GEOTECHNICAL INVESTIGATION
GORDON / MARSH PAVEMENT REHABILITATION
WASHOE COUNTY, NEVADA

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

PREPARED FOR:

FARR WEST ENGINEERING

SEPTEMBER 2017
FILE: 2024

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

September 6, 2017
Project No: 2024

Mr. Gregory Lyman, PE
Farr West Engineering
5442 Longley Lane, Suite A
Reno, Nevada 89511

RE: Geotechnical Investigation
City of Reno Marsh/Gordon Street Rehabilitation Project
Reno, Nevada

Dear Mr. Lyman:

Construction Materials Engineers, Inc (CME) is pleased to submit the following geotechnical investigation report for the proposed City of Reno Marsh/Gordon Street Rehabilitation Project, Nevada.

The following report includes the results of our field and laboratory investigations and presents our recommendations for the design and construction of the project. We wish to thank you for the opportunity to provide our services and look forward to working on future endeavors together.

Please feel free to call us should you have any questions or require additional information.

Sincerely,

CONSTRUCTION MATERIALS ENGINEERS, INC.

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Geotechnical Investigation

City of Reno Marsh/Gordon Street Rehabilitation Project
Reno, Nevada

1.0 INTRODUCTION

Presented herein are the results of Construction Materials Engineers Inc.'s (CME) geotechnical exploration, laboratory testing, and associated geotechnical design recommendations for the proposed City of Reno Marsh/Gordon Rehabilitation Street Project located in Southwest Reno, Nevada. These recommendations are based on subsurface conditions encountered in our explorations, and on details of the proposed project as described in this report. The objectives of this study were to:

1. Determine existing structural section thicknesses, general subgrade soils, and subgrade soil moisture conditions pertaining to design and construction of the proposed improvements.
2. Provide recommendations for construction of the roadways, as related to these geotechnical conditions.

The project is contained in Section 14, Township 19N, Range 19E, MDBM. The area covered by this report is shown on Plate A-1a (Vicinity Map) in Appendix A. Our study included field exploration, laboratory testing and engineering analyses to identify the physical and mechanical properties of the various on-site materials. Results of our field exploration and testing programs are included in this report and form the basis for all conclusions and recommendations.

2.0 PROJECT DESCRIPTION

It is understood that the project involves the rehabilitation and/or reconstruction of 6 different streets in southwest Reno, as listed in Table 1.

TABLE 1- MARSH/GORDON STREET REHABILITATION PROJECT

Streets	Boundaries	Approximate Length (feet)
Marthiam Avenue	San Sorrento Street to about 300 feet north of Susileen Drive	~600
Marsh Avenue	Saint Lawrence to Arlington	~ 1,800
Reno Avenue	Nixon to Arlington	~800
Taylor Street	Nixon to Arlington	~800
Walker Avenue	Nixon to Arlington	~800
Gordon Avenue	California to Monroe	~2,600

Except for Marthiam Avenue, streets are located in a residential neighborhood between California and Monroe, immediately west of Arlington. Marthiam Avenue is located near Cashill Boulevard in southwest Reno. Except for the section of Marthiam Avenue to be improved, streets are two-lane roadways with parking lanes on both sides and improved shoulders consisting of curb and gutter and sidewalks. Marthiam Avenue has unimproved shoulders with drainage ditches on both sides of the street.

Streets will be designed to match existing grades. It is understood that the City of Reno preferred structural section replacement is 5 inches of AC (3 inches of Type 2 overlaid by 2 inches of Type 3), overlying a 6 inch roadbed modification layer. As part of the reconstruction, curbs will be removed and replaced.

3.0 PAVEMENT CONDITIONS

Pavement distress is evident within all the streets. In general, all streets are in poor condition with many street surfaces showing an uneven or undulating surface. Other significant pavement distress is presented in Table 2.

Table 2- Summary of Limited Pavement Condition Survey

Streets	Condition Survey
Marthiam Avenue	Predominantly transverse cracking with localized alligator and longitudinal cracking.
Marsh Avenue	Predominantly longitudinal cracking with widespread closely spaced alligator cracking.
Reno Avenue	Closely spaced block cracking with isolated alligator cracking.
Taylor Street	Block and longitudinal cracking with isolated alligator cracking. Cracks appear to have been recently sealed.
Walker Avenue	Primarily block and longitudinal cracking with isolated alligator cracking.
Gordon Avenue	Primarily block and longitudinal cracking with isolated alligator cracking.

Notes:
1) See pictures next page

Photo #1 - Taylor Street east of Gordon Avenue. Note block cracking

Photo #2 – Walker Avenue. Note Block Cracking

Localized curb and gutter areas are showing extreme spalling and distress with vertical displacements (uplift). Many curbs are cracked and chipped.

4.0 EXPLORATION

4.1 Test Pits

The site was explored in July 2017 by a series of 15 test pits using a rubber-tired backhoe. The approximate locations of the test pits are shown on Plate A-1 Site Plan. The maximum depth of exploration was 4 feet below the existing ground surface. Bulk samples for index testing were collected from the trench walls at specific depths in each soil horizon.

4.2 Coring

Coring was also completed at selected locations to provide supplemental information on structural section types and thicknesses. A total of 9 cores were completed with results presented on Table 3.

4.3 Material Classification

Construction Materials Engineers personnel examined and classified all soils in the field in general accordance with ASTM D 2488. During test pitting, representative bulk samples were placed in sealed plastic bags and returned to our Reno, Nevada laboratory for testing. After the completion of laboratory testing, as described below in the **Laboratory Testing** section, the test pit logs were checked and corrected in accordance with ASTM 2487 (Unified Soil Classification System [USCS]). Logs of the test pits and cores are presented as Plate A-2 – Test Pit and core Logs, and a USCS chart has been included as Plate A-3 - Graphic Soils Classification Chart.

5.0 EXISTING STRUCTURAL SECTION

Structural sections are highly variable with the following three different structural sections encountered:

- **Pavement overlying aggregate base:** The thickness of this structural section is highly variable and ranges from 9 to 24 inches.
- **Pavement overlying concrete:** The thickness of this structural section ranged from 5 to 9½ inches with the underlying concrete thickness ranging from 3½ to 5½ inches. This structural section was placed directly on subgrade soils.
- **Pavement:** This structural section was encountered in one exploration location on Reno Avenue. The asphaltic concrete had a thickness of 5 inches, which was constructed directly on subgrade soils.

Table 3 presents a summary of structural section types and thicknesses encountered. Refer to Appendix C for a summary of all field exploration and laboratory test results.

Table 3 – Structural Section Thicknesses Encountered

Streets		Test Pit or Coring	Asphaltic Concrete (inches)	Base Course (inches)	Structural Section Thickness (inches)
Marthiam Avenue	South of Susileen Drive	TP-14	6	8[1]	14
	North of Susileen Drive	TP-15	5	7[1]	12
Marsh Avenue	West of Nixon	TP-1	3	7	10
	West of Nixon	TP-2	3½	6½	10
	Between Nixon and Gordon	TP-3	4	6	10
	East of Gordon	TP-13	6	5	11
Reno Avenue	West of Gordon	TP-5 (southside)	2 inches AC over 5 inches of concrete	N.E.	7
	East of Gordon	TP-6	2 inches AC over 4 inches of concrete	N.E.	6
	West of Gordon	C-7 (centerline)	5 inches of AC	N.E.	5
Taylor Street	West of Gordon	TP-8	2 inches AC over 5 inches of concrete	N.E.	7
	East of Gordon	TP-9	4 inches AC over 5½ inches of concrete	N.E.	9½
	West of Gordon	C-5	1¾ inches AC over 5 inches of concrete	N.E.	6¾
	West of Gordon	C-6 (centerline)	2 inches AC over 5½ inches of concrete	2	9½
Walker Avenue	West of Gordon	TP-11	5	4	9
	East of Gordon	TP-12	3½	9½	13
	East of Gordon	C-3	4¾	3¾	8½
Gordon Avenue	North of Newlands	C-1	5¾	18¼	24
	Between La Rue and Walker	C-2	1½ inches AC over 4½ inches of concrete	N.E.	6
	Between La Rue and Walker	C-8	2 inches AC over 5½ inches of concrete	N.E.	7½
	Between La Rue and Walker	C-9	2 inches AC over 3½ inches of concrete	N.E.	5
	Between Walker and Monroe	C-4	2 inches AC over 5½ inches of concrete	N.E.	7½
	Intersection with Saint Lawrence	TP-4	6½	6½	13
	Between Reno and Taylor	TP-7	5	12	17
	Intersection with LaRue	TP-10	7½	6	13½

Notes: 1) Base course consists of silty, clayey sand overlying D.G. sand

6.0 LABORATORY TESTING

All soils testing performed in the Construction Materials Engineers Inc. soils laboratory was conducted in accordance with the standards and methodologies described in Volume 4.08 of the ASTM Standards.

