Project No. S1781-05-01
December 23, 2019
Revised February 25, 2020

VIA ELECTRONIC MAIL

Jim Fisher, PE
R.E.Y. Engineers, Inc.
905 Sutter Street, Suite 200
Folsom, California 95630

Subject: LIMITED PAVEMENT EVALUATION
SPRING STREET PAVEMENT REHABILITATION
PLACERVILLE, CALIFORNIA

Mr. Fisher:

In accordance with your authorization, we are providing this limited pavement evaluation for Spring Street between State Route 49 (Coloma Road) on the west and Highway 50 on the east, in Placerville, California. The approximate project alignment is shown on the Vicinity Map, Figure 1.

PROJECT DESCRIPTION AND PURPOSE

The project consists of rehabilitating the pavement along Spring Street between State Route 49 (Coloma Street) on the west and US Highway 50 on the east (approximately 2,400 linear feet). Prior to or as part of the road rehabilitation project, the City intends to make any necessary improvements to City-owned underground utility infrastructure (water, sanitary sewer, and storm drainage).

The existing Hot Mix Asphalt (HMA) pavement is in poor condition with typical age- and traffic-related distress such as transverse and longitudinal cracking, shrinkage cracking, patches, some areas of extensive alligator cracking, and rutting.

The purpose of our services was to evaluate the existing pavement structural section details and subsurface conditions and provide geotechnical recommendations for rehabilitation of pavement within the project limits.

SCOPE OF SERVICES

To prepare this report, we performed the following scope of services:

- Performed a site visit to observe existing pavement conditions and pre-mark our excavation locations.
- Notified subscribing utility companies via Underground Service Alert (USA) a minimum of two working days (as required by law) prior to performing exploratory excavations at the site.
- Obtained an encroachment permit from the City of Placerville.
- Provided necessary traffic control measures during field work.

- Performed five exploratory borings (B1 through B5) within the eastbound and westbound lanes of Spring Street within the project limits. The exploratory borings were performed using a truck mounted drill rig equipped with solid flight augers.
- Measured the existing pavement section material thicknesses at the core locations.
- Obtained representative disturbed soil samples using a driven Standard Penetration Test (SPT) sampler and California Modified sampler. Logs of the borings are presented as Figures 3 through 8.
- Upon completion, backfilled the borings with excess drill cuttings and patched the borings with rapid-set concrete.
- Performed laboratory testing to evaluate pertinent geotechnical parameters including FDR mix design.
- Prepared this summary report with our conclusions and recommendations.

EXISTING PAVEMENT AND SUBGRADE CONDITIONS

Existing Pavement Sections

Table 1 summarizes the existing pavement section material thicknesses encountered at our boring locations. Approximate boring locations are shown on the Site Plan, Figure 2.

TABLE 1
EXISTING PAVEMENT SECTIONS

Boring ID	HMA thickness (inches)	AB[1] thickness (inches)
B1	1½	0
B2	3	0
B3	1½	0
B4	2¾	0
B5	2	0
AVG	2	0

Notes:
1. AB = aggregate base.

Existing Pavement Conditions

Based on our observations, the condition of the existing HMA is generally poor, with typical age- and traffic-related distress such as transverse and longitudinal cracking, shrinkage cracking, patches, some areas of extensive alligator cracking, and areas of rutting.

Subsurface Conditions

Residual Soil

Underlying the HMA pavement in Borings B1 through B5, we encountered residual soil consisting of very loose to medium dense silty sand (SM) with gravel and clayey sand (SC) with gravel.

Mariposa Formation

The residual soil is underlain by Mariposa Formation which consists of variably weathered metasedimentary rock. The metasedimentary rock is completely to moderately weathered, very weak to strong, and thinly laminated.

Weathering decreases with depth and moderate to difficult excavation conditions prevail below about 4 feet to in excess of 10 feet, depending on location. This formation generally breaks down to sand and gravel-sized (3 inches or smaller) fragments when excavated; however, some scattered cobble- to boulder-sized (3 inches and larger) material may be present.

Soil and geologic conditions described in the previous paragraphs are generalized. The boring logs included in Appendix A detail soil type, color, moisture, consistency, and USCS classification of the soils encountered at specific locations and elevations.

Groundwater

We did not encounter groundwater in our borings (maximum depth of 11½ feet) on May 24, 2019. Therefore, in an effort to assess local groundwater conditions, we reviewed reports available on the California State Water Resources Control Board (SWRCB) GeoTracker website (http://geotracker .waterboards.ca.gov) for groundwater information at nearby facilities with a groundwater monitoring well array, such as leaking underground storage tank (LUST) facilities. The nearest such facility is the El Dorado County Courthouse, approximately 300 feet south of the site, which is an closed LUST case. According to the information available on GeoTracker, depth to groundwater measured groundwater monitoring wells at this facility ranged from approximately 4 feet to 40 feet below ground surface.

Based on our observations of the site and our experience at similar sites in the Motherlode region, perched groundwater/seepage may develop at variable depths generally at the contacts between residual soil and weathered or fresh bedrock, as well as within formational material based on the degree of weathering, fracturing, jointing, and bedding especially during winter and spring. Perched groundwater seepage is more likely to affect earthwork construction than fluctuations in the static groundwater table. Excavations performed during perched groundwater conditions may expose transient seepage in cuts.

Laboratory Test Results

We performed laboratory Resistance Value (R-Value) testing to evaluate pavement support characteristics. The R-Value test results are summarized in Table 2. To account for variations in the subgrade soil, we recommend using an R-Value of 40 for design.

