this report are based upon the assumption that earthwork construction will conform to recommendations set forth in this section of the report.

Landscaped areas should be cleared of all organic and objectionable material such as wood, root stumps, etc., if any. In cut areas, no other work is necessary except grading to proper elevation and drainage conditions. In landscape fill areas, fill should be placed in loose lifts not exceeding twelve (12) inches, and compacted to at least ninety-five percent (95%) relative compaction to prevent erosion.

Water should not be allowed to pond on pavements or adjacent to structures, and measures should be taken to reduce surface water infiltration into the subgrade soils.

A representative of Lumos should be present during all site clearing, excavation removals, and grading operations to ensure that any unforeseen or concealed conditions within the site are identified and properly mitigated, and to test and observe earthwork construction. This testing and observation is an integral part of our services as acceptance of earthwork construction and is dependent upon compaction and stability of the subgrade soils. The soils engineer may reject any material that does not meet acceptable fill, compaction, and stability requirements. Further, recommendations in this report are provided upon the assumption that earthwork construction will conform to recommendations set forth in this section of the report.

6.0 PAVEMENT DESIGN

6.1 Pulverization, Cement Treatment, and Asphalt Concrete

Lumos recommends pulverizing the existing asphalt, aggregate base, and/or subgrade soils to a depth of ten (10) inches with the exception of Coachman Court. The exception is made to Coachman Court due to the fact no base was encountered, and the subgrade soil consisted of clayey sand with a plasticity index of 20. Therefore, the existing asphalt and subgrade shall be removed and replaced with new type 2, class B aggregate base and asphalt. The pavement structural section was determined for the asphalt concrete utilizing a resistance value (R-Value) of 15 (Native Clayey Sand) and an R-Value of 80 for the cement treated recycled aggregate base. For this project, we have assumed a Traffic Index (TI) value of 5.5 due to the anticipated low to moderate traffic volume. Refer to Table 3 for the recommended asphalt pavement sections. The pulverized material shall meet the gradation requirements of Type 1 Recycled Aggregate Base. The pulverized material shall be regraded to accommodate four (4) inches of asphalt. The remaining six (6) inches of pulverized material shall be cement treated. The regraded pulverized material shall be moisture conditioned to at least two percent (2%) over optimum, three percent (3%) cement added by dry weight of aggregate, and compacted to a minimum of **ninety-five percent (95%)** relative density of the ASTM D1557 standard. The compacted cement treated pulverized material shall be sealed with a coat of CSS applied at a rate of between 0.15 gallons to 0.25 gallon per square-yard within twenty-four (24) hours of compaction. The cement treated pulverized material shall be kept moist until the cure seal is placed. Following placement of the cure the prepared material shall be allowed to cure for a minimum of seven (7) days and reach a compressive strength of at least three-hundred pounds per square inch (300 psi) prior to paving. Immediately prior to paving, the cement treated pulverized materials shall be "microcracked", utilizing a vibratory roller. Microcracking shall be completed prior to paving and to the satisfaction of the Geotechnical Engineer. See Appendix C and D for the Pavement Calculations and Cement Treated Specimen Compression Test Data.

**TABLE 3
PULVERIZATION REQUIREMENTS AND PAVEMENT STRUCTURAL SECTION**

Area	Traffic Index	Pulverization Depth	Aggregate Base Thickness	Asphalt Thickness
All Streets Except Coachman Court	5.5	10"	6" Cement Treated Pulverized Base	4"
Coachman Court	5.5	N/A	8" Aggregate Base	4"

We recommend a Type III, PG64-28NV, 50 blow Marshall mix targeting three percent (3%) air voids. The asphalt concrete shall be compacted to between ninety-three percent (93%) and ninety-eight percent (98%) of the theoretical maximum ("Rice") specific gravity.

7.0 CORROSION AND CHEMICAL ATTACK

Tested soils have a mild sulfate content of 17 parts per million. However, Type II cement (meeting ASTM C150) is recommended for all concrete and cement in direct contact with on-site soil.

All exterior concrete should have between four and one half and seven and one-half percent (4.5%-7.5%) entrained air, a maximum water-cement ratio of 0.45 and comply with all other ACI recommendations for concrete placed in areas subject to freezing. A minimum compressive strength of 4,000 psi is recommended for all external concrete. All concrete shall be placed pursuant to ACI recommendations.

8.0 MOISTURE PROTECTION, EROSION AND DRAINAGE

The finish surfaces around all structures should slope away from the foundations and toward appropriate drop inlets or other surface drainage devices. It is recommended that within ten feet of any structure a minimum slope of five percent (5%) be used for soil subgrade and a minimum of one percent (1%) be used for pavement. These grades should be maintained for the life of the structures.

9.0 CONSTRUCTION SPECIFICATIONS

All work shall be governed by the latest adopted revision of the Standard Specifications and Standard Details for Public Works Construction, as distributed by The City of Sparks, except as modified herein.

10.0 LIMITATIONS

This report has been prepared in accordance with the currently accepted engineering practices in Northern Nevada and Northern California. The analysis and recommendations in this report are based upon exploration performed at the locations shown on the site plan, the proposed improvements, as described in the Introduction section of this report, and upon the property in its condition as of the date of this report. Lumos makes no guarantee as to the continuity of conditions as subsurface variations may occur between or beyond exploration points and over time. Any subsurface variations encountered during construction should be immediately reported to Lumos so that, if necessary, Lumos' recommendations may be modified.

This report has been prepared for and provided directly to The City of Sparks ("The Client"), and any and all use of this report is expressly limited to the exclusive use of the Client. The Client is responsible for determining who, if anyone, shall be provided this report, including any designers and subcontractors whose work is related to this project. Should the Client decide to provide this report to any other individual or entity, Lumos shall not be held liable for any use by those individuals or entities to whom this report is provided. The Client agrees to indemnify, defend and hold harmless Lumos, its agents and employees from any claims resulting from unauthorized users.

If this report is utilized in the preparation of an Engineer's Estimate of Probable Construction Costs, then the preparer of the estimate acknowledges that the report recommendations are based on the subsurface conditions found at the specific locations investigated on site; that subsurface conditions may vary outside these locations; and that no guaranty or warranty, express or implied, is made that the conditions encountered are representative of the entire site. The preparer of the estimate agrees to indemnify, defend and hold harmless Lumos & Associates, its agents, and employees from any and all claims, causes of action or liability arising from any claims resulting from the use of the report in the preparation of an Engineer's Cost Estimate.

This report is not intended for, nor should it be utilized for, bidding purposes. If it is utilized for bidding purposes, Client acknowledges that the report recommendations are based on the subsurface conditions found at the specific locations investigated on site; that subsurface

conditions may vary outside these locations; and that no guaranty or warranty, express or implied, is made that the conditions encountered are representative of the entire site. The Client agrees to indemnify, defend and hold harmless Lumos & Associates, Inc., its agents, and employees from any and all claims, causes or action or liability arising from any claims resulting from the use of the report for bidding purposes.

As explained above, subsurface variations may exist and as such, beyond the express findings located in this report, no warranties express, or implied, are made by this report. No affirmation of fact, including but not limited to statements regarding suitability for use of performance shall be deemed to be a warranty or guaranty for any purpose.



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Lumos & Associates, Inc.