6.1 Index Testing

Samples of significant soil types were analyzed to determine their in situ moisture content (ASTM D 2216), grain size distribution (ASTM D 422), and plasticity index (ASTM D 4318), and the results of these tests are shown on Plate B-1 (Index Test Results) in Appendix B. Results of these tests were used to classify the soils according to ASTM D 2487 and to check the field logs, which were then updated as appropriate.

6.2 R-value Testing

Resistance value (R-value) tests (ASTM D 2844) were performed on representative samples of subgrade soil. R-value testing is a measure of subgrade strength and expansion potential and is used in design of flexible pavements. Results of the R-value tests are shown on Plate B-2 - R-value Tests.

6.3 Laboratory Moisture-Density Relationship Test

A moisture density relationship test (ASTM D 1557) was performed on a representative sample of anticipated subgrade soils. Results of this test (optimum moisture) were compared with measured in-place moisture contents to provide a basis to determine if unstable subgrade soil conditions maybe encountered during construction. Results of the laboratory moisture-density relationship tests are present on Plate B-3.

A summary of the laboratory test results is presented in Table 4. Refer to Appendix C for a summary of all field exploration and laboratory test results.

Table 4 - Laboratory Testing Summary							
Roadway/ Test Pit Number	**Subgrade Soil Type**	**Liquid limit**	**Plastic limit**	**% passing #200**	**Natural moisture Content (%)**	**Maximum density /optimum moisture**	**R-value**
Marthiam Way (TP-14)	Clayey Sand **(SC)**	24	16	44.9	14.0		
	Poorly graded sand with silt and gravel **(SP-SM)**	35	30	7.5	7.0		52
Marthiam Way (TP-15)	Clayey Sand **(SC)**	28	19	28.8	10.1		
Marsh Avenue (TP-2)	Clayey Sand **(SC)**	34	12	36.4	9.5		< 5
	Fat clay with sand						
Marsh Avenue (TP-3)	Clayey Sand **(SC)**	34	12	36.4	9.5	112.5pcf / 14.5%	
	Fat Clay **(CH)**						
Marsh Avenue (TP-1)	Sandy Fat Cay **(CH)**	58	14	64.1	22.7		
Gordon Avenue (TP- 10)	Sandy Fat Clay **(CH)**	60	15	62.2	24.7		
Gordon Avenue (TP-7)	Clayey sand with gravel and Cobbles **(SC)**	38	15	14.0	5.5		20
Reno Avenue (TP-6)	Fat Clay with Sand and Gravel **(CH)**	63	18	51.6	16.1		16
Taylor Street (TP-8)	Fat Clay with sand and gravel **(CH)**	61	38	69	14.9		
Walker Avenue (TP-12)	Sandy Fat Clay **(CH)**						
	Poorly graded gravel with clay and sand **(GP-GC)**	31	23	7.5	7.7		

7.0 GEOLOGIC AND GENERAL SOIL CONDITIONS

Based on a review of a published Geologic Map of the site with the exception of Marthiam Avenue, *Reno Quadrangle* by Bonham and Bingler, 1973, with the exception of Marthiam Avenue, the roadways are located in the Donner Lake Glacial Outwash Deposit. This formation forms an extensive alluvial wedge, thickening eastward to an estimated thickness of several hundred feet (Bingler,1975). The Donner Lake

Outwash Formation is a glacial outwash deposit of Pleistocene age characterized as a heterogeneous mixture of sands, gravels, cobbles and boulders. Boulder-sized particles up to 16 feet in diameter have been encountered in this deposit (Bingler, 1975). Typically, this formation has a well-developed argillic horizon consisting of clayey sands and gravels with moderate to high plasticity soil characteristics.

Based on a review of a published Geologic Map for Marthiam Avenue, *Mount Rose Quadrangle* by Bonham and Roger, 1983, Marthiam Avenue is located in Alluvial Fan Deposits of Peavine Mountain. A variety of soil types are typically encountered in these alluvial fan deposits ranging from fine-grained soils to coarse-grained granular soils. The grain size of these soil types is dependent on the climatic conditions during the time of deposition. During quiescent climatic periods, fine-grained soils were predominantly be deposited. Conversely, during wet climatic periods with high energy storm water discharges, coarser granular deposits may dominant the soil profile. Because of the climatic changes, deposits encountered are typically complexly interbedded with lenticular alluvial soil horizons.

7.1 Subgrade Soil Classification and Moisture Conditions

Subgrade soils encountered were highly variable with predominant soil classifications including silty, clayey sand **(SC-SM),** Clayey Sand **(SC),** Sandy Fat Cay **(CH),** Fat Clay with Sand and Gravel **(CH).** The thickness of these soil layers range from about 0.33 feet to nearly 2 feet. These soil layers generally represent remnant argillic soil horizon layers. Underlying these subgrade soils are the glacial outwash deposits, generally classified as a silty sand with gravel, cobbles, and boulders **(SM).** Refer to Photos 3 and 4 showing trench sidewall profiles at Taylor Street and Reno Avenue.

Subgrade soils were generally encountered in a moist to very moist condition. Moisture infiltration through existing cracks and moisture accumulation induced by thermal gradients between the pavement surface and subgrade soil can develop localized wet/perched zones below the pavement areas. Table 5 summarizes subgrade soil classification and moisture conditions. Soil moisture conditions, as presented on Table 5, are based on exploratory test pit and laboratory findings and are anticipated to be variable within the roadways. Table 6 presents a summary of anticipated subgrade soils thicknesses and depth below existing finished grades, based on our field explorations, for the various roads.

Table 5 - Subgrade Soil Classification and Moisture Conditions

Roadways	Primary Subgrade Soil Classification	Subgrade moisture conditions
Marthiam Avenue	Clayey Sand **(SC)**	Moist - Estimated at near optimum moisture.
Marsh Avenue	Clayey Sand **(SC)** or Sandy Fat Cay **(CH)**	Moist to very moist - Estimated at near or above optimum moisture.
Reno Avenue	Fat Clay with Sand and Gravel **(CH)**	Moist to very moist - Estimated at near or above optimum moisture.
Taylor Street	Sandy Fat Clay **(CH)**	Moist to very moist - Estimated at near or above optimum moisture.
Walker Avenue	Clayey Sand **(SC)**	Moist - Estimated at near optimum moisture.
Gordon Avenue	Clayey Sand **(SC)** or Sandy Fat Clay **(CH)**	Moist to very moist - Estimated at near or above optimum moisture.

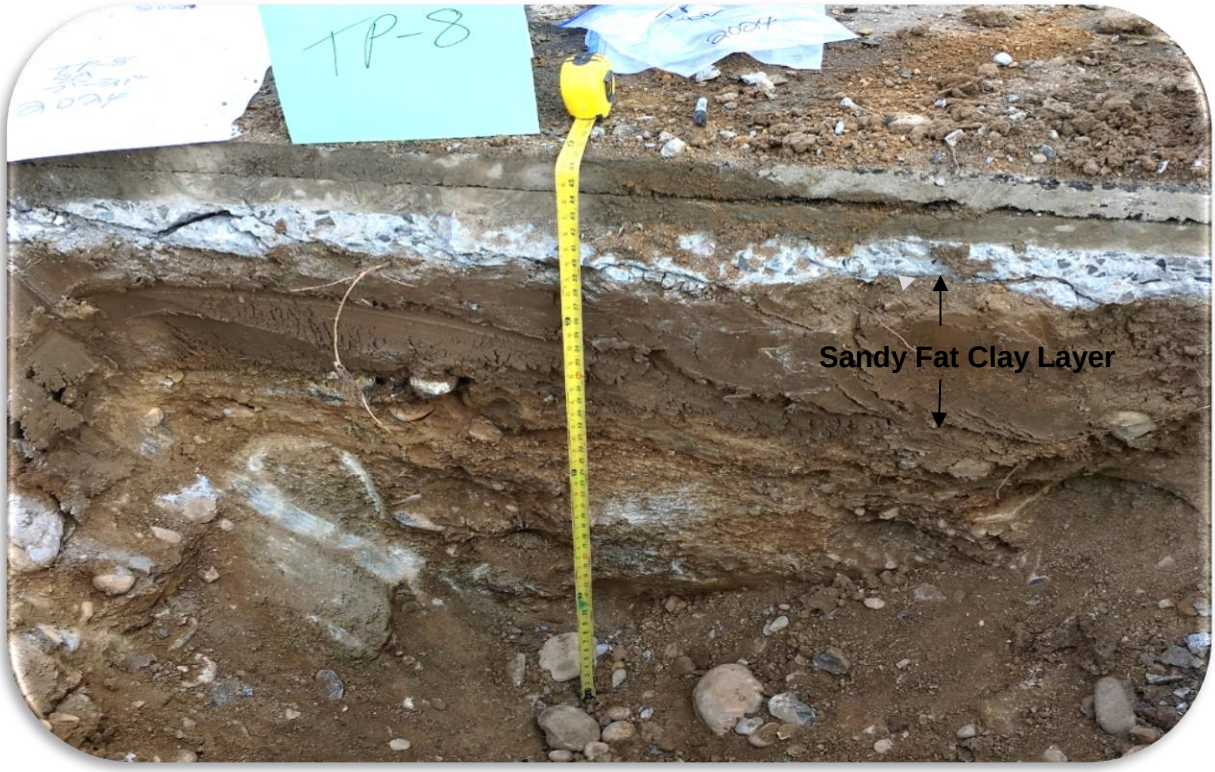


Photo #3: Trench sidewall at Test Pit TP-8 (Taylor Street). Note pavement overlying concrete.