TABLE 2
SUMMARY OF R-VALUE TEST RESULTS

Sample ID	Sample Depth Below HMA (feet)	Sample Description	R-Value
B1 Bulk	0-5	Light brown Silty Sand with gravel (SM)	51
B5 Bulk	0-5	Yellowish brown Silty SAND with gravel (SM)	52

We also performed laboratory tests to evaluate in-situ dry density and moisture content, plasticity characteristics, and unconfined compressive strength of cement treated soil. Results are presented as Figures 9 through 11.

DISCUSSION AND PAVEMENT REHABILITATION ALTERNATIVES

Given the age, condition, and thickness of the existing pavement, we consider the existing pavement section to be structurally deficient for the design Traffic Index (TI) of 8.0. On average, the existing HMA is 2 inches thick and does not include an underlying base layer. The back calculated TI for the current pavement (assuming new pavement conditions) is less than 3.0. Furthermore, the existing HMA is in very poor condition and will not adequately support an HMA overlay. Therefore, pavement rehabilitation may consist of one or more of the following:

- Pavement reconstruction using in-place recycling/cement stabilization known as full-depth rehabilitation (FDR)
- Removal and replacement of the existing pavement with new HMA and AB

If properly constructed the alternatives listed above will provide a minimum 20-year service life. Descriptions of each alternative are provided below.

Removal and Replacement

Removal and replacement consists of removing the existing pavement section and replacing with a new section consisting of HMA and AB. Removal and replacement will require significant material offhaul and importation of new materials and would be disruptive to local residents and businesses.

Full-Depth Reclamation (FDR)

FDR consists of reconstructing an existing distressed or structurally deficient pavement section by in-place recycling of the pavement materials with chemical treatment to enhance the structural properties of the recycled materials. This work consists of pulverizing existing pavement section materials in-place, reshaping the grade to allow for any conforms and drainage, and uniformly mixing with Portland cement and water. The mixture is then compacted, finished, and cured in such a manner that the cement-treated mixture forms a dense, uniform mass conforming to the lines, grades, and cross sections required. HMA is then placed over the cured FDR cement-treated materials to complete the pavement structural section. FDR is more cost-effective than removal and replacement and results in less offhaul and importation of materials. FDR can also be staged and constructed with less impact to local residences and businesses.

RECOMMENDATIONS

Flexible pavement reconstruction may consist of removal and replacement, or FDR with cement. Table 3 provides alternative pavement structural sections based on design TIs of 7.0 and 8.0 based on the design methods of the Caltrans *Highway Design Manual* using an R-value of 50.

TABLE 3
FLEXIBLE PAVEMENT SECTIONS

Traffic Index = 7.0 (R-Value = 50)			
RHMA[1], inches	---	---	2.5
HMA[2], inches	3.5	3.0	---
AB[3], inches	6.0	---	---
FDR[4], inches	---	9.0	9.0
Traffic Index = 8.0 (R-Value = 50)			
RHMA[1], inches	---	---	2.5
HMA[2], inches	4.0	3.0	---
AB[3], inches	7.0	---	---
FDR[4], inches	---	9.0	9.0

Notes:

1. *Rubberized Hot Mix Asphalt (RHMA) conforming to Caltrans' latest Standard Specifications*
2. *Hot Mix Asphalt (HMA) conforming to Caltrans latest Standard Specifications.*
3. *Class 2 Aggregate Base conforming to Caltrans Standard Specifications*
4. *Full-Depth Reclamation (FDR) – In-place treatment of existing HMA with 5% cement. Develops a minimum 7-day unconfined compressive strength of 350 pounds per square inch (psi). Minimum recommended FDR thickness is 8 inches.*

The recommended pavement section is based on the following assumptions:

1. Subgrade soil has a minimum R-Value of 40.
2. If removal and replacement is selected, Class 2 AB has a minimum R-Value of 78 and meets the requirements of Section 26 of Caltrans' latest *Standard Specifications*.
3. If removal and replacement is selected, Class 2 AB is compacted to at least 95% relative compaction at or near optimum moisture content. Prior to placing HMA the AB should be proof-rolled with a loaded water truck to verify stability.
4. If removal and replacement is selected, Subgrade soil is scarified at least 6 inches, uniformly moisture-conditioned above optimum moisture content and compacted to 95% or higher relative compaction. Prior to placing AB, subgrade soil should be proof-rolled with a loaded water truck to verify stability.
5. HMA should conform to Section 39 of Caltrans' latest *Standard Specifications*.
6. Periodic maintenance of HMA pavements is performed.

FDR, if performed, should consist of thoroughly mixing pulverized existing materials with Portland cement and water to the required depths. Prior to placement and mixing of Portland cement and water, existing HMA should be removed or pre-pulverized to a minimum depth of 6 inches below existing top of HMA, shaped to grade, and compacted to approximately 90% relative compaction. Alternatively, the existing HMA may be removed and exported prior to treatment. In this case pre-pulverization is not required.

After grading to the required elevation(s), the subgrade should be treated to a minimum depth of 11 or 12 inches per Table 3. In order to achieve a minimum developed unconfined compressive strength of 350 pounds per square inch (psi), we recommend using 5% Portland cement by dry weight for an 11-inch or 12-inch treatment depth. For bidding purposes, the in-place dry unit

weight of 120 pounds per cubic foot (pcf) may be assumed. Actual in-place dry unit weight should be evaluated during construction immediately prior to treatment.