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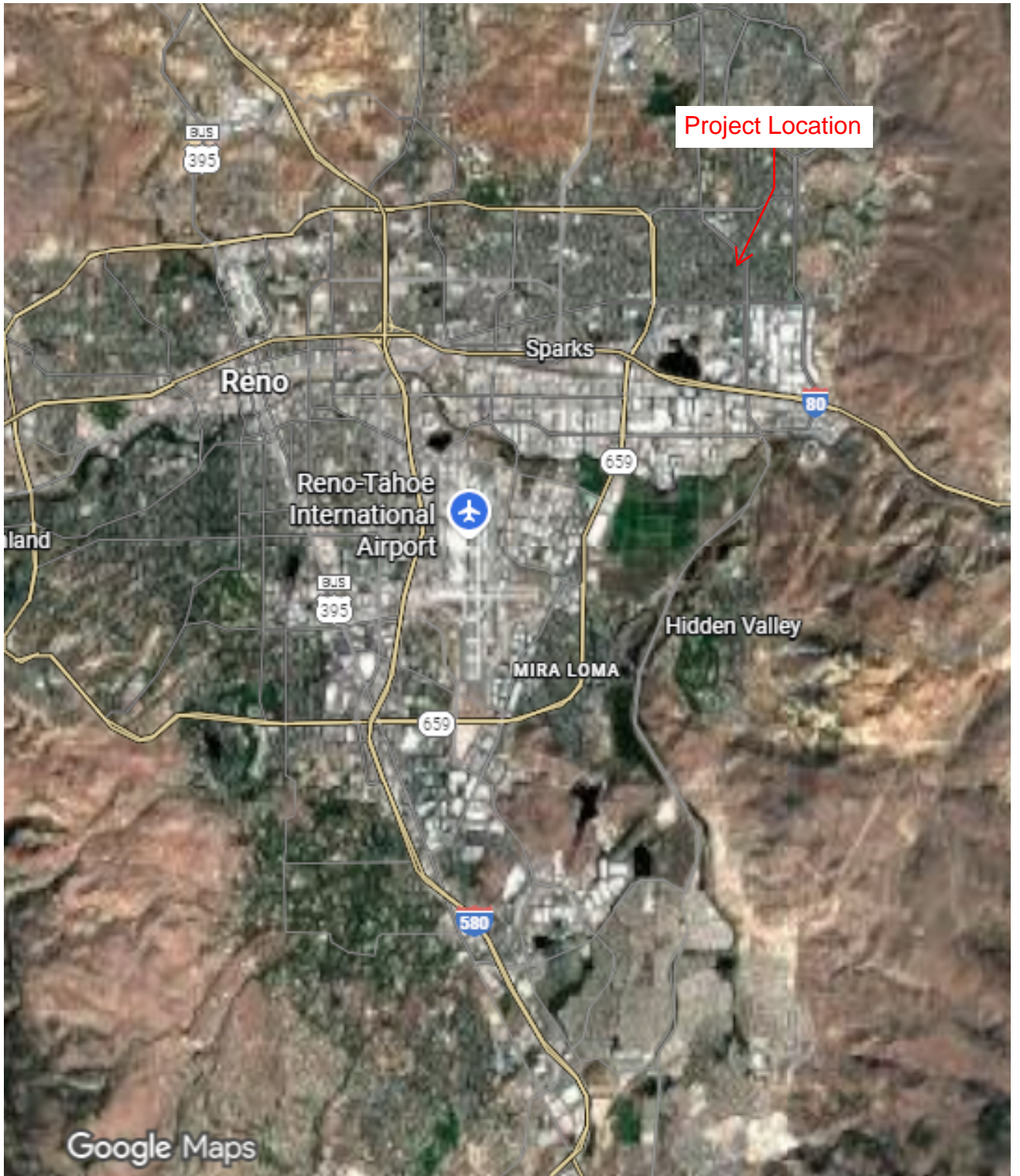
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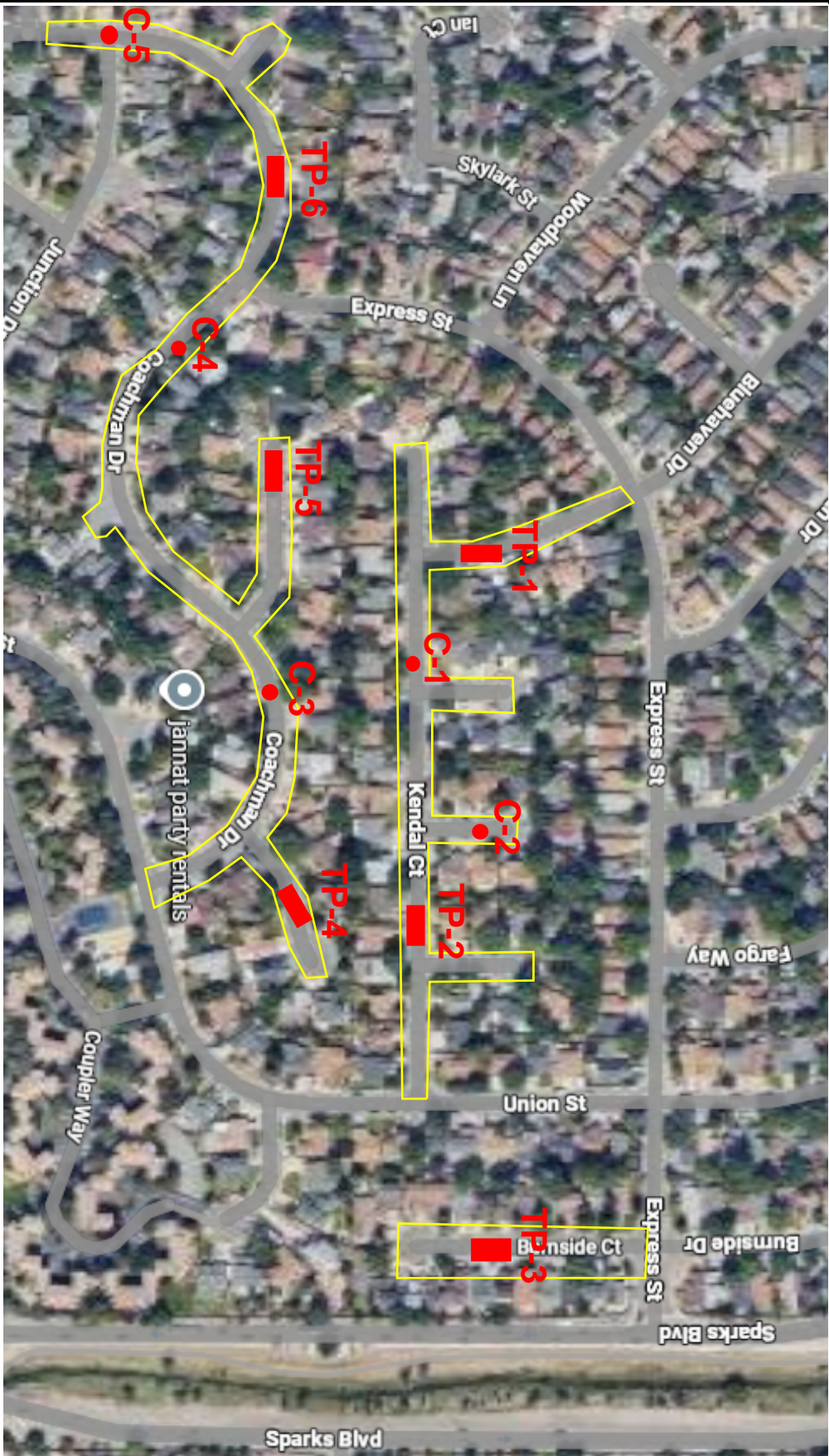
City of Sparks 2026 Street Rehab

VICINITY MAP

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PLATE
1



= Project Streets

● = Approximate Core Hole Location

▭ = Approximate Test Pit Location



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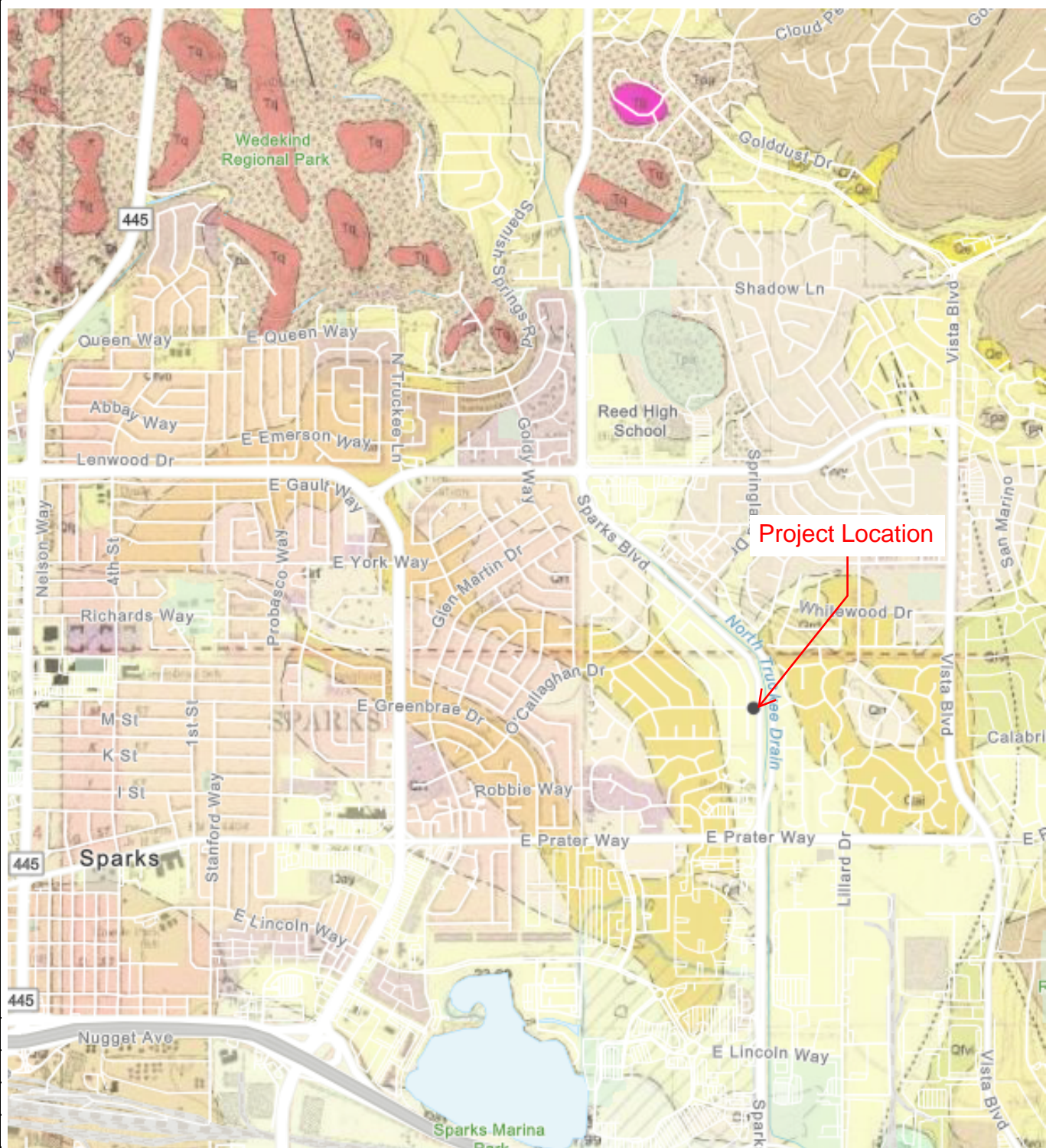
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SITE MAP

**PLATE
2**

Job Number: 12421.001

Date: December 2025



- Qay Younger alluvium
- Qai Intermediate age alluvium (Tioga and older)
- Qao Older alluvial deposits (Middle and Early Pleistocene)

Title: Preliminary revised geologic maps of the Reno urban area, Nevada
 Author(s): Ramelli, A.R., Henry, C.D., Walker, J.P., with contributions by Bell, J.W., Cashman, P.H., dePolo, C.M., Garside, L.J., House, P.K., Trexler, J.H., and Widmer, M.C.
 Publishing Organization: Nevada Bureau of Mines and Geology
 Series and Number: Open File Report 2011-07
 Publication Date: 2011



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GEOLOGIC MAP

Job Number: 12421.001 Date: December 2025

PLATE

3

APPENDIX A

FIELD EXPLORATION LOGS



TEST PIT No. TP #1

Logged By: **J. Macaluso**

Total Depth: **4 feet**

Date Logged: **11/14/25**

Water Depth: **No groundwater encountered**

Equipment Type: **CAT 430F2 Backhoe**

Ground Elev.:

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION			Natural Moisture Content, %	Optimum Moisture Content, %	Maximum Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
	B		5" Asphalt												
	B		4" Material Similar to Aggregate Base Very Poor Quality	0.4											
1	B		Grey Clayey SAND (SC) Medium Dense, Moist Estimated: 70% Coarse to Fine Sand, 30% Low-Medium Plastic Clay	0.8											
	B		Brown Clayey SAND (SC) Medium Dense, Moist	1.3											
2	B														
	B														
3	B														
	B														
4	B		Light Brown Clayey SAND (SC) Dense, Moist Estimated: 80% Medium to Fine Sand, 20% Low Plastic Clay	3.5											
	B			4.0											
Test pit terminated at 4 feet. Test Pit backfilled without compaction verification.															