Photo #4: Trench sidewall at Test Pit TP-5 (Reno Avenue). Note pavement overlying concrete and displacement at the joint. Structural section directly on underlying clay soils.

Table 6 – Summary of anticipated fat clay subgrade soil thicknesses

Streets		Test Pit	Primary Subgrade Soil Classification	Subgrade soil thickness[1] (inches)	Existing Structural Section Thickness (inches)	Base of subgrade soil below finished grade (inches)
Marsh Avenue	West of Nixon	TP-1	Sandy Fat Clay **(CH)**	5	10	15
	West of Nixon	TP-2	Clayey sand **(SC)** overlying fat clay with sand **(CH)**	19	10	29
	Between Nixon and Gordon	TP-3	Clayey sand **(SC)** overlying fat clay with sand **(CH)**	20	10	30
	East of Gordon	TP-13	Fat clay **(CH)**	4	11	15
Reno Avenue	West of Gordon	TP-5 (southside)	Fat clay with sand and gravel **(CH)**	7	7	14
	East of Gordon	TP-6	Sandy fat clay with gravel **(CH)**	9	6	15
Taylor Street	West of Gordon	TP-8	Sandy fat clay **(CH)**	14	7	21
	East of Gordon	TP-9	Fat clay with sand and gravel **(CH)**	14	9½	24
Walker Avenue	West of Gordon	TP-11	Clayey sand **(SC)** overlying fat clay with sand **(CH)**	31	9	40
	East of Gordon	TP-12	Sandy fat clay **(CH)**	5	13	18
Gordon Avenue	Intersection with Saint Lawrence	TP-4	Fat Clay with sand and gravel **(CH)**	10	13	23
	Intersection with LaRue	TP-10	Sandy fat clay **(CH)**	19½	13½	33

Notes:

1) Subgrade soil thicknesses to be verified during construction. Subgrade soils underlain by a silty sand with gravel, cobbles, boulder **(SM)** soil horizon

7.2 Groundwater Conditions

Groundwater was not encountered during exploration and is anticipated to lie at a depth that will not affect construction.

8.0 SUBGRADE SOIL STRENGTH (RESILIENT MODULUS)

The Resilient Modulus (M_R) of the subgrade soils were determined by R-value testing and Asphalt Institute Methodology. Resilient Modulus is utilized by the Asphalt Institute as a measure of subgrade soil strength for structural section design. Table 7 summarizes subgrade soil R-value test results and corresponding resilient modulus.

Table 7 - Subgrade Soil Strength			
Roadway	**Soil Type**	**R-value**	**Resilient Modulus ($M_{R\text{-}psi}$)**
Marthiam Avenue	Clayey Sand with gravel **(SC)**	52	30,010
Marsh Avenue	Clayey Sand **(SC)** to Sandy Fat Cay **(CH)**	<5	3,825
Gordon Avenue	clayey sand with gravel **(SC)**	20	12,150
Reno Avenue	Fat Clay with sand and gravel **(CH)**	16	9,930

Design resilient modulus values are summarized in Table 8. These values have been averaged based on soil type and location.

Table 8 – Design M_R Values for the Different Roadways	
Roadway	**Design M_R Value (PSI)**
Marsh Avenue	3,825
Gordon Avenue	8,000
Reno Avenue	6,900
Taylor Street	6,900
Walker Avenue	6,900

9.0 DISCUSSION AND RECOMMENDATIONS

Roadways are in poor condition and will be reconstructed. The predominant subgrade soil type encountered is a fat clay with variable percentages of sand and gravel. Based on R-value test results, subgrade soils have weak support characteristics and can be unstable when subjected to construction traffic. The predominant soil horizon encountered, underlying the predominantly clay subgrade soils, is a silty sand with gravels, cobbles, and boulders **(SM)**, as part of the Donner Outwash Formation.

Existing structural sections are highly variable with the following three different structural sections encountered:

- **Pavement overlying aggregate base:** The thickness of this structural section is highly variable and ranges from 9 to 24 inches.
- **Pavement overlying concrete:** The thickness of this structural section ranged from 5 to 9½ inches with the underlying concrete thickness ranging from 3½ to 5½ inches. This structural section was constructed directly on the subgrade soils.

- **Pavement:** This structural section was encountered in one exploration location on Reno Avenue. The asphaltic concrete had a thickness of 5 inches, which was constructed directly on subgrade soils.

Due to the subgrade soil types as well as the thickness and different types of structural sections encountered, traditional reconstruction methods consisting of pulverization and mixing the pavement into the underlying base and subgrade soils will be restricted, as follows:

- Because of the presence of large gravels, cobbles, and boulders near the subgrade soil elevation as well as subgrade soils predominantly exhibiting high plasticity characteristics, a deep pulverization and mixing of the structural section into the subgrade soils is not recommended;

- Pulverization of the structural section consisting of thin pavement overlying concrete is not a feasible option;

Another construction consideration is the presence of potentially unstable subgrade soils, which based on the in-place soil moisture contents is anticipated to be localized. Based on laboratory tests, roadways anticipated to have a higher percentage of unstable soil areas are Marsh Avenue, Reno Avenue, Taylor Street, and portions Gordon Avenue.

Clay soils exhibiting high plasticity characteristics were encountered at subgrade elevation within the majority of the roadways. These soils can shrink or swell in response to moisture changes. Roadways are showing the effects of volume changes in the underlying clay soils as indicated by the blocking cracking in the pavement, uneven pavement surfaces, and displacements in the curb and gutter.

9.1 General Information

The recommendations provided herein, are intended to reduce the risks of structural distress related to consolidation or expansion of native soils and/or structural fills. These recommendations, along with proper design and construction of the planned roadways and associated improvements, work together as a system to improve overall performance. If any aspect of this system is ignored or poorly implemented, the performance and quality of the project will be reduced. Sufficient construction observation and testing should be performed to document that the recommendations presented in this report are followed.

Structural areas referred to in this report include all areas of concrete slabs and asphalt pavements. All compaction requirements presented in this report are relative to ASTM D 1557*. Unless presented in this report, all construction should follow recommendations presented in the Standard Specifications for Public Works Construction, 2016 (SSPWC).

Any evaluation of the site for the presence of surface or subsurface hazardous substances is beyond the scope of this study. When suspected hazardous substances are encountered during routine geotechnical investigations, they are noted in the exploration logs and reported to the client. No such substances were identified during our exploration.

* Relative compaction refers to the ratio (percentage of the in-place density of a soil divided by the same soil's maximum dry density as determined by the ASTM D 1557 laboratory test procedure. Optimum moisture content is the corresponding moisture content of the same soil at its maximum dry density

10.0 CONSTRUCTION RECOMMENDATIONS

10.1 Structural Section Construction Recommendations

Because of the different structural sections encountered overlying differing thicknesses of subgrade clay soils, different structural section construction recommendations are provided.

It should be understood that the standard design practice when constructing roadways over clays soils is to place the structural section on a 2 foot thick fill separation layer. However, this requirement would likely not be economically feasible. It is recommended that where the clay soil thicknesses are thinner, consideration be given to remove the entire clay layer. Roadbed modification would have an additional benefit of reducing water infiltration into the underlying fat clay soils. However, constructing on clay soils is an inherent risk and volume changes in these soils may reduce the service life of the roadway.

Except for the northern half of Gordon Avenue (California to Taylor), Marsh Avenue, Walker Avenue, and Marthiam Avenue, the remaining roadways are not conducive to a roadbed modification because they do not have an underlying base aggregate layer and are underlain by concrete. Table 9 provides a summary of structural section construction for these roadways.