After treatment, the FDR section should be compacted to a minimum of 95% relative compaction at least 2% above optimum moisture content. We recommend that the surface of the cement-treated FDR section be kept moist while exposed. If exposure is to continue beyond three days, we recommend that a bituminous cure seal be placed after initial moist cure. To further reduce the potential for future reflective cracking, the finished FDR section should be microcracked a minimum of 24 hours after final compaction and prior to placement of the new HMA section. The entire FDR section should be proof rolled prior to placement of the new HMA section. We can provide guideline specifications for FDR and microcracking upon request.

Underground Utility Excavation

Excavation characteristics will vary at the site depending on location and excavation depths. Table 4 summarizes anticipated excavation characteristics in each geologic material identified at the site.

TABLE 4
ANTICIPATED EXCAVATION CHARACTERISTICS

Geologic Unit[1]	Excavation Characteristics
Residual Soils and Completely Weathered Metasedimentary Rock	The residual soils and completely weathered metasedimentary rock encountered from the ground surface to approximate depths of 11½ feet generally excavates as hard silty clay and lean clay with gravel and may include cobble to boulder size material. We anticipate that grading and excavation may be accomplished with standard to difficult effort using heavy-duty grading/excavation equipment. We anticipate excavations will generate material predominantly 6 inches and smaller; however, some larger rock/cementations may be encountered.
Moderately Weathered Metasedimentary Rock	Weathering generally decreases with depth, and moderate to heavy ripping will likely be required at depths below about 4 feet in isolated areas. Pre-ripping with a large excavator (such as a Caterpillar 235) equipped with ripping shank, may be required in less weathered rock.
Fresh Metasedimentary Rock	Fresh (unweathered) metasedimentary rock was not encountered in our borings, but may be encountered during construction. Excavation with a large excavator (such as a Caterpillar 235) equipped with a hydraulic hammer could be used but would likely result in slow excavation production.

Underground Utility Backfill

Pipe bedding and shading should conform to the requirements of the appropriate utility authority. Utility trenches should be backfilled with AB per City of Placerville requirements. Trench backfill should be placed in loose lifts not exceeding 8 inches, moisture-conditioned at or above optimum and compacted to at least 95% relative compaction. Compaction should be performed by mechanical means only; jetting of trench backfill is not recommended.

CLOSURE AND LIMITATIONS

The pavement recommendations and associated design life presented in this report assume that periodic pavement maintenance is performed (such as crack sealing and similar surface treatment. The conclusions and recommendations presented in this limited pavement evaluation are based on our observation, limited investigation (coring), and our geotechnical experience. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the subsurface conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, we should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous materials or environmental contamination was not part of our scope of services.

Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices used in the site area at this time. No warranty is provided, express or implied.

Please contact us if you have any questions regarding this letter or if we may be of further service.

Sincerely,

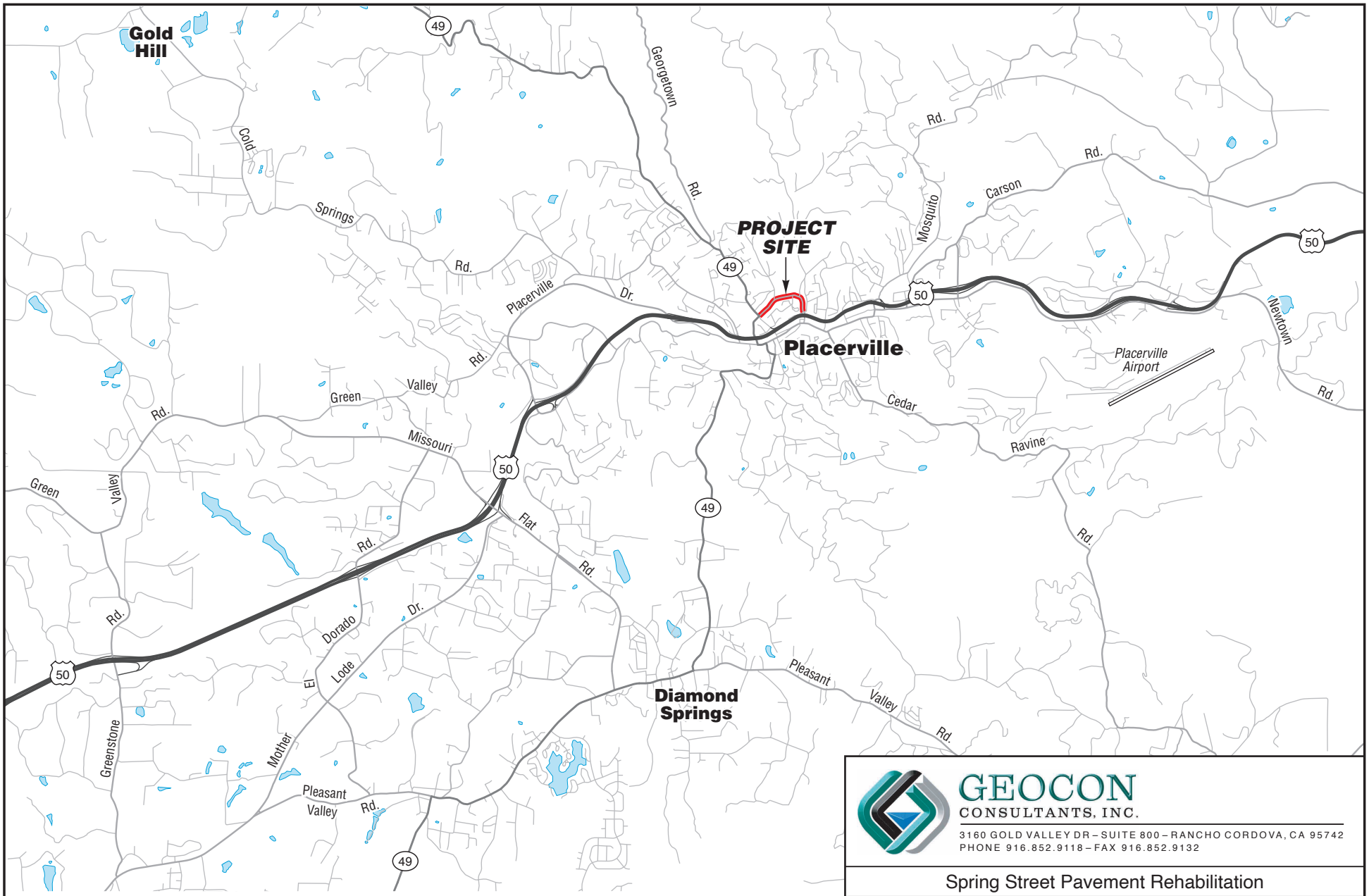
GEOCON CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
RICHARD C. CHURCH
NO. 67848
CIVIL
STATE OF CALIFORNIA