LUMOS TP FULL PAGE AS TEST PIT SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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City of Sparks 2026 Street Rehab

LOG OF EXPLORATORY

Job Number: 12421.001

Date: December 2025

PLATE

A-1

TEST PIT No. TP #3

Logged By: **J. Macaluso**

Total Depth: **4.5 feet**

Date Logged: **11/14/25**

Water Depth: **No groundwater encountered**

Equipment Type: **CAT 430F2 Backhoe**

Ground Elev.:

Depth in Feet	Graphic Log	Sample Type	<input type="checkbox"/> Percolation Test <input type="checkbox"/> Split Spoon <input type="checkbox"/> Ziplock Sample <input type="checkbox"/> Core Sampler <input type="checkbox"/> Bulk Sample <input type="checkbox"/> Static Water Table	SOIL DESCRIPTION	Natural Moisture Content, %	Optimum Moisture Content, %	Maximum Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
		<input type="checkbox"/>		5" Asphalt Top 0.25" is Slurry, Underlain by 1" of Chip										
0.4		<input type="checkbox"/>		Brown Poorly Graded SAND with Silt (SP-SM) Medium Dense to Dense, Moist										
1		<input type="checkbox"/>												
2		<input type="checkbox"/>			5.5			NP	NP	5.7	85.3	8.9		
3														
4														
4.5														

Test pit terminated at 4.5 feet.
Test Pit backfilled without compaction verification.

LUMOS TP FULL PAGE AS TEST PIT SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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PLATE

A-3

TEST PIT No. TP #4

Logged By: **J. Macaluso**








Total Depth: **5 feet**

Date Logged: **11/14/25**

Water Depth: **No groundwater encountered**

Equipment Type: **CAT 430F2 Backhoe**

Ground Elev.:

Depth in Feet	Graphic Log	Sample Type	<input type="checkbox"/> Percolation Test <input type="checkbox"/> Split Spoon <input type="checkbox"/> Ziplock Sample <input type="checkbox"/> Core Sampler <input type="checkbox"/> Bulk Sample <input type="checkbox"/> Static Water Table	SOIL DESCRIPTION	Natural Moisture Content, %	Optimum Moisture Content, %	Maximum Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
				4" Asphalt										
				5" Material Similar to Aggregate Base	0.3									
1		B		Brown Clayey SAND (SC) Medium Dense, Moist Estimated: 60% Medium to Fine Sand 40% Medium to High Plastic Clay	0.8									
2		B		Brown Clayey SAND (SC) Medium Dense, Slightly Moist Estimated: 10% Gravel 70% Coarse to Fine Sand 20% Low Plastic Clay	1.5									
3														
4		B												
5					5.0									
Test pit terminated at 5 feet. Test Pit backfilled without compaction verification.														

LUMOS TP FULL PAGE AS TEST PIT SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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PLATE

A-4

TEST PIT No. TP #5

Logged By: **J. Macaluso**


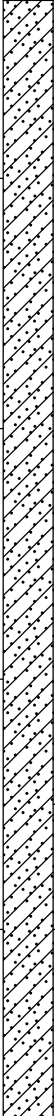
Total Depth: **4.75 feet**

Date Logged: **11/14/25**

Water Depth: **No groundwater encountered**

Equipment Type: **CAT 430F2 Backhoe**

Ground Elev.:

Depth in Feet	Graphic Log	Sample Type	<input type="checkbox"/> Percolation Test <input type="checkbox"/> Split Spoon <input type="checkbox"/> Ziplock Sample <input type="checkbox"/> Core Sampler <input type="checkbox"/> Bulk Sample <input type="checkbox"/> Static Water Table	SOIL DESCRIPTION	Natural Moisture Content, %	Optimum Moisture Content, %	Maximum Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
				3.5" Asphalt No Aggregate Base										
				Brown to Light Brown Clayey SAND (SC) Medium Dense, Moist										
1														
2														
3														
4		<input type="checkbox"/>			10.3			38	20	6.2	68.9	24.9		
					4.8									
Test pit terminated at 4.75 feet. Test Pit backfilled without compaction verification.														

LUMOS TP FULL PAGE-AS TEST PIT SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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City of Sparks 2026 Street Rehab

LOG OF EXPLORATORY

Job Number: 12421.001

Date: December 2025

PLATE

A-5

TEST PIT No. TP #6

Logged By: **J. Macaluso**


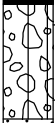
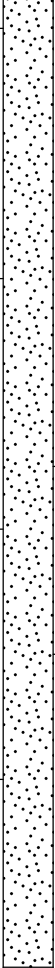
Total Depth: **4.75 feet**

Date Logged: **11/14/25**

Water Depth: **No groundwater encountered**

Equipment Type: **CAT 430F2 Backhoe**

Ground Elev.:

Depth in Feet	Graphic Log	Sample Type	<input type="checkbox"/> Percolation Test <input type="checkbox"/> Split Spoon <input type="checkbox"/> Ziplock Sample <input type="checkbox"/> Core Sampler <input type="checkbox"/> Bulk Sample <input type="checkbox"/> Static Water Table	SOIL DESCRIPTION	Natural Moisture Content, %	Optimum Moisture Content, %	Maximum Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
				5" Asphalt										
				5.5" Material Similar to Aggregate Base	0.4									
1				Brown Poorly Graded SAND (SP) Medium Dense, Moist	0.9									
2														
3														
4														
						14.1		NP	NP	6.9	88.5	4.6	49	
						4.8								

Test pit terminated at 4.75 feet.
Test Pit backfilled without compaction verification.

LUMOS TP FULL PAGE AS TEST PIT SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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LOG OF EXPLORATORY

Job Number: 12421.001

Date: December 2025




PLATE

A-6

CORE HOLE No. Core #1

Logged By: **J. Macaluso**
 Date Logged: **11/14/25**
 Drill Type: **Hand Excavation**

Total Depth: **1.583 feet**
 Water Depth: **No groundwater encountered**
 Ground Elev.: **Not Surveyed**

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION			Natural Moisture Content, %	Optimum Moisture Content, %	Maximum Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
			Percolation Test	Split Spoon	Ziplock Sample										
			4" Asphalt												
			6" Material Similar to Aggregate Base			0.3									
0.5			Grey Clayey SAND (SC) Medium Dense, Moist Estimated: 10% Gravel 55% Sand 35% Clay			0.8									
1.0															
1.5						1.6									
Core Hole terminated at 1.583 feet. Core Holes Filled with Soil and Capped with Non-Shrink Grout.															

CORE HOLE LOG SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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LOG OF EXPLORATORY CORE HOLE

Job Number: 12421.001

Date: December 2025




PLATE

A-7

CORE HOLE No. Core #2

Logged By: **J. Macaluso**
 Date Logged: **11/14/25**
 Drill Type: **Hand Excavation**

Total Depth: **1.542 feet**
 Water Depth: **No groundwater encountered**
 Ground Elev.: **Not Surveyed**

Depth in Feet	Graphic Log	Sample Type	Percolation Test California Sampler Split Spoon Bulk Sample Ziplock Sample Static Water Table	SOIL DESCRIPTION	Natural Moisture Content, %	Optimum Moisture Content, %	Maximum Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
				4.5" Asphalt										
0.5				6.5" Material Similar to Aggregate Base										
1.0				Brown Clayey SAND (SC) Medium Dense, Moist Estimated: 10% Gravel 55% Sand 35% Clay										
1.5														

Core Hole terminated at 1.542 feet.
 Core Holes Filled with Soil and Capped with Non-Shrink Grout.

CORE HOLE LOG SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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LOG OF EXPLORATORY CORE HOLE

Job Number: 12421.001

Date: December 2025




PLATE

A-8

CORE HOLE No. Core #3

Logged By: **J. Macaluso**
 Date Logged: **11/14/25**
 Drill Type: **Hand Excavation**

Total Depth: **1.5 feet**
 Water Depth: **No groundwater encountered**
 Ground Elev.: **Not Surveyed**

Depth in Feet	Graphic Log	Sample Type	SOIL DESCRIPTION			Natural Moisture Content, %	Optimum Moisture Content, %	Maximum Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
			Percolation Test	Split Spoon	Ziplock Sample										
			3.5" Asphalt												
			5.5" Material Similar to Aggregate Base			0.3									
0.5			Brown Clayey SAND (SC) Medium Dense, Moist Estimated: 10% Gravel 70% Sand 20% Clay			0.8									
1.0															
1.5															
			Core Hole terminated at 1.5 feet. Core Holes Filled with Soil and Capped with Non-Shrink Grout.			1.5									

CORE HOLE LOG SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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LOG OF EXPLORATORY CORE HOLE

Job Number: 12421.001

Date: December 2025


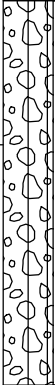

PLATE

A-9

CORE HOLE No. Core #5

Logged By: **J. Macaluso**
 Date Logged: **11/14/25**
 Drill Type: **Hand Excavation**

Total Depth: **2 feet**
 Water Depth: **No groundwater encountered**
 Ground Elev.: **Not Surveyed**

Depth in Feet	Graphic Log	Sample Type	Percolation Test California Sampler Split Spoon Bulk Sample Ziplock Sample Static Water Table	Natural Moisture Content, %	Optimum Moisture Content, %	Maximum Dry Density, pcf	Liquid Limit, %	Plasticity Index, %	Gravel, % (3" - #4 Sieve)	Sand, % (#4 - #200 Sieve)	Fines, % (< #200 Sieve)	R-Value	Expansion Index
0.0 - 0.3													
0.3 - 0.9													
0.9 - 2.0													
Core Hole terminated at 2 feet. Core Holes Filled with Soil and Capped with Non-Shrink Grout.													