Table 9 – Structural Section Construction Recommendations
Marsh Avenue, Walker Avenue, Marthiam Avenue, Gordon Avenue (California to Taylor)

Roadway Segment	Construction Recommendations[1]
Marsh Avenue Gordon Avenue (California to Taylor) Walker Avenue	Pulverize the existing pavement and mix into the underlying base aggregate to a depth of 11 inches. Scalp off 5 inches for pavement section. Roadbed modification for the underlying 6 inches of pulverized material.
Marthiam Avenue	Pulverize the existing pavement and mix into a combination of silty, clayey sand **(SC-SM)** and decomposed granitic sand for a depth of 11 inches. Scalp off 5 inches for pavement section. Roadbed modification for the underlying 6 inches of pulverized material.

Notes:
1) Refer to Section 10.2 , Roadbed Modification for recommended cement contents.

The existing structural section in the remaining streets (Reno Avenue, Taylor Street, and southern half of Gordon Avenue) consists of a thin pavement overlaying a concrete slab and pulverization is not possible. Additionally, to provide sufficient depth for a structural section of 5 inches of AC overlying 6 inches of roadbed modification, removal of at least a portion of the clay soils will be required. Table 10 provides construction recommendations for the remainder of the streets.

Table 10 – Structural Section Construction Recommendations Reno Avenue, Taylor Street, and Gordon Avenue (Taylor to Monroe)	
Roadway Segments	**Construction Recommendations**
Gordon Avenue (Taylor to Monroe) Reno Avenue Taylor Street	Due to the concrete slab underlying the thin pavement overlay, pulverization is not feasible. The concrete slab will be broken-up and removed. The underlying subgrade soils will then be removed to accommodate the new structural section. Estimated depth of subgrade soil removal is about 6 inches to accommodate a replacement structural section of 5 inches AC overlying 6 inches of roadbed modification. Scalped pulverized material from other portions of the project site could be used for the roadbed modification. The disadvantage of this option is that instability of the underlying subgrade soils may result (refer to alternative construction recommendations)
Roadway Segments	**Alternative Construction Recommendations**
Reno Avenue	An alternative construction option is to completely remove the fat clay with sand and gravel soil horizon. The estimated thickness is about 9 to 10 inches or an additional 3 to 4 inches of removal depth. The proposed replacement structural section is 5 inches of AC overlying about 11 inches of untreated base aggregate placed directly on the glacial outwash deposits. Consequently, roadbed modification is not required. Refer to picture #4.
Taylor Street Gordon Avenue (Taylor to Monroe)	The existing clay subgrade soil layer is relatively thick, varying from 14 to nearly 20 inches and complete removal, although it could be an option, is likely not feasible. An alternative construction option would be to lime treat the clay soils to a depth of 12 inches after the existing structural section is removed. The new structural section would be 5 inches of asphaltic concrete over a base layer leveling course that may vary from 2 to 5 inches.
Notes: 1) Refer to Section 10.2 , Roadbed Modification for recommended cement contents.	

10.2 Roadbed Modification

This construction method consists of strengthening a pulverized mixture of asphalt, base material, and subgrade soils with the addition of cement. After the completion of the pulverization and mixing, material is removed to accommodate the new pavement layer. The material is then mixed again with the addition of cement. Cement will add strength to the support soils and also promote bridging over potential unstable subgrade soils. This mixture shall be densified to 95 percent relative compaction.

Where the pulverized section consists of base aggregate and pavement, it is recommended that a minimum of 2 percent cement by dry weight is added to the pulverized mixture. Areas of unstable soils may be encountered. These areas could be corrected by removal and replacement (refer to Section 10.3) or corrected by a deeper mixing depth and the addition of lime, since clay soils will be incorporated into the mixture. It is recommended to add lime to the cement stabilization to reduce the plasticity characteristics and strengthen the clay soils. The minimum recommended blend is 2 percent lime and 2 percent cement by dry weight of material. To determine the optimum construction option, it is recommended to pothole the areas of instability and characterize the depth of the clay soils and underlying glacial outwash deposits.

Cement treated base placement procedures should comply with the specifications given in Section 309.03 of the Standard Specifications for Public Works Construction (2016) for the roadmix method.

It should be advised that consistent construction truck traffic imposed on otherwise stable subgrade soils could promote unstable soil conditions. Therefore, it is recommended that if unstable soil conditions occur, different construction truck traffic route alternatives be considered. It is also recommended not to expose long sections of the streets to construction traffic prior to paving.

10.3 Stabilization/Corrective Subgrade Soil Construction Recommendations

Unstable soil areas will likely be encountered and two different stabilization/corrective subgrade soil construction measures are recommended:

1. Lime is added to the material to promote stability (Refer to Section 10.2)
2. Removal and Replacement Construction Procedure (Refer to Section 10.3.1)

10.3.1 Removal and Replacement Construction Procedure

This method consists of removing unstable or "pumping" soils and replacing with a stabilizing fill overlying a geotextile.

The actual depth of removal shall be determined during construction. However, it is anticipated that the removal depth will depend on the depth to the underlying glacial outwash deposits, which should be a firm stable deposit. Unless a firmer surface is encountered at a shallower depth, the recommended minimum depth of removal is 18-inches. It should be advised that shallow utilities are present and these utility locations shall be identified prior to excavation, which may reduce the depth of removal.

A high performance geotextile (HPG) combines strength and permeability and is recommended for this project. The geotextile shall be placed directly below the stabilizing fill to provide separation and stabilization. The geotextile should be woven and meet or exceed the minimum properties presented in Table 11.

Table 11 - Stabilizing Fill Geotextile

Mechanical Properties	Minimum Average Roll Value (MARV)	
	MD (#/ft)	CD (#/ft)
Tensile Strength at ultimate (ASTM D 4595)	3600	3200
Tensile Strength at 5% strain (ASTM D 4595)	1400	1400
Minimum permittivity (ASTM D 4491)	0.5 sec^{-1}	
Apparent Opening Size (AOS)	0.60 mm maximum	

Products such as a Mirafi HP370, Terra Tex HPG-37, or approved equal can be utilized for this project.

Prior to placement of the geotextile, the ground surface should be smooth without sharp particles or abrupt edges. The geotextile should be laid in accordance with the manufacturer's recommendation with a minimum joint overlap of 18 inches. Construction equipment is prohibited from traveling directly on the geotextile.

It is recommended that construction equipment does not enter the removal area and construction equipment from outside the removal area be utilized to place the initial lift of stabilizing fill over the geotextile. The stabilizing fill should be pushed ahead of the construction equipment during placement over the geotextile. The initial lift of stabilizing fill shall have a minimum loose lift thickness of 12 inches. Subsequent lifts shall be placed in maximum 8-inch lifts. The total recommended minimum densified

thickness of stabilizing fill overlying the geotextile should be 18 inches. Additional lifts of stabilizing fill may be necessary.

Regardless of which alternate is selected, a test section should be used to determine the required thickness of stabilizing fill. Stabilization is always a trial and error procedure with requirements and effectiveness varying within the same project. Additionally, the contractor is hereby advised that vibratory compactive efforts or heavy rubber-tired vehicle travel on wet, fine-grained soils can cause instability in otherwise stable subgrade. Therefore, it is the contractor's responsibility not to damage otherwise firm site soils.

10.4 Grading and Filling

Fill material should be free of vegetation, organic matter, debris, and other deleterious material. Fill material required for this project is divided into two different fill types: stabilizing fill or untreated aggregate base.

10.4.1 Stabilizing Fill

Stabilizing fill will likely have to be imported to the site and shall meet the specifications presented in Table 12.

Table 12 – Stabilizing Fill Gradation Specifications

Sieve Size	Percent by Dry Weight Passing
4 Inch	100
¾ Inch	70 – 100
No. 4	20 – 70
No. 200	0 – 10
Maximum Liquid Limit	**Maximum Plastic Index**
40	5

10.4.2 Untreated Aggregate Base Material

Aggregate base material can be imported, or recycled from pulverizing the existing structural section. The aggregate base material either recycled or imported shall conform to Section 200.01 of the Standard Specifications for Public Works Construction, or "Orange Book".

10.4.3 Densification and Moisture Conditioning Recommendations

Aggregate base material should be densified to at least 95 percent relative compaction. Stabilizing fill shall be densified to at least 90 percent relative compaction. Prior to densification, these materials shall be uniformly moisture conditioned to plus or minus 2 percent of optimum moisture. Higher moisture contents are acceptable if the soil lift is stable and required relative compaction can be attained in the soil lift and succeeding soil lifts.

10.4.4 Pavement Construction

Type 2 and 3 Plantmix aggregate in accordance with Section 200.02 (SSPWC, 2016) should be utilized for the asphalt. Asphalt pavement compaction requirements should be in accordance with the SSPWC. A pavement mix design should be submitted to the owner by the Contractor at least five working days prior to construction for approval.