Richard Church, PE
Project Engineer

Jeremy J. Zorne, PE, GE
Senior Engineer

Attachments: Figure 1, Vicinity Map
Figure 2, Site Plan
Figure 3 through 8, Logs of Borings
Figure 9, Summary of Laboratory Results
Figure 10, Atterberg Limits
Figure 11, Unconfined Compressive Strength of Soil-Cement Specimens



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Scale in Miles

N

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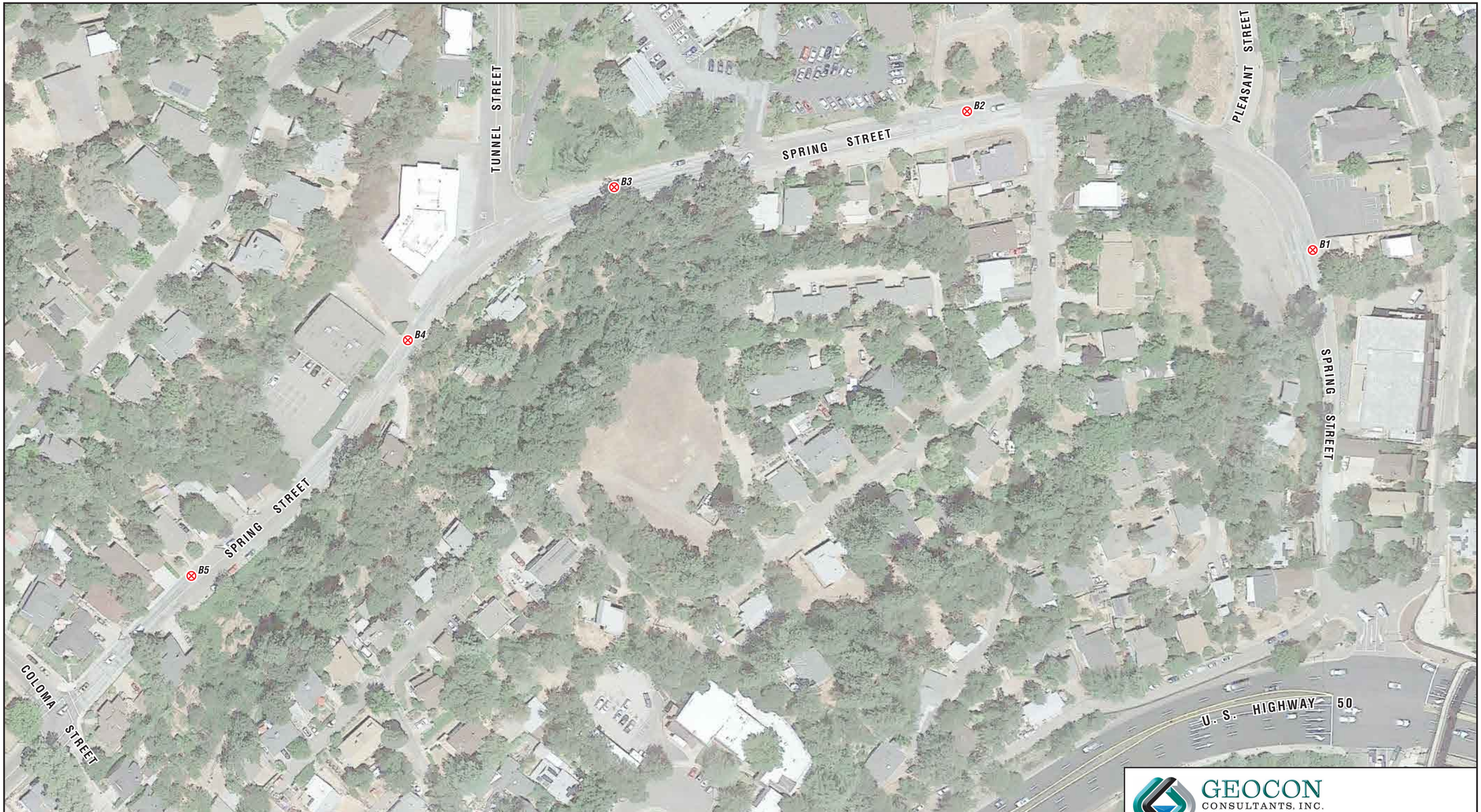
Spring Street Pavement Rehabilitation