CORE HOLE LOG SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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LOG OF EXPLORATORY CORE HOLE

Job Number: 12421.001

Date: December 2025

PLATE

A-11

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS	
			GRAPH	LETTER		
<p>COARSE GRAINED SOILS</p> <p>MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE</p>	<p>GRAVEL AND GRAVELLY SOILS</p> <p>MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE</p>	<p>CLEAN GRAVELS</p> <p>(LITTLE OR NO FINES)</p>		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		<p>GRAVELS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p>		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		<p>GRAVELS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p>		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES	
		<p>GRAVELS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p>		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES	
	<p>SAND AND SANDY SOILS</p> <p>MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE</p>	<p>CLEAN SANDS</p> <p>(LITTLE OR NO FINES)</p>		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
		<p>CLEAN SANDS</p> <p>(LITTLE OR NO FINES)</p>		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES	
		<p>SANDS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p>		SM	SILTY SANDS, SAND - SILT MIXTURES	
		<p>SANDS WITH FINES</p> <p>(APPRECIABLE AMOUNT OF FINES)</p>		SC	CLAYEY SANDS, SAND - CLAY MIXTURES	
		<p>FINE GRAINED SOILS</p> <p>MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE</p>	<p>SILTS AND CLAYS</p> <p>LIQUID LIMIT LESS THAN 50</p>		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
					CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL			ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY		
<p>SILTS AND CLAYS</p> <p>LIQUID LIMIT GREATER THAN 50</p>			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS		
			CH	INORGANIC CLAYS OF HIGH PLASTICITY		
		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS			
<p>HIGHLY ORGANIC SOILS</p>				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Other Tests	
AN	ANALYTICAL TEST (pH, Soluble Sulfate, and Resistivity)
C	CONSOLIDATION TEST
DS	DIRECT SHEAR TEST
MD	MOISTURE DENSITY CURVE

LUMOS LEGEND SPARKS FY 26.GPJ 10-23-06.GDT 12/1/25



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LEGEND

Job Number: 12421.001

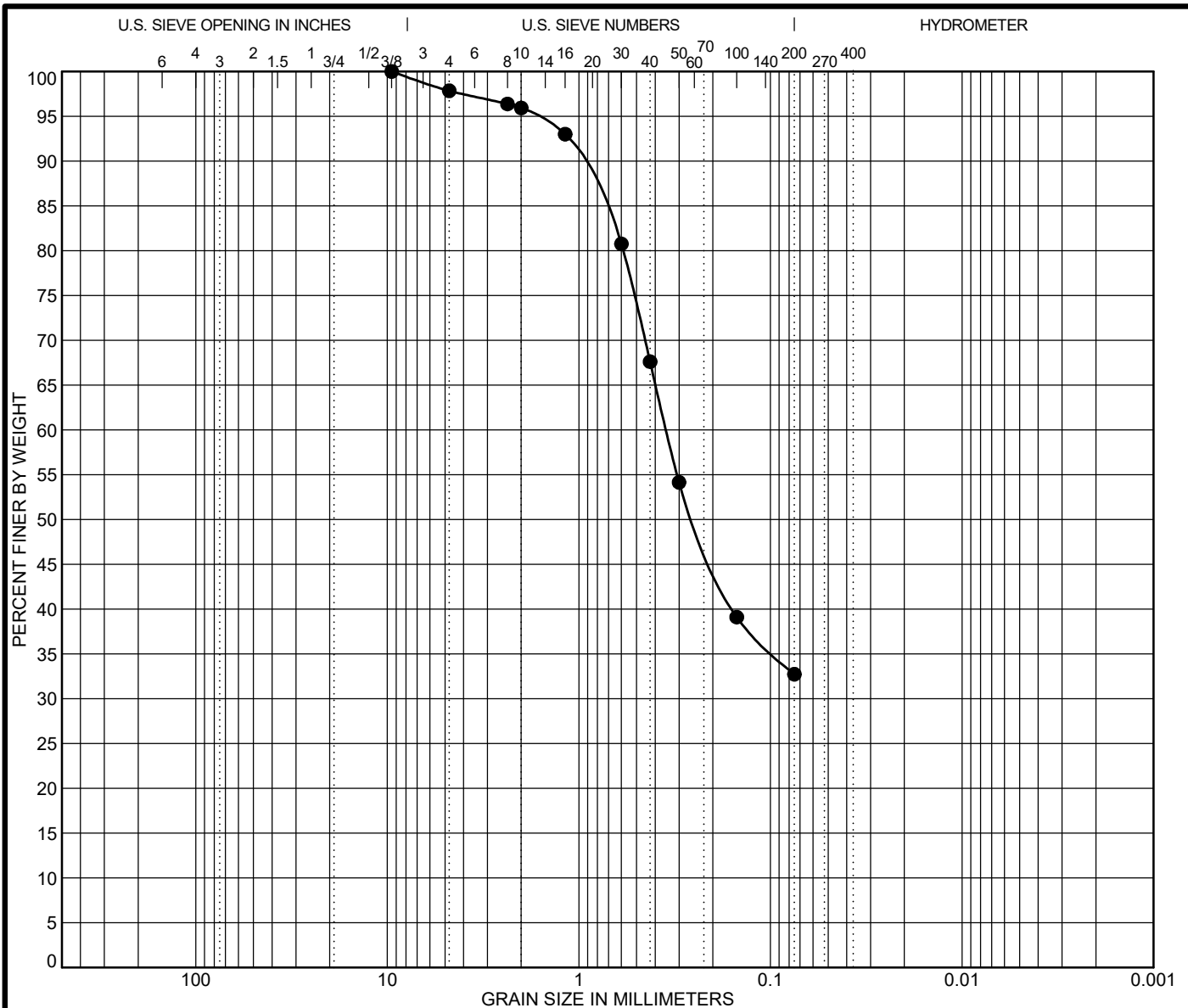
Date: December 2025

PLATE
A-12

APPENDIX B

SOILS LABORATORY TEST RESULTS





COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Date: 11/17/25									
TP #1		Classification					LL	PL	PI	Cc	Cu
Depth: 2		Brown Clayey SAND (SC)					41	11	30		
Sample Location		Test Pit #1, 2' - 2.5'									
USCS		SC									
AASHTO											
Specimen Identification											
TP #1		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
Depth: 2		9.5	0.349			2.2	65.1	32.7			
Natural Moisture		10.7 %		Direct Shear		Absorption %					
R-Value		15		Max Dry Density		Soundness					
Expansion Index		48		Specific Gravity		S.E.					

LUMOS GRAIN SIZE SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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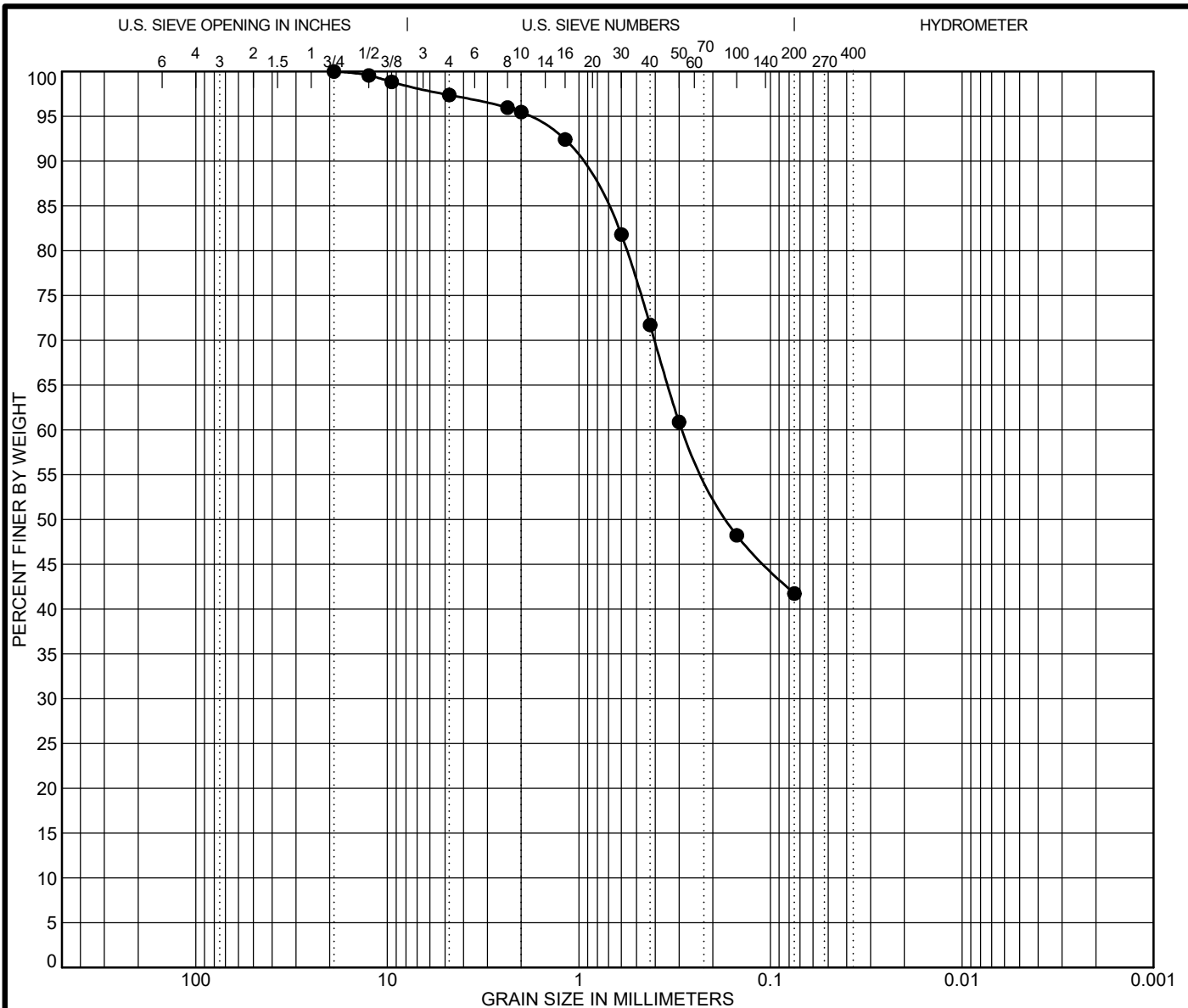
City of Sparks 2026 Street Rehab

GRAIN SIZE DISTRIBUTION

Job Number: 12421.001 Date: December 2025

PLATE

B-1.1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Date: 11/17/25									
● TP #2	Classification					LL	PL	PI	Cc	Cu
Depth: 1	Brown Clayey SAND (SC)					58	20	38		
Sample Location	Test Pit #2, 1' - 1.5'									
USCS	SC									
AASHTO										

Specimen Identification									
● TP #2	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
Depth: 1	19	0.286			2.6	55.6	41.7		
Natural Moisture	19 %		Direct Shear		Absorption %				
R-Value			Max Dry Density		Soundness				
Expansion Index			Specific Gravity		S.E.				