It is recommended that when pavement is placed adjacent to concrete flatwork, the finish compacted grade of the pavement be at least ¼ to ½ of an inch higher than the edge of adjacent concrete surface. This is to allow adequate compaction of the pavement without damaging the concrete.

10.5 Concrete Curb Subgrade Soil Preparation

As indicated on Table 6, fat clays with variable quantities of sand and gravel will be encountered at curb subgrade elevation for the majority of roadway areas. The thickness of the clay soil is highly variable ranging from 14 to 40 inches below the existing roadway finished grade with the majority of streets having clay depths ranging from 14 to 24 inches below the existing roadway finished grade.

Where clays are thick, the typical construction standard is to remove clays to provide a 2 foot separation between the bottom of the base layer and top of the clay surface. The typical curb and base layer thicknesses are 6 inches each. An additional 2 foot removal would provide a depth of 36 inches below the existing roadway finished grade. In the majority of the roadways, this depth would exceed the actual depth of the clay layer.

Because of the extreme difference in clay thicknesses throughout the roadways, it is difficult to develop a specification that is consistent for all roadways. The following construction specification is recommended:

- The standard recommendation for all roadways would be to place the curbs on a minimum 12 inch base section. Based on our limited field exploration, this depth would remove the clay soils from below the curbs for nearly half of the roadways;
- Where clays are thicker, a subbase is recommended below the base layer. The recommended thickness of the subbase is 12 inches;
- The subbase layer thickness can be less than 12 inches, if the underlying silty sand with gravel layer is encountered at a shallower depth;
- Clay removal shall extend laterally from the edge of curb at least the depth of clay removal;
- Subbase can consist of base aggregate or meet the requirements of structural fill in Section 200.01.09 of the SSPWC.

10.6 Construction Difficulties

The existing structural section in Reno Avenue, Taylor Street, and southern half of Gordon Avenue consists of a thin pavement overlaying a concrete slab and pulverization is not possible. Removal of this structural section will be labor intensify and this material will have to be off-hauled. The other consideration is that the excessive truck traffic anticipated during the concrete slab removal process on the underlying predominantly fat clay subgrade soils will likely promote instability in these soils and removal or stabilization treatment will be required.

11.0 CONSTRUCTION OBSERVATION AND MATERIALS TESTING SERVICES

The recommendations presented in this report are based on the assumption that the owner/project manager provide adequate field testing and construction review during all phases of construction. These tests and observations should include, but not be limited to:

- Earthwork observation and materials testing;
- Observation and testing of construction utility trench backfill;
- Observation and testing of concrete; and
- Special Inspection of foundations and other structural elements;

It is also recommended that the project geotechnical engineer conduct a general review of the project plans and specifications to determine if the earthwork and foundations recommendations presented in this report have been properly interpreted and implemented during design.

CME maintains one of the region's largest accredited labs and employs a full staff of qualified inspectors. CME can provide additional information concerning the scope and cost of these services upon request.

12.0 LIMITATIONS

The recommendations provided herein, particularly under Sections 9.0 through 11.0 are intended to reduce the risks of structural distress related to consolidation of native soils, undocumented fills, and/or structural fills. These recommendations along with proper design and construction of the proposed project as currently proposed are intended to improve the overall performance. If any part of this system is ignored or poorly implemented, the performance and quality of the project will be reduced. Sufficient construction observation and testing should be performed to document that the recommendations presented in this report are adhered to.

This report has been prepared in accordance with generally accepted local geotechnical practices. The analysis and recommendations submitted are based upon the field exploration performed at the locations shown on Plate A-1. This report does not reflect soils variations that may become evident during construction. Re-evaluation of the recommendations may be necessary if subsurface conditions vary from those presented in this report.

This report has been prepared to provide information allowing the engineer to design the project as currently proposed. The owner/project manager is responsible for distribution of this report to all designers and contractors whose work is affected by the geotechnical recommendations contained herein. In the event of changes in the design, location or ownership of the project after presentation of this report, our recommendations should be reviewed and possibly modified by the project geotechnical engineer. If the geotechnical engineer is not accorded the privilege of making this recommended review, they can assume no responsibility for misinterpretation or misapplication of recommendations or their validity in the event changes have been made in the original design concept without prior review. The engineer makes no other warranties, either expressed or implied as to the professional advice provided under the terms of this agreement and included in this report.

This report was prepared for Farr West Engineering; the material in it reflects our best judgment in light of the information available to us at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based upon it, shall be done at their own risk. CME accepts no responsibility for damages suffered by any third party as a result of decisions made or implemented based on this report.

REFERENCES

American Society for Testing and Materials (ASTM), 1993, *Soil and Rock; Dimension Stone; Geosynthetics,* Volume 4.08;

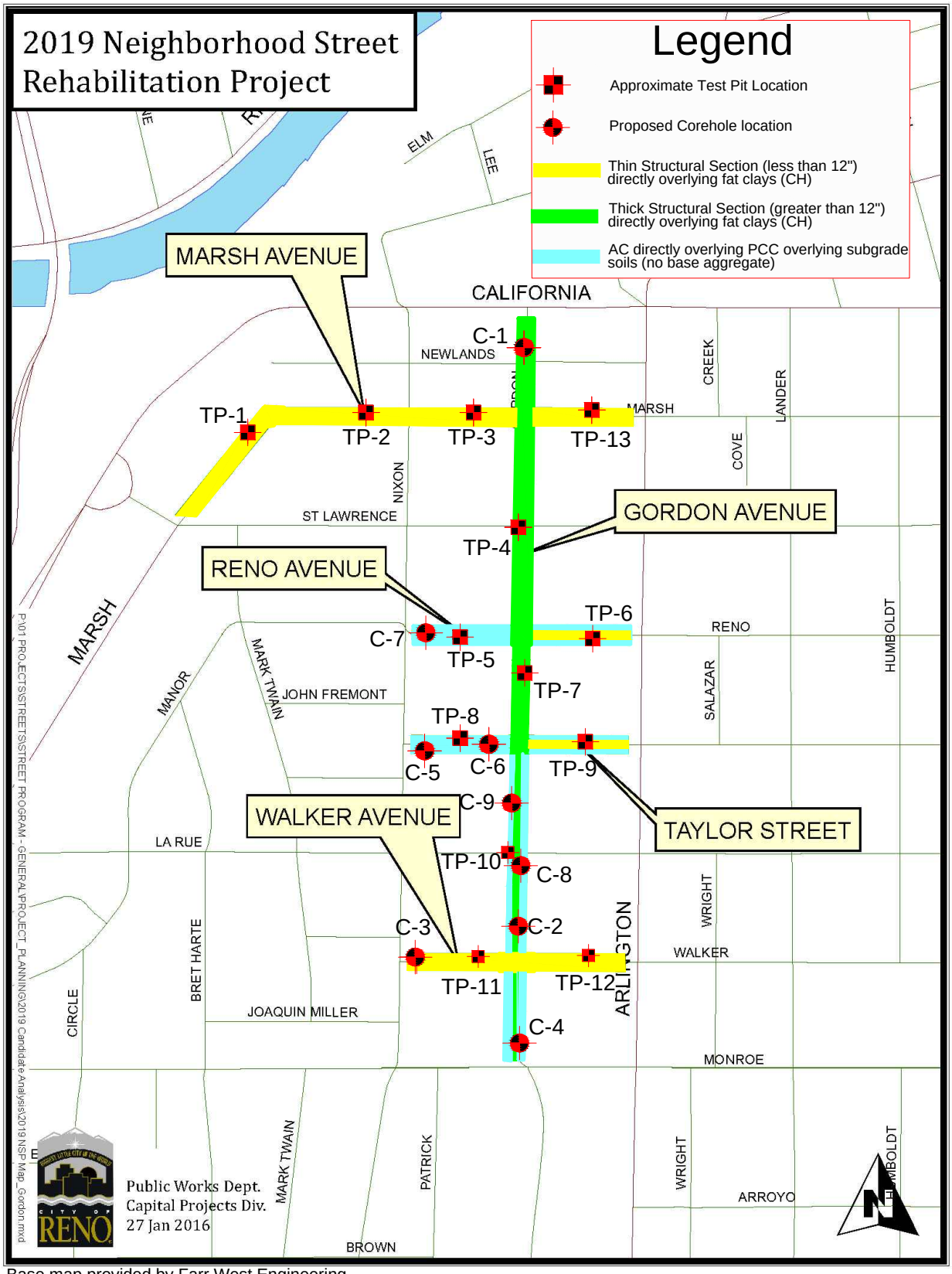
Bonham, H. F. and E. C. Bingler, 1973, *Geologic Map, Reno Quadrangle*: Nevada Bureau of Mines and Geology, Map 4Ag.

Bonham, H. F. and D. K. Rogers, 1983, *Geologic Map, Mt. Rose Quadrangle*: Nevada Bureau of Mines and Geology, Map 4Bg.