Placerville, California

VICINITY MAP

S1781-05-01	December 2019	Figure 1



LEGEND:

B1 ⊗ Approximate Boring Location

N

0 120

Scale in Feet

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Spring Street Pavement Rehabilitation

Placerville,
California

SITE PLAN

S1781-05-01	December 2019	Figure 2

UNIFIED SOIL CLASSIFICATION

MAJOR DIVISIONS				TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO.4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC	CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO.4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS WITH OR WITHOUT GRAVEL
			SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL	ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
	HIGHLY ORGANIC SOILS		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

BORING/TRENCH LOG LEGEND

- No Recovery
- Shelby Tube Sample
- Bulk Sample
- SPT Sample
- Modified California Sample
- Groundwater Level (At Completion)
- Groundwater Level (Seepage)

PENETRATION RESISTANCE

SAND AND GRAVEL			SILT AND CLAY			
RELATIVE DENSITY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	CONSISTENCY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	COMPRESSIVE STRENGTH (tsf)
VERY LOOSE	0 - 4	0 - 6	VERY SOFT	0 - 2	0 - 3	0 - 0.25
LOOSE	5 - 10	7 - 16	SOFT	3 - 4	4 - 6	0.25 - 0.50
MEDIUM DENSE	11 - 30	17 - 48	MEDIUM STIFF	5 - 8	7 - 13	0.50 - 1.0
DENSE	31 - 50	49 - 79	STIFF	9 - 15	14 - 24	1.0 - 2.0
VERY DENSE	OVER 50	OVER 79	VERY STIFF	16 - 30	25 - 48	2.0 - 4.0
			HARD	OVER 30	OVER 48	OVER 4.0

*NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE LAST 12 INCHES OF AN 18-INCH DRIVE

MOISTURE DESCRIPTIONS

FIELD TEST	APPROX. DEGREE OF SATURATION, S (%)	DESCRIPTION
NO INDICATION OF MOISTURE; DRY TO THE TOUCH	S<25	DRY
SLIGHT INDICATION OF MOISTURE	25≤S<50	DAMP
INDICATION OF MOISTURE; NO VISIBLE WATER	50≤S<75	MOIST
MINOR VISIBLE FREE WATER	75≤S<100	WET
VISIBLE FREE WATER	100	SATURATED

QUANTITY DESCRIPTIONS

APPROX. ESTIMATED PERCENT	DESCRIPTION
<5%	TRACE
5 - 10%	FEW
11 - 25%	LITTLE
26 - 50%	SOME
>50%	MOSTLY

GRAVEL/COBBLE/BOULDER DESCRIPTIONS

CRITERIA	DESCRIPTION
PASS THROUGH A 3-INCH SIEVE AND BE RETAINED ON A NO. 4 SIEVE (#4 TO 3")	GRAVEL
PASS A 12-INCH SQUARE OPENING AND BE RETAINED ON A 3-INCH SIEVE (3"-12")	COBBLE
WILL NOT PASS A 12-INCH SQUARE OPENING (>12")	BOULDER

BEDDING SPACING DESCRIPTIONS

THICKNESS/SPACING	DESCRIPTOR
GREATER THAN 10 FEET	MASSIVE
3 TO 10 FEET	VERY THICKLY BEDDED
1 TO 3 FEET	THICKLY BEDDED
3 5/8-INCH TO 1 FOOT	MODERATELY BEDDED
1 1/4-INCH TO 3 5/8-INCH	THINLY BEDDED
5/8-INCH TO 1 1/4-INCH	VERY THINLY BEDDED
LESS THAN 5/8-INCH	LAMINATED

STRUCTURE DESCRIPTIONS

CRITERIA	DESCRIPTION
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS AT LEAST 1/4-INCH THICK	STRATIFIED
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS LESS THAN 1/4-INCH THICK	LAMINATED
BREAKS ALONG DEFINITE PLANES OF FRACTURE WITH LITTLE RESISTANCE TO FRACTURING	FISSURED
FRACTURE PLANES APPEAR POLISHED OR GLOSSY, SOMETIMES STRIATED	SLICKENSIDED
COHESIVE SOIL THAT CAN BE BROKEN DOWN INTO SMALLER ANGULAR LUMPS WHICH RESIST FURTHER BREAKDOWN	BLOCKY
INCLUSION OF SMALL POCKETS OF DIFFERENT SOIL, SUCH AS SMALL LENSES OF SAND SCATTERED THROUGH A MASS OF CLAY	LENSED
SAME COLOR AND MATERIAL THROUGHOUT	HOMOGENOUS

CEMENTATION/INDURATION DESCRIPTIONS

FIELD TEST	DESCRIPTION
CRUMBLES OR BREAKS WITH HANDLING OR LITTLE FINGER PRESSURE	WEAKLY CEMENTED/INDURATED
CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE	MODERATELY CEMENTED/INDURATED
WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE	STRONGLY CEMENTED/INDURATED