LUMOS GRAIN SIZE SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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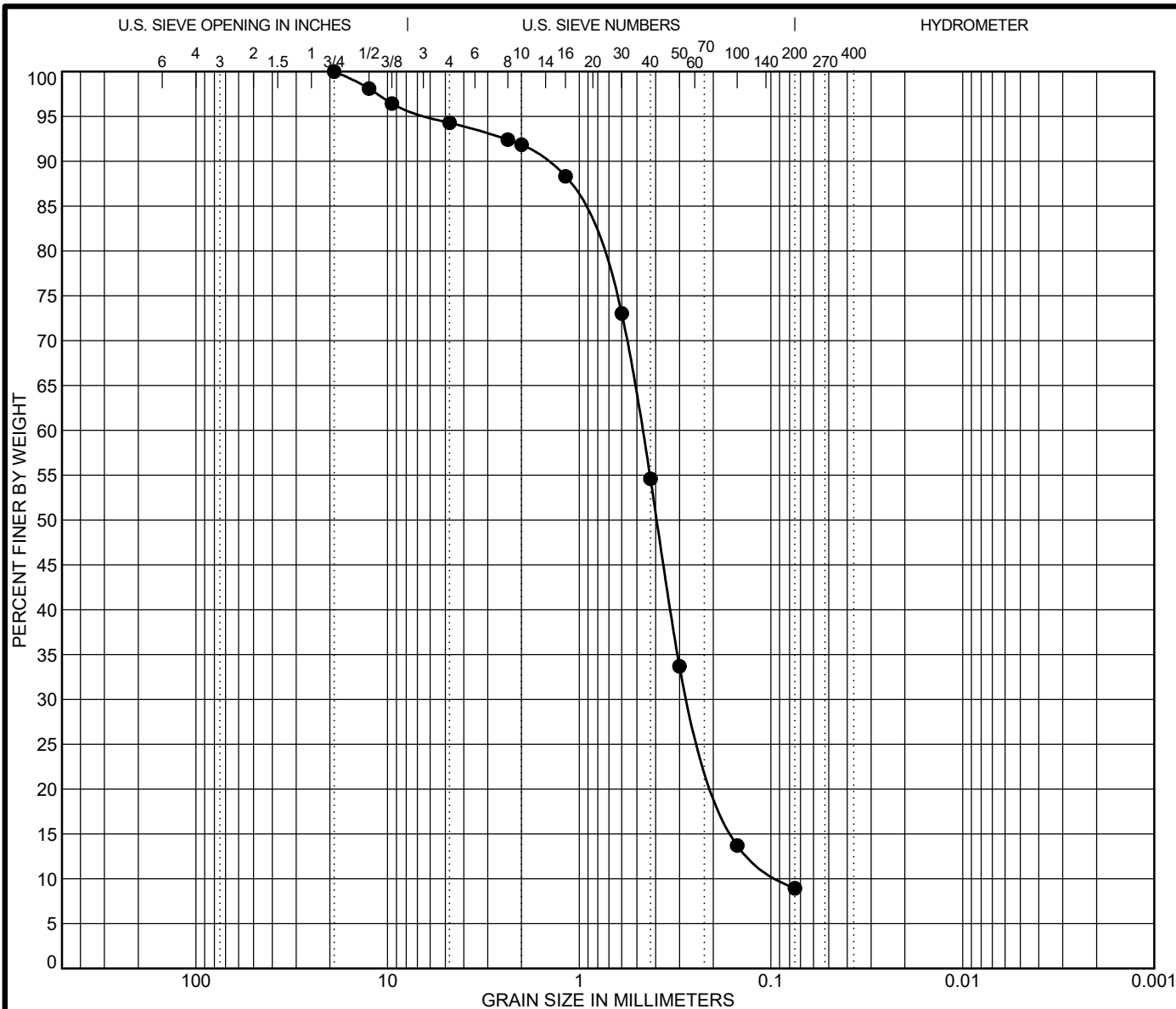
City of Sparks 2026 Street Rehab

GRAIN SIZE DISTRIBUTION

Job Number: 12421.001 Date: December 2025

PLATE


B-1.2



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Date: 11/17/25									
●	TP #3	Classification					LL	PL	PI	Cc	Cu
	Depth: 1.5	Brown Poorly Graded SAND with Silt (SP-SM)					NP	NP	NP	1.7	5.4
	Sample Location	Test Pit #3, 1.5' - 2'									
	USCS	SP-SM									
	AASHTO										
Specimen Identification											
●	TP #3	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
	Depth: 1.5	19	0.47	0.264	0.088	5.7	85.3	8.9			
	Natural Moisture	5.5 %		Direct Shear		Absorption %					
	R-Value			Max Dry Density		Soundness					
	Expansion Index			Specific Gravity		S.E.					

LUMOS GRAIN SIZE SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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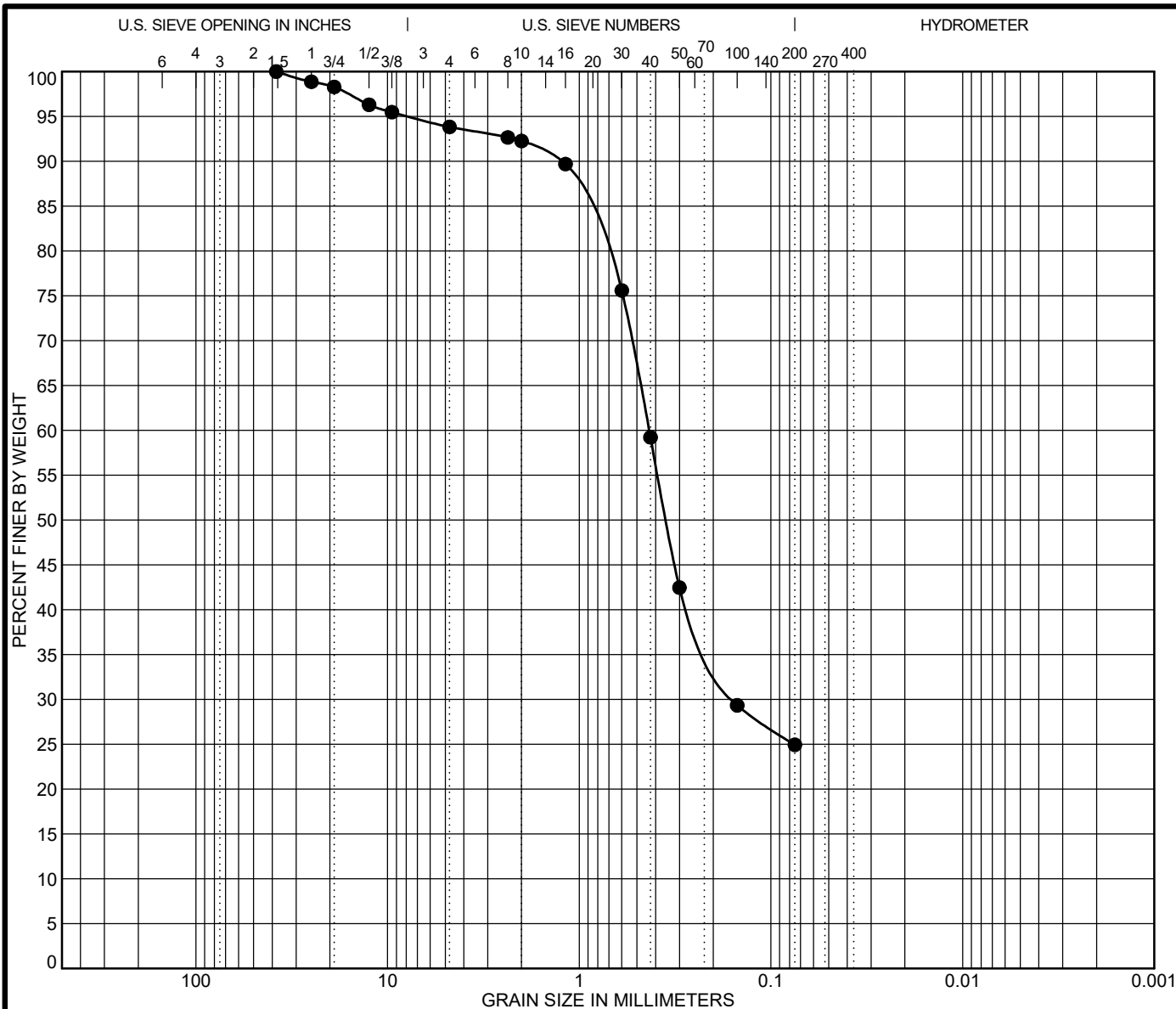
City of Sparks 2026 Street Rehab

GRAIN SIZE DISTRIBUTION

Job Number: 12421.001 Date: December 2025

PLATE

B-1.3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Date: 11/17/25									
●	TP #5	Classification					LL	PL	PI	Cc	Cu
	Depth: 3.5	Light Brown Clayey SAND (SC)					38	18	20		
	Sample Location	Test Pit #5, 3.5' - 4'									
	USCS	SC									
	AASHTO										
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
●	TP #5	38.1	0.432	0.155		6.2	68.9	24.9			
	Depth: 3.5										
	Natural Moisture	10.3 %		Direct Shear		Absorption %					
	R-Value			Max Dry Density		Soundness					
	Expansion Index			Specific Gravity		S.E.					