Standard Specifications for Public Works Construction, 2016 (Washoe County, Sparks-Reno, Carson City, Yerington, Nevada);

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

APPENDIX A



Base map provided by Farr West Engineering

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

FARR WEST ENGINEERING
GORDON/MARSH STREET REHAB
FIELD LOCATION MAP
WASHOE COUNTY, NEVADA

PROJECT NO.:2024 DATE: 8/16/2017

PLATE

A-1a

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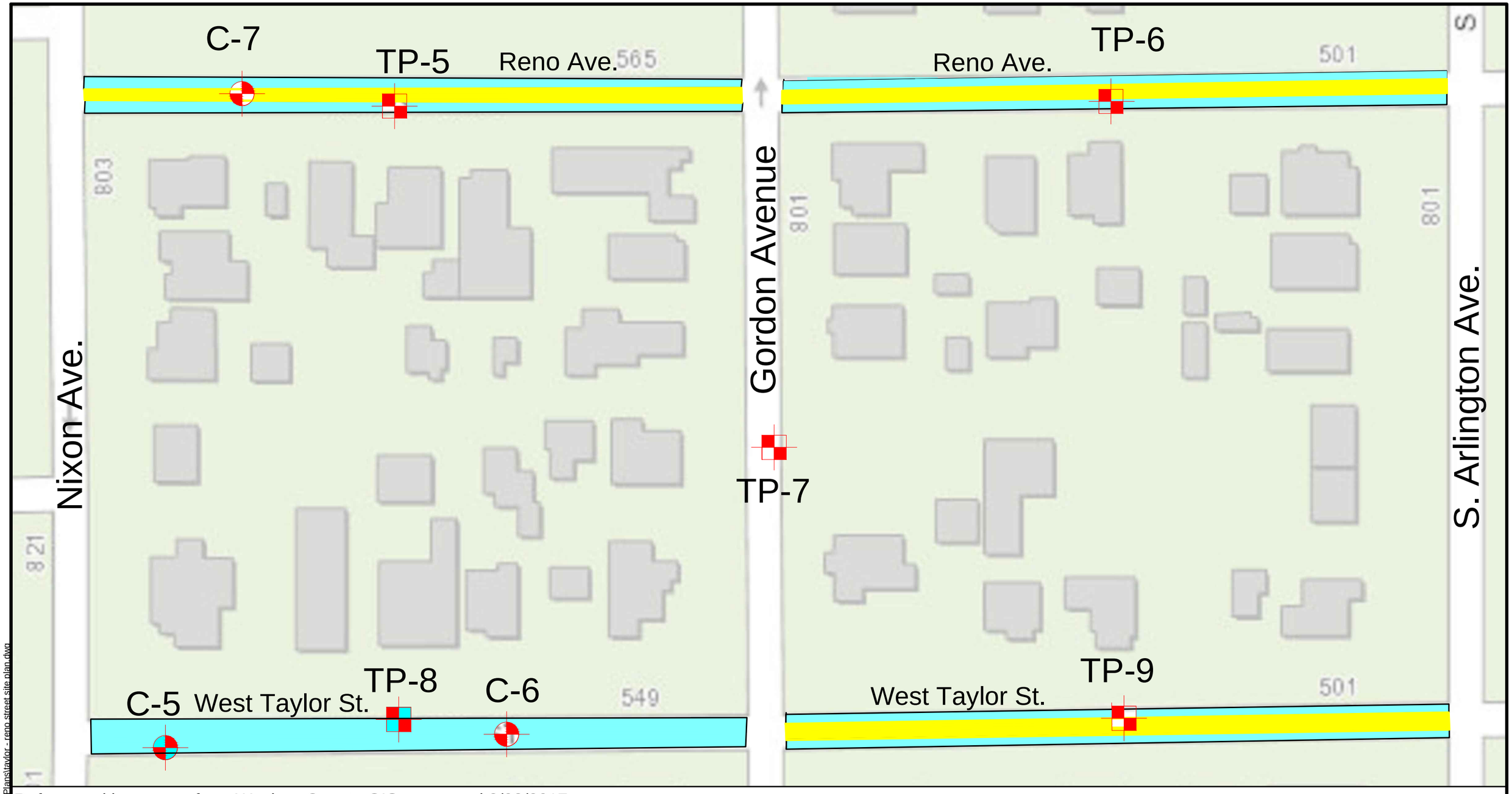

Referenced base map from Washoe County GIS, accessed 8/08/2017

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

FARR WEST ENGINEERING
GORDON / MARSH STREET REHABILITATION
Reno / West Taylor Street Structural Section
WASHOE COUNTY, NEVADA

PROJECT NO.: 2024 DATE: 8/8/2017

LEGEND

- Approximate Core Location
- Approximate Test Pit Location
- Anticipated Pavement Over Concrete Areas
- Anticipated Pavement Areas

Note: Concrete/Pavement delineation areas are appoximate and shall be verified during construction

PLATE

A-1b

Base map provided by CIty of Reno Gis, Accessed 7/27/2018

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

FARR WEST ENGINEERING
MARTHIAM AVE REHABILIATION
FIELD EXPLORATION MAP
WASHOE COUNTY, NEVADA

PROJECT NO.:2024 DATE:7/28/2017

PLATE
A-1c

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LOG OF TEST PIT NO. TP-1

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J RUBBER TIRED
CLIENT FARR WEST ENGINEERING **LOCATION** MARSH AVENUE WEST OF NIXON AVENUE
PROJECT NO. 2024 **DATE** 7/13/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-3.0": ASPHALT CONCRETE.							
	SM			B	1A		MOIST	3.0"-10.0": AGGREGATE BASE FILL, mostly fine to medium sand, some fine to medium subrounded to subangular gravels, non plastic, dark gray.							
1	CH			B	1b		MOIST	10.0"-15.0": SANDY FAT CLAY, some very fine to fine sands, trace fine to medium rounded gravel, dark brown.	64.1	58	44			22.7	A, G
	SM			B	1c		MOIST	15.0"-48.0": SILTY SAND WITH GRAVEL, COBBLES, AND BOULDERS, mostly fine to coarse sand, some fine to coarse							
2															
3															
4								TEST PIT TERMINATED AT 4 FEET. SAMPLING TERMINATED AT 4 FEET.							
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		7/13/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2a**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-2

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** MARSH AVENUE WEST OF NIXON AVENUE
PROJECT NO. 2024 **DATE** 7/13/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-3.5": ASPHALT CONCRETE.							
	SM			B	2A		MOIST	3.5"-10.0": AGGREGATE BASE FILL, mostly fine to medium sand, some fine to medium subrounded to subangular gravel, non plastic, brownish gray.							
1	SC			B	2B		MOIST	10.0"-18.0": CLAYEY SAND, mostly very fine to fine sand, few fine to medium subrounded to rounded gravel, plastic, dark brown. Note: Bulk sample 2E taken from 0.83'- 2.42'	36.4	34	22			9.5	A, G
	CH			B	2C		MOIST	18.0"-29.0": FAT CLAY WITH SAND, few very fine to fine sand, high plasticity, dark brown.							
2															
	SM			B	2D		MOIST	29.0"-48.0": SILTY SAND WITH GRAVEL, mostly very fine to fine sand, few fine to medium subangular gravel, non plastic, tannish brown, trace of fine to medium rounded gravel weakly cemented.							
3															
4								TEST PIT TERMINATED AT 4 FEET. SAMPLING TERMINATED AT 4 FEET.							
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		7/13/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2b**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-3

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** MARSH AVENUE BETWEEN NIXON AND GORDON
PROJECT NO. 2024 **DATE** 7/13/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-4.0": ASPHALT CONCRETE							
	GM			B	3A		MOIST	4.0"-10.0": AGGREGATE BASE, SILTY GRAVEL WITH SAND, mostly fine to medium subrounded to subangular gravel, some very fine to fine sand, non plastic, brown to gray.							
1	SC			B	3B		MOIST	10.0"-16.0": CLAYEY SAND, mostly very fine to fine sand, low plasticity, light gray.						14.4	
	CH			B	3C		MOIST	16.0"-30.0": FAT CLAY, few very fine to fine sand, dark brown.							
2															
	SM			B	3D		MOIST	30.0"-48.0": SILTY SAND, some very fine to fine sand, low plasticity, tannish brown. Notes. Bulk sample 3E taken from 0.83'-2.5'. Very hard excavation at bottom.						13.2	
3															
4								TEST PIT TERMINATED AT 4 FEET. SAMPLING TERMINATED AT 4 FEET.							
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		7/13/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2c**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-4