IGNEOUS/METAMORPHIC ROCK STRENGTH DESCRIPTIONS

FIELD TEST	DESCRIPTION
MATERIAL CRUMBLES WITH BARE HAND	WEAK
MATERIAL CRUMBLES UNDER BLOWS FROM GEOLOGY HAMMER	MODERATELY WEAK
1/8-INCH INDENTATIONS WITH SHARP END FROM GEOLOGY HAMMER	MODERATELY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **ONE** BLOW FROM GEOLOGY HAMMER	STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **COUPLE** BLOWS FROM GEOLOGY HAMMER	VERY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **MANY** BLOWS FROM GEOLOGY HAMMER	EXTREMELY STRONG

IGNEOUS/METAMORPHIC ROCK WEATHERING DESCRIPTIONS

DEGREE OF DECOMPOSITION	FIELD RECOGNITION	ENGINEERING PROPERTIES
SOIL	DISCOLORED, CHANGED TO SOIL, FABRIC DESTROYED	EASY TO DIG
COMPLETELY WEATHERED	DISCOLORED, CHANGED TO SOIL, FABRIC MAINLY PRESERVED	EXCAVATED BY HAND OR RIPPING (Saprolite)
HIGHLY WEATHERED	DISCOLORED, HIGHLY FRACTURED, FABRIC ALTERED AROUND FRACTURES	EXCAVATED BY HAND OR RIPPING, WITH SLIGHT DIFFICULTY
MODERATELY WEATHERED	DISCOLORED, FRACTURES, INTACT ROCK-NOTICEABLY WEAKER THAN FRESH ROCK	EXCAVATED WITH DIFFICULTY WITHOUT EXPLOSIVES
SLIGHTLY WEATHERED	MAY BE DISCOLORED, SOME FRACTURES, INTACT ROCK-NOT NOTICEABLY WEAKER THAN FRESH ROCK	REQUIRES EXPLOSIVES FOR EXCAVATION, WITH PERMEABLE JOINTS AND FRACTURES
FRESH	NO DISCOLORATION, OR LOSS OF STRENGTH	REQUIRES EXPLOSIVES

IGNEOUS/METAMORPHIC ROCK JOINT/FRACTURE DESCRIPTIONS

FIELD TEST	DESCRIPTION
NO OBSERVED FRACTURES	UNFRACTURED/UNJOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1 TO 3 FOOT INTERVALS	SLIGHTLY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 4-INCH TO 1 FOOT INTERVALS	MODERATELY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1-INCH TO 4-INCH INTERVALS WITH SCATTERED FRAGMENTED INTERVALS	INTENSELY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT LESS THAN 1-INCH INTERVALS; MOSTLY RECOVERED AS CHIPS AND FRAGMENTS	VERY INTENSELY FRACTURED/JOINTED

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KEY TO LOGS | Figure 3

PROJECT NO. **S1781-05-01** PROJECT NAME **Spring Street Pavement Rehabilitation**

BORING B1

ELEV. (MSL.) _____ DATE COMPLETED **5/24/2019**

ENG./GEO. **R. Church** DRILLER **V&W**

EQUIPMENT **CME-55HT** HAMMER TYPE **140 lb Automatic**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					1-1/2 inches AC, No AB			
1	B1-1			SM	**RESIDUAL SOIL**	23		
2	B1-1.5 B1-2.0				Medium dense, damp, reddish brown, Silty SAND with gravel	7	114.7	14.2
3								
4								
5					Moist	8		
6	B1-5.5 B1-6.0							
7				SM	MARIPOSA FORMATION Completely weathered, laminated, olive gray/yellowish brown, weak, metasedimentary rock. Excavates as medium dense, damp, Silty SAND with gravel			
8								
9								
10	B1-10.0					23		
11								
					BORING TERMINATED AT 11.5 FEET GROUNDWATER NOT ENCOUNTERED BACKFILLED WITH CUTTINGS			

Figure 4, Log of Boring, page 1 of 1

IN PROGRESS NO A S1781-05-01 SPRING STREET PAVEMENT REHAB.GPJ 06/14/19

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SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... STANDARD PENETRATION TEST
... DRIVE SAMPLE (UNDISTURBED)
... DISTURBED OR BAG SAMPLE
... CHUNK SAMPLE
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **S1781-05-01** PROJECT NAME **Spring Street Pavement Rehabilitation**

BORING B2

ELEV. (MSL.) _____ DATE COMPLETED **5/24/2019**

ENG./GEO. **R. Church** DRILLER **V&W**

EQUIPMENT **CME-55HT** HAMMER TYPE **140 lb Automatic**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					3 inches AC, No AB			
1	B1-1			SM	**RESIDUAL SOIL**	32	99.5	15.4
2	B1-1.5 B1-2.0			SM	Medium dense, damp, reddish brown, Silty SAND with gravel			
3					MARIPOSA FORMATION Completely weathered, very thinly bedded, olive gray, weak, metasedimentary rock. Excavates as dense, damp, Silty SAND with gravel.			
4					Moderately weathered, gray, strong	10/0"		

REFUSAL AT 4.5 FEET
GROUNDWATER NOT ENCOUNTERED
BACKFILLED WITH CUTTINGS

Figure 5, Log of Boring, page 1 of 1

IN PROGRESS NO A S1781-05-01 SPRING STREET PAVEMENT REHAB.GPJ 06/14/19

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SAMPLE SYMBOLS
... SAMPLING UNSUCCESSFUL
... DISTURBED OR BAG SAMPLE
... STANDARD PENETRATION TEST
... CHUNK SAMPLE
... DRIVE SAMPLE (UNDISTURBED)
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **S1781-05-01** PROJECT NAME **Spring Street Pavement Rehabilitation**