LUMOS GRAIN SIZE SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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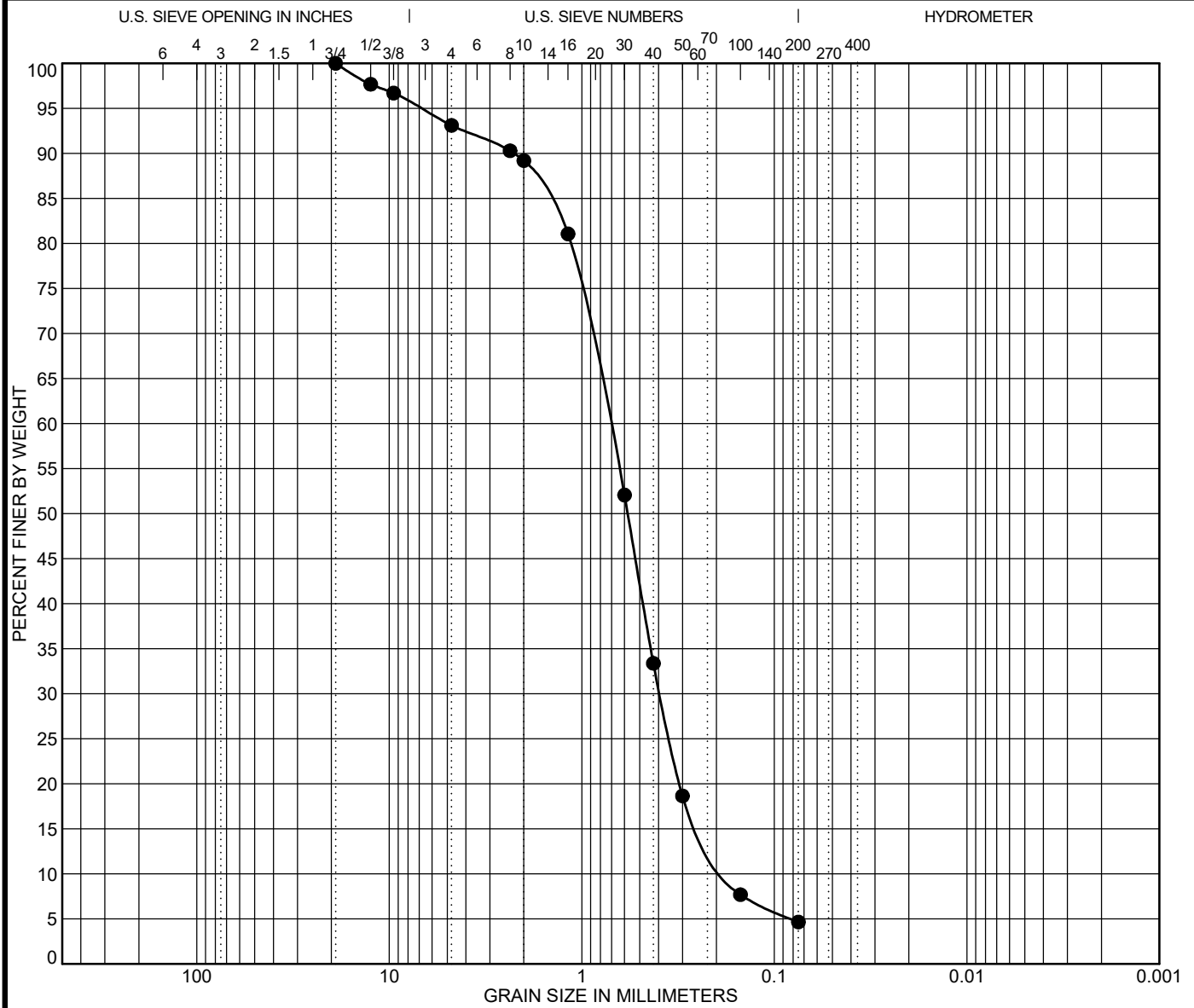
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GRAIN SIZE DISTRIBUTION

Job Number: 12421.001 Date: December 2025

PLATE

B-1.4



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Date: 11/17/25									
●	TP #6	Classification					LL	PL	PI	Cc	Cu
	Depth: 2.75	Brown Poorly Graded SAND (SP)					NP	NP	NP	1.2	4.2
Sample Location		Test Pit #6, 2.75' - 3.5'									
USCS		SP									
AASHTO											
Specimen Identification											
●	TP #6	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
	Depth: 2.75	19	0.722	0.392	0.174	6.9	88.5	4.6			
Natural Moisture		14.1 %		Direct Shear		Absorption %					
R-Value		49		Max Dry Density		Soundness					
Expansion Index				Specific Gravity		S.E.					

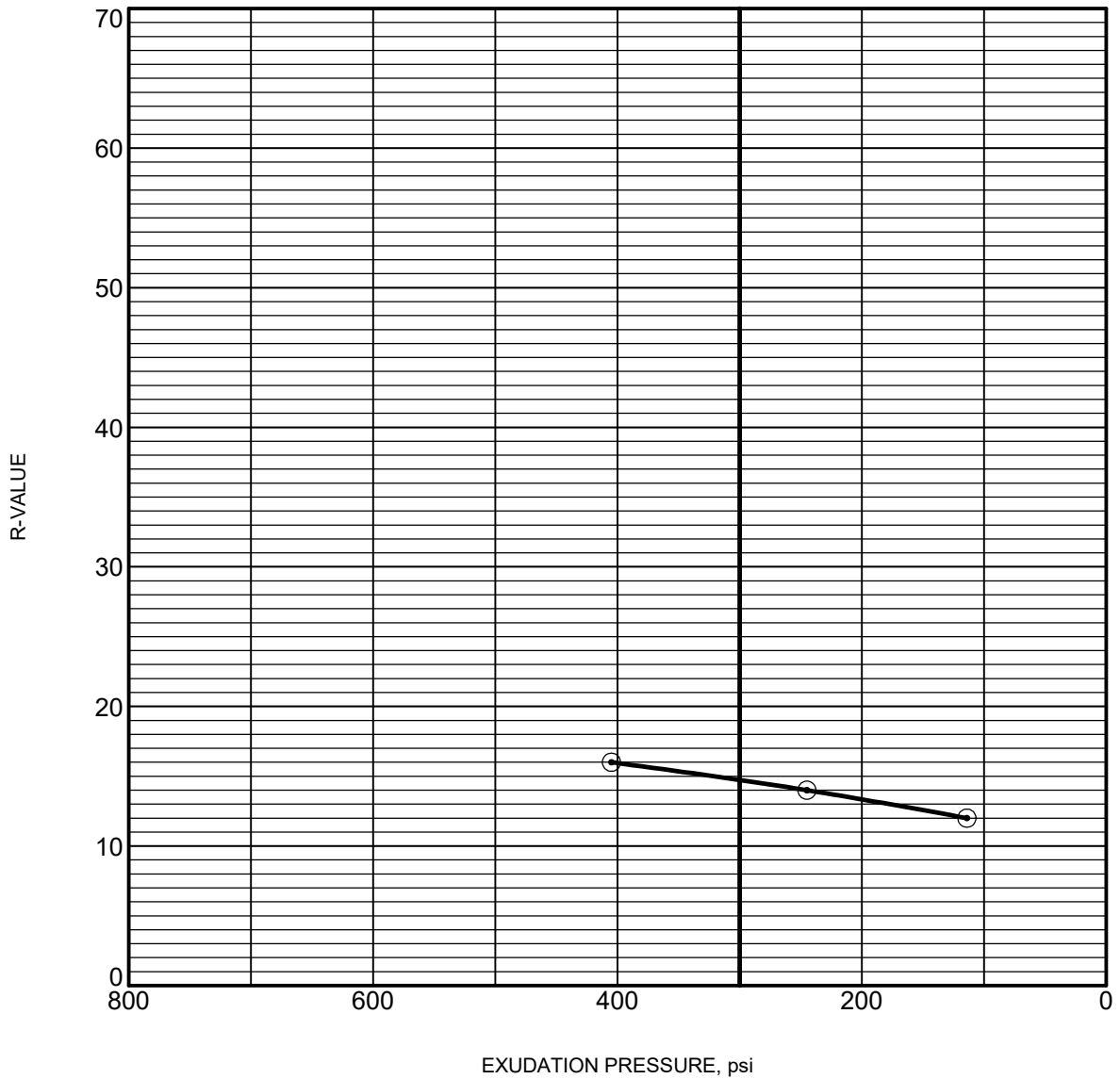
LUMOS GRAIN SIZE SPARKS FY 26.GPJ US LAB.GDT 12/1/25



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City of Sparks 2026 Street Rehab
GRAIN SIZE DISTRIBUTION
 Job Number: 12421.001
 Date: December 2025

PLATE
B-1.5



Test Data

Specimen No.	Water Content (%)	Dry Density (pcf)	Expansion (psf)	Exudation (psi)	Test R-Value*
1	11.6	114.5	0.0	114.0	12.0
2	11.0	112.3	0.0	245.0	14.0
3	10.6	112.7	190.0	405.0	16.0

* Reported values have been corrected for sample height, where required.