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** INTERSECTION OF GORDON AVENUE & ST. LAWRENCE
PROJECT NO. 2024 **DATE** 7/14/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-6.5": ASPHALT CONCRETE							
	GP-GM			B	4A		MOIST	6.5"-13.0": AGGREGATE BASE, mostly fine to coarse gravel, some fine to medium sand, non plastic, dark gray.	10.2	21	1			4.3	A, G
1	CH			B	4B		MOIST	13.0"-23.0": FAT CLAY WITH SAND AND GRAVEL, few very fine to fine sand, fine to coarse gravel, high plasticity, dark brown.							
2	SM			B	4C		MOIST	23.0"-42.0": SILTY SAND WITH GRAVEL, COBBLES AND BOULDERS, mostly fine to coarse sand, some fine to coarse rounded gravel and cobbles, boulders upto 18" diameter, non plastic, tannish brown.							
3															
4								TEST PIT TERMINATED AT 3.5 FEET DUE TO REFUSAL. SAMPLING TERMINATED AT 3.5 FEET.							
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		7/14/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS
A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

PLATE NO.: A-2d

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-5

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** RENO AVENUE WEST OF GORDON AVENUE
PROJECT NO. 2024 **DATE** _____ **LOGGED BY:** SH **SURFACE ELEVATION** _____

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-2.0": ASPHALT CONCRETE 2.0"-7.0": PORTLAND CEMENT CONCRETE							
1	CH			B	5A		MOIST	7.0"-14.0": FAT CLAY WITH SAND AND GRAVEL, few very fine to fine sand, few fine to coarse rounded gravel, high plasticity, dark brown.						20.6	MC
2	SM			B	5B		MOIST	14.0"-46.0": SILTY SAND WITH GRAVEL, COBBLES AND BOULDERS, mostly fine to coarse sand, some fine to coarse rounded to subrounded gravel and cobbles, boulders upto 24" diameter, non plastic, tannish brown.							
3															
4								REFUSAL AT 3.83 FEET.							
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS
A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

PLATE NO.: A-2e

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-6

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** RENO AVENUE EAST OF GORDON AVENUE
PROJECT NO. 2024 **DATE** 7/14/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-2.0": ASPHALT CONCRETE 2.0"-6.0": PORTLAND CEMENT CONCRETE							
1	CH			B	6A		MOIST	6.0"-15.0": SANDY FAT CLAY WITH GRAVEL, little very fine to fine sand, few fine to medium gravel, medium to dark brown.	51.6	63	45			16.1	A, G
2	SM			B	6B		MOIST	15.0"-44.0": SILTY SAND WITH GRAVEL, COBBLES AND BOULDERS, mostly fine to coarse sand, some fine to coarse rounded to subrounded gravel and cobbles, boulders up to 36" diameter near surface approximately 18" deep, non plastic, medium brown.	11.6	NV	NP			3.3	G
3															
4								REFUSAL AT 3.67 FEET.							
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		7/14/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2f**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-7

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** GORDON AVENUE BETWEEN TAYLOR STREET AND RENO
PROJECT NO. 2024 **DATE** 7/14/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-5.0": ASPHALT CONCRETE							
	GP-GM						MOIST	5.0"-18.0": AGGREGATE BASE, mostly fine to medium rounded to subrounded gravel, some fine to coarse sand, non plastic, gray.							
1				B	7A				8.3	19	1			3.7	A, G
	SC						MOIST	18.0"-48.0": CLAYEY SAND WITH GRAVEL AND COBBLES, mostly fine to medium sand, some fine to coarse rounded to subrounded gravel, few rounded cobbles, medium brown.							
2															
3				B	7B				14.0	38	23			5.5	A, G
4								TERMINATED AT 4 FEET.							
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		7/14/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2g**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-8

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** TAYLOR ST WEST OF GORDON AVENUE
PROJECT NO. 2024 **DATE** 7/14/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-2.0": ASPHALT CONCRETE.							
								2.0"-7.0": PORTLAND CEMENT CONCRETE							
	CH						MOIST	7.0"-21.0": SANDY FAT CLAY, little very fine to fine sand, few fine to coarse subrounded to rounded gravel, medium brown to dark brown.							
1				B	8A			Note: Roots to 1' depth.	69.0	61	38			14.9	A, G
	SM						MOIST	21.0"-48.0": SILTY SAND WITH GRAVEL, COBBLES AND BOULDERS, mostly fine to coarse sand, some fine to coarse rounded to subrounded gravel and cobbles, boulders upto 24" diameter, non plastic, medium brown.							
2															
3				B	8B										
4								TERMINATED AT 4 FEET.							
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		7/14/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2h**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-9

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** TAYLOR STREET EAST OF GORDON AVENUE
PROJECT NO. 2024 **DATE** 7/14/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-4.25": ASPHALT CONCRETE							
	SM			B	9A		MOIST	4.25"-9.75": AGGREGATE BASE, SILTY SAND, mostly fine to medium sand, some fine to coarse subrounded to rounded gravel, non plastic, dark gray.							
1	CH			B	9B		MOIST	9.75"-24.0": FAT CLAY WITH SAND AND GRAVEL, few very fine to fine sand, few fine to coarse rounded to subrounded gravel, medium brown. NOTE: On the north side of test pit AC was underlain by 5" of PCC. PCC extended roughly 8' from the edge of the curb.						22.3	MC
2	SM			B	9C		MOIST	24.0"-34.0": SILTY SAND WITH GRAVEL, COBBLES AND BOULDERS, mostly fine to coarse sand, some fine to coarse subrounded to rounded gravel and cobbles, non plastic, brown. Boulders about 3' diameter at bottom of hole. Note: Very hard excavation at 2'.							
3								TERMINATED AT 2.83 FEET.							
4															
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		7/14/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2i**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-10

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** INTERSECTION OF GORDON AVENUE AND LA RUE AVENUE
PROJECT NO. 2024 **DATE** _____ **LOGGED BY:** SH **SURFACE ELEVATION** _____

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-7.5": ASPHALT CONCRETE							
1	SM			B	10A		MOIST	7.5"-13.5": AGGREGATE BASE, SILTY SAND WITH GRAVEL, mostly fine to coarse sand, some fine to medium subrounded to subangular gravel, non plastic, dark gray.							
2	CH			B	10B		MOIST	13.5"-33.0": SANDY FAT CLAY, little very fine to medium sand, trace fine to medium gravel, high plasticity, dark brown to dark gray.	62.2	60	45			24.7	A, G
3	SM			B	10C		MOIST	33.0"-52.0": SILTY SAND WITH GRAVEL, COBBLES AND BOULDERS, mostly fine to coarse sand, little fine to coarse rounded to subrounded gravel and cobbles, few boulders upto 24" diameter, non plastic, tannish brown.							
4								TERMINATED AT 4.33 FEET.							
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2j**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-11

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** WALKER AVENUE WEST OF GORDON AVENUE
PROJECT NO. 2024 **DATE** **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-5.0": ASPHALT CONCRETE							
	SM			B	11A		MOIST	5.0"-9.0": AGGREGATE BASE, SILTY SAND WITH GRAVEL, mostly fine to medium sand, some fine to medium subangular to subrounded gravel, non plastic, dark gray.							
1	SC			B	11B		MOIST	9.0"-26.0": CLAYEY SAND, mostly very fine to fine sand, trace fine to medium subrounded to rounded gravel, dark gray						10.1	MC
2	CH			B	11C		MOIST	26.0"-40.0": FAT CLAY WITH SAND, few very fine to fine sand, high plasticity, dark gray.							
3	CL			B	11D		MOIST	40.0"-48.0": SANDY LEAN CLAY, some very fine to fine sand, low to medium plasticity, tannish brown.							
4								TERMINATED AT 4 FEET.							
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2k**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-12

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** WALKER AVENUE EAST OF GORDON AVENUE
PROJECT NO. 2024 **DATE** _____ **LOGGED BY:** SH **SURFACE ELEVATION** _____

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-3.5": ASPHALT CONCRETE							
	SM			B	12A		MOIST	3.5"-13.0": AGGREGATE BASE, SILTY SAND WITH GRAVEL, mostly fine to medium sand, some fine to medium subrounded to subangular gravel, non plastic, dark gray.							
1	CH			B	12B		MOIST	13.0"-18.0": SANDY FAT CLAY, some very fine to medium sand, high plasticity, dark gray.							
	GP-GC			B	12C		MOIST	18.0"-42.0": POORLY GRADED GRAVEL WITH CLAY AND SAND, mostly fine to coarse subrounded to rounded gravel and cobbles, some fine to coarse sand, few boulders upto 24" diameter, low plastic, tannish brown.	7.5	31	8			7.7	A, G
2															
3															
								TERMINATED AT 3.5 FEET.							
4															
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽			
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2l**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-13