BORING B3

ELEV. (MSL.) _____ DATE COMPLETED **5/24/2019**

ENG./GEO. **R. Church** DRILLER **V&W**

EQUIPMENT **CME-55HT** HAMMER TYPE **140 lb Automatic**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					1-1/2 inches AC, No AB			
1	B1-1			SC	**RESIDUAL SOIL** Medium dense, damp, reddish brown, Clayey SAND with gravel	28	108.2	12.3
2	B1-1.5 B1-2.0					8		
3								
4				SC	MARIPOSA FORMATION Completely weathered, laminated, light olive gray, weak, metasedimentary rock. Excavates as medium dense, damp, Clayey SAND with gravel			
5	B1-5.5					35		
6	B1-6.0							
7								
8								
9								
10	B1-10.0				BORING TERMINATED AT 11.5 FEET GROUNDWATER NOT ENCOUNTERED BACKFILLED WITH CUTTINGS Moderately weathered, dark gray brown, very strong	10/0"		

Figure 6, Log of Boring, page 1 of 1

IN PROGRESS NO A S1781-05-01 SPRING STREET PAVEMENT REHAB.GPJ 06/14/19

GEOCON

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL
... DISTURBED OR BAG SAMPLE
... STANDARD PENETRATION TEST
... CHUNK SAMPLE
... DRIVE SAMPLE (UNDISTURBED)
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **S1781-05-01** PROJECT NAME **Spring Street Pavement Rehabilitation**

BORING B4

ELEV. (MSL.) _____ DATE COMPLETED **5/24/2019**

ENG./GEO. **R. Church** DRILLER **V&W**

EQUIPMENT **CME-55HT** HAMMER TYPE **140 lb Automatic**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					2-3/4 inches AC, No AB			
1				SM	**RESIDUAL SOIL** Medium dense, damp, reddish brown, Silty SAND with gravel			

BORING TERMINATED AT 1 FOOT DUE TO NUMEROUS UNDERGROUND UTILITIES
GROUNDWATER NOT ENCOUNTERED
BACKFILLED WITH CUTTINGS

Figure 7, Log of Boring, page 1 of 1

IN PROGRESS NO A S1781-05-01 SPRING STREET PAVEMENT REHAB.GPJ 06/14/19

GEOCON

SAMPLE SYMBOLS
... SAMPLING UNSUCCESSFUL
... DISTURBED OR BAG SAMPLE
... STANDARD PENETRATION TEST
... CHUNK SAMPLE
... DRIVE SAMPLE (UNDISTURBED)
... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **S1781-05-01** PROJECT NAME **Spring Street Pavement Rehabilitation**

BORING B5

ELEV. (MSL.) _____ DATE COMPLETED **5/24/2019**

ENG./GEO. **R. Church** DRILLER **V&W**

EQUIPMENT **CME-55HT** HAMMER TYPE **140 lb Automatic**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0					2 inches AC, No AB			
1	B1-1			SM	**RESIDUAL SOIL**	6		
2	B1-1.5 B1-2.0				Very loose, wet, reddish brown, Silty SAND with gravel	9	97.2	16.5
3								
4								
5					Wet	3		
6								
7				SM	MARIPOSA FORMATION Completely weathered, laminated, yellowish brown, weak, metasedimentary rock. Excavates as medium dense, damp, Silty SAND with gravel Moderately strong			
8								
9								
10	B1-10.0					66		
11								
					BORING TERMINATED AT 11.5 FEET GROUNDWATER NOT ENCOUNTERED BACKFILLED WITH CUTTINGS			

Figure 8, Log of Boring, page 1 of 1

IN PROGRESS NO A S1781-05-01 SPRING STREET PAVEMENT REHAB.GPJ 06/14/19

GEOCON

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◪ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

Sample ID	Depth (feet)	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Water Content (%)	Dry Density (pcf)
B1-1.5	1.5	31	30	1	---	38.0	14.2	114.7
B2-1.0	1	27	26	1	---	33.1	15.4	99.5
B3-1.0	1	28	21	7	---	31.7	12.3	108.2
B5-1.5	1.5	33	25	8	---	26.9	16.5	97.2