Test Result

Specimen Identification	Classification	R-Value
TP #1 2.0	Brown Clayey SAND (SC)	15

R-VALUE SPARKS FY 26 GPJ US LAB.GDT 12/1/25



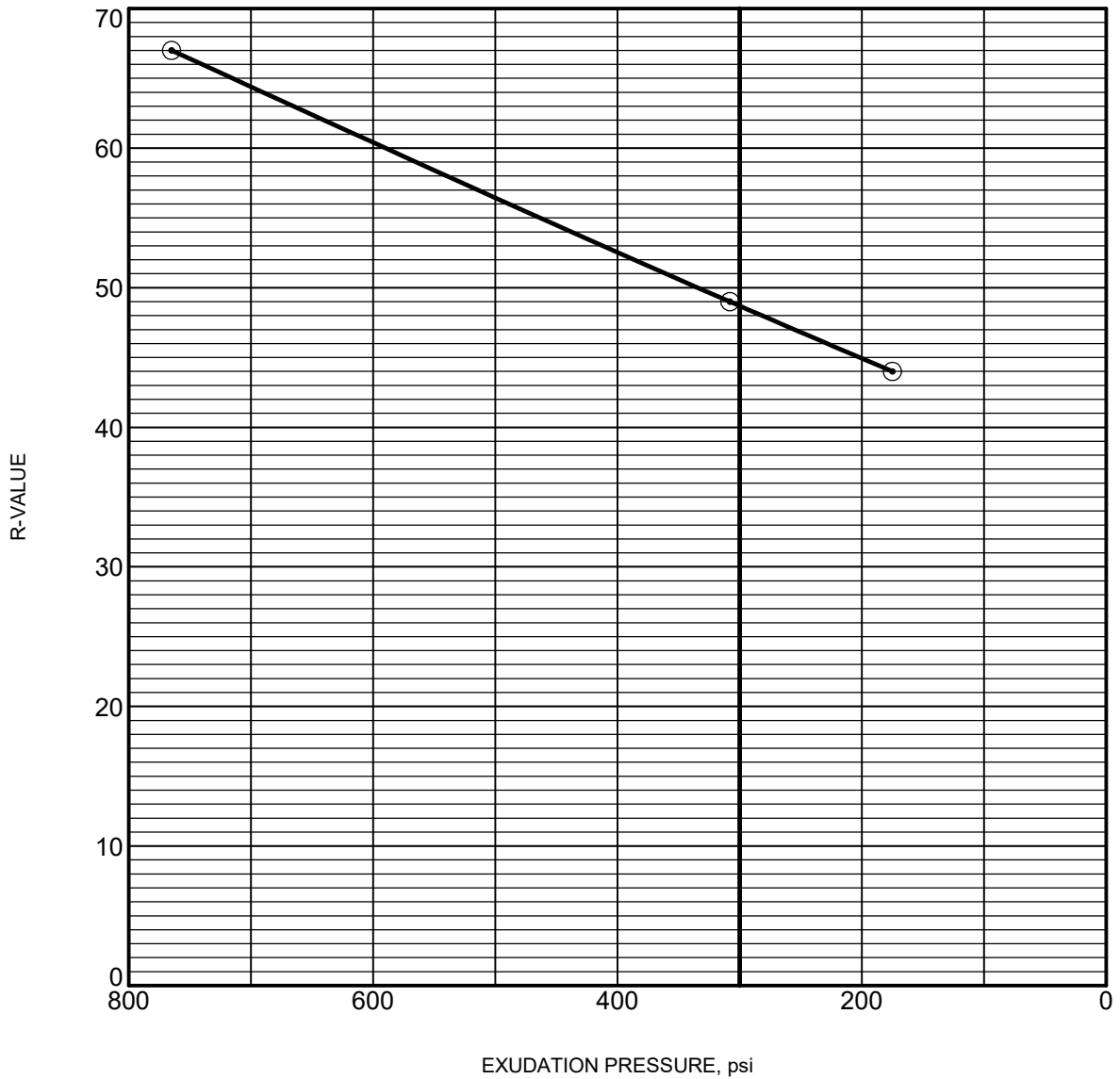
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City of Sparks 2026 Street Rehab
RESISTANCE VALUE TEST

Job Number: 12421.001

Date: December 2025

PLATE
B-3.1



Test Data

Specimen No.	Water Content (%)	Dry Density (pcf)	Expansion (psf)	Exudation (psi)	Test R-Value*
1	5.2	100.5	0.0	175.0	44.0
2	4.4	101.4	0.0	308.0	49.0
3	4.3	108.5	0.0	765.0	67.0

* Reported values have been corrected for sample height, where required.

Test Result

Specimen Identification	Classification	R-Value
TP #6 2.8	Brown Poorly Graded SAND (SP)	49

R-VALUE SPARKS FY 26 GPJ US LAB.GDT 12/1/25



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City of Sparks 2026 Street Rehab
RESISTANCE VALUE TEST

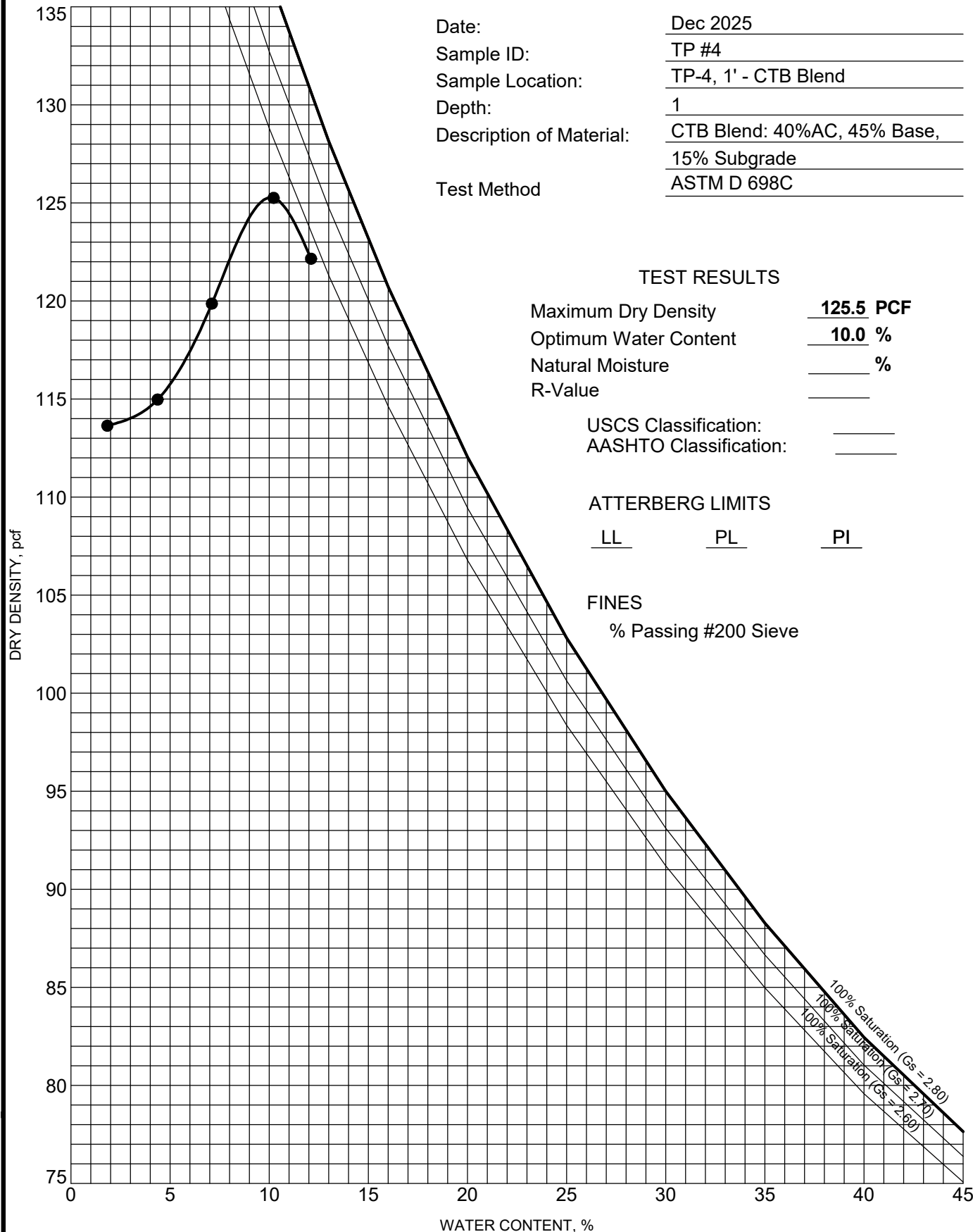
Job Number: 12421.001

Date: December 2025

PLATE

B-3.2

Date: Dec 2025
 Sample ID: TP #4
 Sample Location: TP-4, 1' - CTB Blend
 Depth: 1
 Description of Material: CTB Blend: 40%AC, 45% Base, 15% Subgrade
 Test Method: ASTM D 698C



LUMOS COMPACTION SPARKS FY 26.GPJ US LAB.GDT 12/10/25



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City of Sparks 2026 Street Rehab

MOISTURE-DENSITY CURVE

Job Number: 12421.001

Date: December 2025

PLATE

B-4

Western Environmental Testing Laboratory Analytical Report

Lumos & Associates, Inc.
950 Sandhill Road, Suite 100
Reno, NV 89521
Attn: Mitch Burns
Phone: (775) 827-6111 Fax: (775) 827-6122
PO\Project: 12421.001/Task1/MTB

Date Printed: 12/5/2025
OrderID: 25120049

Customer Sample ID: C-3 9in-12in
WETLAB Sample ID: 25120049-001

Collect Date/Time: 11/14/2025
Receive Date: 12/2/2025 10:10

Analyte	Method	Results	Units	DF	RL	Analyzed	LabID
<u>Anions by Ion Chromatography</u>							
Sulfate	EPA 300.0	17	mg/kg	10	15	12/4/2025	NV00925
<u>Sample Preparation</u>							
10:1 DI Water Extraction	WL 10.0	Complete		1		11/14/2025	NV00925

DF=Dilution Factor, RL = Reporting Limit (minimum 3X the MDL), ND = Not Detected <RL or <MDL (if listed)

Page 3 of 4



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City of Sparks 2026 Street Rehab
ANALYTICAL TESTING

**PLATE
B-5**

Job Number: 12421.001

Date: December 2025

APPENDIX C

CEMENT TREATED PULVERIZED
ASPHALT/BASE/SUBGRADE
MIX DESIGN





CEMENT TREATED BASE COMPRESSION TESTS

REPORT TO:	City of Sparks	PROJECT NAME:	FY 26 Street Rehabilitation Unit 1
		PROJECT NO.:	12421.001
		LOCATION:	Sparks, Nevada
SAMPLED BY:	J. Macaluso	DATE RECEIVED:	
DATE MOLDED:	12/5/2025	MOLDED BY:	Z. Lim, B. Battaglia

MATERIAL DESCRIPTION: Laboratory Mix Design (4% Cement By Dry Weight of Soil)
2% Over Optimum Water Content
Sulfur Bonded Capping.
40% AC, 45% Base, and 15% Subgrade

SAMPLE LOCATION: TP#4 at 1'

SAMPLE TYPE: LABORATORY DESIGN X FIELD SAMPLE

LAB NO.	DIAMETER (INCHES)	AREA (SQ.IN)	TEST AGE	DATE TESTED	TOTAL LOAD-LBS.	UNIT LOAD PSI
CC-3596-25	4.14	13.46	3	12/08/25	4,995	370
CC-3597-25	4.13	13.40	3	12/08/25	4,750	355
CC-3598-25	4.12	13.33	3	12/08/25	4,375	330
CC-3599-25	4.12	13.33	7	12/12/25	5,645	425
CC-3600-25	4.07	13.01	7	12/12/25	5,585	430
CC-3601-25	4.07	13.01	7	12/12/25	5,960	460
CC-3602-25			Hold			
CC-3603-25			Hold			
Average Compressive Strength 3-Day:						350
Average Compressive Strength 7-Day:						440

Testing and Sampling were performed in accordance with ASTM D-558, C-1632, C-1633. Standards as applicable.