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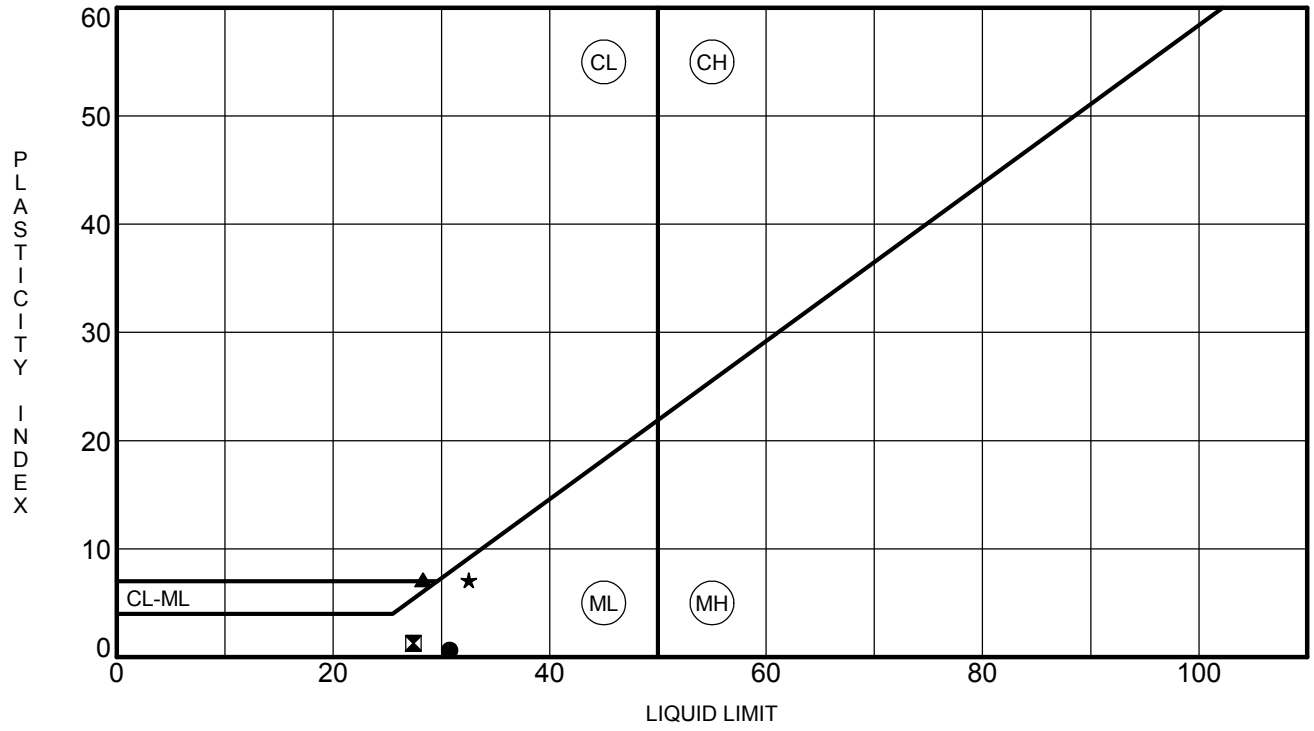
Rancho Cordova, CA 95742
Telephone: 9168529118

Summary of Laboratory Results

Project: Spring Street Pavement Rehabilitation
Location: Placerville, CA
Number: S1781-05-01
Figure: 9



	Sample No.	Liquid Limit	Plastic Limit	Plasticity Index	% Pass #200 Sieve	Unified Soil Classification Description	Preparation Method
●	**B1-1.5**	**31**	**30**	**1**	**38.0**	**SILTY SAND(SM)**	
⊠	**B2-1.0**	**27**	**26**	**1**	**33.1**	**SILTY SAND(SM)**	
▲	**B3-1.0**	**28**	**21**	**7**	**31.7**	**SILTY, CLAYEY SAND(SC-SM)**	
★	**B5-1.5**	**33**	**25**	**8**	**26.9**	**SILTY SAND(SM)**	

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ATTERBERG LIMITS (ASTM D4318)

Project: Spring Street Pavement Rehabilitation
Location: Placerville, CA
Number: S1781-05-01
Figure: 10

PI COPY 2 S1781-05-01 SPRING STREET PAVEMENT REHAB.GPJ US_LAB.GDT 6/13/19

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Unconfined Compressive Strength of Soil-Cement Specimens

ASTM D1633, Method A

Project Name:	Spring Street				Project No.	S1781-05-01	
Tested by:	M. Repking			Date:	9/12-20/19		
Sample Description/comments:							
Specimen ID	3%-1	3%-2	5%-1	5%-2	7%-1	7%-2	
Date Cast	9/12/2019	9/12/2019	9/12/2019	9/12/2019	9/12/2019	9/12/2019	
Date of Break	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019	
Age (days)	7	7	7	7	7	7	
Dimensions and Weights							
Diameter (in.)	3.99	3.98	3.99	3.99	3.99	3.99	
Height (in.)	4.61	4.62	4.62	4.62	4.61	4.62	
Square Area (in^2)	12.50	12.44	12.50	12.50	12.50	12.50	
Volume (ft^3)	0.03336	0.03326	0.03343	0.03343	0.03336	0.03343	
Weight before Cure (g)	2105.0	2105.4	2116.1	2120.8	2101.1	2118.0	
Weight at of Unconfined (g)	2102.1	2102	2111.4	2116.7	2098.4	2114.2	
Calc'd dry weight. (g)	1894.8	1892.3	1906.1	1913.2	1894.6	1914.2	
Compressive Strength Data							
Ultimate Load (lbs.)	3350	3025	5032	4764	5174	5225	
Compressive Strength (psi)	268	243	402	381	414	418	
Average Compressive St. (psi)	**256**		**392**		**416**		
Moisture Density Data							
Tare ID	J-3	J-10	13	311	C	Q-15	
Tare Plus Wet (g)	2297.7	2286.1	2320.8	2310.9	2214.9	2304.8	
Tare Plus Dry (g)	2091.2	2078.4	2116.3	2108.7	2020.4	2106.2	
Tare Weight (g)	203.5	204.3	217.2	207.9	212.4	205.6	
Spec. Mt. At Remold (%)	11.1%	11.3%	11.0%	10.9%	10.9%	10.6%	
Spec. Mt. At Unconfined (%)	10.9%	11.1%	10.8%	10.6%	10.8%	10.4%	
Specimen Wet Density (pcf)	139.1	139.5	139.5	139.9	138.9	139.7	
Specimen Dry Density (pcf)	125.2	125.4	125.7	126.2	125.2	126.2	