REMARKS: _____

CAPPING UNBONDED BONDED

TEST RESULTS: COMPLY DO NOT COMPLY

Client Notified of Test Results Respectively Submitted by:
 M. Burns Materials Engineering Manager

 LUMOS & ASSOCIATES	Lumos & Associates 2144 College Pkwy, Suite 110 Carson City, NV 89706 775.883.7077 Fax: mburns@lumosinc.com	City of Sparks 2026 Street Rehab <h3 style="margin: 0;">CTB - 4% Cement</h3> Job Number: 12421.001 Date: December 2025	PLATE C-1
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CEMENT TREATED BASE COMPRESSION TESTS

REPORT TO: City of Sparks PROJECT NAME: FY 26 Street Rehabilitation Unit 1
 PROJECT NO.: 12421.001
 LOCATION: Sparks, Nevada
 DATE RECEIVED: _____
 SAMPLED BY: J. Macaluso MOLDED BY: Z. Lim, B. Battaglia
 DATE MOLDED: 12/5/2025

MATERIAL DESCRIPTION: Laboratory Mix Design (6% Cement By Dry Weight of Soil)
2% Over Optimum Water Content
Sulfur Bonded Capping.
40% AC, 45% Base, and 15% Subgrade
 SAMPLE LOCATION: TP#4 at 1'

SAMPLE TYPE: LABORATORY DESIGN FIELD SAMPLE _____

LAB NO.	DIAMETER (INCHES)	AREA (SQ.IN)	TEST AGE	DATE TESTED	TOTAL LOAD-LBS.	UNIT LOAD PSI
CC-3604-25	4.11	13.27	3	12/08/25	5,200	390
CC-3605-25	4.14	13.46	3	12/08/25	5,975	445
CC-3606-25	4.14	13.46	3	12/08/25	6,325	470
CC-3607-25	4.07	13.01	7	12/12/25	8,165	630
CC-3608-25	4.03	12.76	7	12/12/25	7,885	620
CC-3609-25	4.05	12.88	7	12/12/25	7,440	580
CC-3610-25			Hold			
CC-3611-25			Hold			
Average Compressive Strength 3-Day:						435
Average Compressive Strength 7-Day:						610

Testing and Sampling were performed in accordance with ASTM D-558, C-1632, C-1633. Standards as applicable.

REMARKS: _____

CAPPING UNBONDED BONDED

TEST RESULTS: COMPLY DO NOT COMPLY

Client Notified of Test Results Respectively Submitted by:
 M. Burns Materials Engineering Manager

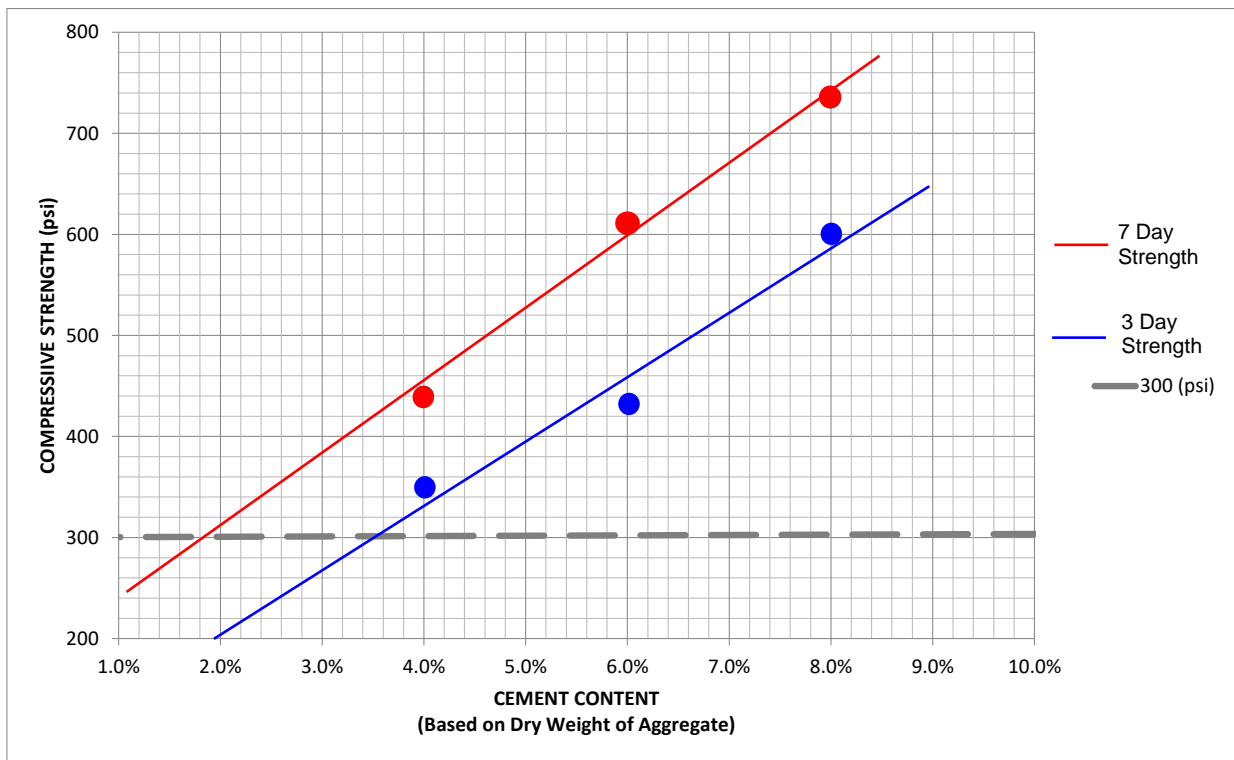
 LUMOS & ASSOCIATES	Lumos & Associates 2144 College Pkwy, Suite 110 Carson City, NV 89706 775.883.7077 Fax: mburns@lumosinc.com	City of Sparks 2026 Street Rehab <h3 style="margin: 0;">CTB - 6% Cement</h3> Job Number: 12421.001	PLATE C-2
Date: December 2025			



CEMENT TREATED BASE COMPRESSION TESTS

REPORT TO:	City of Sparks	PROJECT NAME:	FY 26 Street Rehabilitation Unit 1
		PROJECT NO.:	12421.001
		LOCATION:	Sparks, Nevada
SAMPLED BY:	J. Macaluso	DATE RECEIVED:	
DATE MOLDED:	12/5/25	MOLDED BY:	Z. Lim, B. Battaglia
MATERIAL DESCRIPTION:	Graph of 4%, 6%, and 8% Cement Contents		
SAMPLE LOCATION:	TP#4 at 1'		

TEST AGE	CEMENT CONTENT		
	4.0%	6.0%	8.0%
3-Day Strength (psi)	350	435	595
7-Day Strength (psi)	440	610	735



Reviewed by:



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City of Sparks 2026 Street Rehab
CTB - Mix Design Graph

PLATE
 C-4

Job Number: 12421.001

Date: December 2025

APPENDIX D

PAVEMENT CALCULATIONS



Job Number: 12421.001
Project: City of Sparks FY26 Unit 1 Rehab
Client: The City of Sparks
Description: Pavement Calculations
By: M. Burns

R-Value for CTB = 80 (Assumed)
R-Value for Aggregate Base = 70 (Standard Specification)
R-Value for Native Soils = 15
TI (Local Road) = 5.5 (Light Traffic)

$$GE=0.0032*(TI)*(100-R)$$

$$Gf_{(AC,Local)}=2.32, Gf_{(Cement\ Treated\ Soil)}=1.7, Gf_{(base)}=1.1$$
$$t_{layer}=GE/Gf$$

Local Road Pavement Section : Asphalt and Cement Treated Recycled Material
***Except Coachman Court**

$$GE_{AC}=0.0032*(5.5)*(100-80)=0.35'$$
$$t_{AC}=(0.35/2.32)*(12"/1')=1.8" \quad \text{USE 4" Asphalt Concrete}$$
$$GE_{AC}=(4"*2.32)/(12")=0.77'$$

$$GE_{CTB(Pulv.)}=0.0032*(5.5)*(100-15)=1.50'$$
$$t_{CTB(Pulv.)}(((1.50'-0.77')/1.7)*(12"/1'))=5.3" \quad \text{USE 6" Cement Treated Pulverized Material}$$

Coachman Court

$$GE_{AC}=0.0032*(5.5)*(100-70)=0.53'$$
$$t_{AC}=(0.53/2.32)*(12"/1')=2.7" \quad \text{USE 4" Asphalt Concrete}$$
$$GE_{AC}=(4"*2.32)/(12")=0.77'$$

$$GE_{AB}=0.0032*(5.5)*(100-15)=1.50'$$
$$t_{AB}(((1.50'-0.77')/1.1)*(12"/1'))=8.0" \quad \text{USE 8" Aggregate Base}$$



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City of Sparks 2026 Street Rehab

PAVEMENT DESIGN

Job Number: 12421.001

Date: December 2025

PLATE
D-1