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** MARSH AVENUE EAST OF GORDON AVENUE
PROJECT NO. 2024 **DATE** _____ **LOGGED BY:** SH/ **SURFACE ELEVATION** _____

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-6.0": ASPHALT CONCRETE							
	SM			B	13A		MOIST	6.0"-11.0": AGGREGATE BASE, SILTY SAND WITH GRAVEL, mostly fine to coarse sand, some fine to coarse subrounded to rounded gravel, non plastic, dark gray.							
1	CH			B	13B		MOIST	11.0"-15.0": FAT CLAY, trace very to fine sand, high plasticity, reddish brown.						20.4	MC
	SM						MOIST	15.0"-36.0": SILTY SAND WITH GRAVEL, COBBLES AND BOULDERS, mostly fine to coarse sand, some fine to coarse subrounded gravel, little subrounded to rounded cobbles, few boulders upto 24" diameter, non plastic, light brown.							
2				B	13C										
3								TERMINATED AT 3 FEET DUE TO LARGE BOULDERS AT BOTTOM OF TEST PIT.							
4															
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽			
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2m**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-14

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** MARTHAIM AVENUE SOUTH OF SUSILEEN DRIVE
PROJECT NO. 2024 **DATE** 7/19/2017 **LOGGED BY:** SH/ **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-6.0": ASPHALT CONCRETE							
	SC-SM			B	14A		MOIST	6.0"-8.0": SILTY CLAYEY SAND, mostly fine to coarse sand, trace subangular to angular gravel, low plasticity, reddish brown.							
	SM			B	14B		MOIST	8.0"-14.0": SILTY SAND, mostly fine to coarse sand, trace gravel, non plastic, yellowish brown ("Decomposed Granite").							
1	SC			B	14C		MOIST	14.0"-23.0": CLAYEY SAND, mostly very fine to medium sand, few fine to coarse subangular to angular gravel, low to moderate plasticity, dark brown.	44.9	24	8			14.0	A, G
2	SP-SM						MOIST	23.0"-48.0": POORLY GRADED SAND WITH SILT AND GRAVEL, mostly fine to coarse sand, some fine to coarse subrounded to rounded gravel, few fine to coarse cobbles, low plastic, pinkish brown.							
3				B	14D				7.5	35	5			7.0	A, G
4								TERMINATED AT 4 FEET.							
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		7/19/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2n**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-15

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** DEERE 410J WITH 30" BUCKET
CLIENT FARR WEST ENGINEERING **LOCATION** MATHIAM AVENUE NORTH OF SUSILEEN DRIVE
PROJECT NO. 2024 **DATE** 7/19/2017 **LOGGED BY:** SH/ **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0'-5.0": ASPHALT CONCRETE							
	SC-SM			B	15A		MOIST	5.0"-8.0": SILTY CLAYEY SAND, mostly fine to coarse sand, trace subangular to angular gravel, low plasticity, reddish brown.							
	SM			B	15B		MOIST	8.0"-12.0": SILTY SAND, mostly fine to coarse sand, trace gravel, non plastic, yellowish brown ("Decomposed Granite").							
1	SC			B	15C		MOIST	12.0"-20.0": CLAYEY SAND WITH GRAVEL, mostly very fine to medium sand, some very fine to fine subrounded to rounded gravel, low plasticity, dark brown.							
	CH			B	15D		MOIST	20.0"-32.0": SANDY FAT CLAY WITH GRAVEL, very fine to fine sand, little fine to coarse subangular to angular gravel, high plasticity, light brown.							
2															
3	GM			B	15E		MOIST	32.0"-48.0": SILTY GRAVEL WITH SAND AND COBBLES, fine to coarse subrounded to rounded gravel, some fine to coarse sand, few fine to coarse cobbles, non plastic, pinkish brown.							
4								TERMINATED AT 4 FEET.							
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		7/19/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS
A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

PLATE NO.: A-2o

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. C-1

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** CORE RIG
CLIENT FARR WEST ENGINEERING **LOCATION** GORDON AVENUE NORTH OF NEWLANDS LANE
PROJECT NO. 2024 **DATE** 8/7/2017 **LOGGED BY:** SH/ **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-5.75"": ASPHALT CONCRETE.							
	SM						MOIST	5.75"-24.0": AGGREGATE BASE, mostly fine to coarse sand, some fine to coarse gravel, non plastic, golden brown.							
1				B	1A										
2								Core hole terminated at 2.0 feet due to large cobble in bottom of corehole.							
3															
4															
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		8/7/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2p**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. C-2

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** CORE RIG
CLIENT FARR WEST ENGINEERING **LOCATION** GORDON AVENUE BETWEEN LA RUE AND WALKER
PROJECT NO. 2024 **DATE** 8/7/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-1.5": ASPHALT CONCRETE. 1.5"-6.0": PORTLAND CEMENT CONCRETE.							
	SC			B	2A		MOIST	NOTE: Corehole taken 7.5' from curb. Half of the core towards the center of Gordon Street was AC to depth. East side of core was 1.5" AC underlain by 4.5" PCC.						12.6	MC
	CH			B			MOIST	6.0"-9.0": CLAYEY SAND, mostly fine to coarse sand, few fine to coarse gravels, low plasticity, dark brown. 9.0"-10.0": SANDY FAT CLAY, some very fine to fine sands, trace gravels, reddish brown. Core hole terminated at 0.83'.							
1															
2															
3															
4															
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		8/7/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2p**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. C-3

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** CORE RIG
CLIENT FARR WEST ENGINEERING **LOCATION** WALKER AVENUE WEST OF GORDON AVENUE
PROJECT NO. 2024 **DATE** 8/7/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-4.75": ASPHALT CONCRETE.							
	GM			B	3A		MOIST	4.75"-8.5": AGGREGATE BASE, mostly fine to coarse gravel, some fine to coarse sand, non plastic, grayish brown.							
	SC			B	3B		MOIST	0.71'-0.83': CLAYEY SAND, mostly very fine to medium sand, few gravels, low plasticity, reddish brown.							
1								Core hole terminated at 0.83'.							
2															
3															
4															
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		8/7/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2q**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. C-4

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** CORE RIG
CLIENT FARR WEST ENGINEERING **LOCATION** GORDON AVENUE BETWEEN MONROE AND WALKER
PROJECT NO. 2024 **DATE** 8/8/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-2.0": ASPHALT CONCRETE. 2.0"-7.5": PORTLAND CEMENT CONCRETE.							
1	SC			B	4A		MOIST	7.5"-13.0": CLAYEY SAND, mostly fine to coarse sand, few fine to medium gravels, trace fine to coarse cobbles, gray to brown.						19.6	MC
								CORE HOLE TERMINATED AT 13.0 INCHES.							
2															
3															
4															
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		8/8/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2r**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. C-5

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE**
CLIENT FARR WEST ENGINEERING **LOCATION** TAYLOR STREET WEST OF GORDON AVENUE
PROJECT NO. 2024 **DATE** **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-1.75": ASPHALT CONCRETE.							
								1.75"-6.75": PORTLAND CEMENT CONRETE.							
			B		5A			6.75"-12.0": CLAYEY SAND WITH GRAVEL, mostly very fine to medium sand, some fine to coarse rounded to subrounded gravel, low platict, medium brown.							
1								Core hole terminated at 1.0'.							
2															
3															
4															
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽			
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2s**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. C-6

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** CORE RIG
CLIENT FARR WEST ENGINEERING **LOCATION** TAYLOR STREET WEST OF GORDON AVENUE
PROJECT NO. 2024 **DATE** 8/8/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-2.0": ASPHALT CONCRETE.							
								2.0"-7.5": PORTLAND CEMENT CONCRETE.							
	SP-SM						MOIST	7.5"-9.5": POORLY GRADED SAND WITH SILT (BEDDING SAND), mostly very fine to medium sand, non plastic, gray.							
1	CH			B	6A		MOIST	9.5"-18.0": SANDY FAT CLAY, some very fine to medium sand, reddish brown.							
								Core hole terminated at 1.5 feet.							
2															
3															
4															
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		8/8/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2t**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. C-7

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** CORE RIG
CLIENT FARR WEST ENGINEERING **LOCATION** RENO AVENUE WEST OF GORDON AVENUE
PROJECT NO. 2024 **DATE** 8/8/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-5.0": ASPHALT CONCRETE.							
	CH			B	7A		MOIST	5.0"-12.0": SANDY FAT CLAY WITH GRAVEL, some very fine to medium sand, little fine to coarse gravel, trace cobbles, reddish brown.						11.5	MC
1								Core hole terminated at 1.0 feet.							
2															
3															
4															
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		8/8/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2u**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. C-8

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** CORE RIG
CLIENT FARR WEST ENGINEERING **LOCATION** GORDON STREET BETWEEN LA RUE AND WALKER AVENUE
PROJECT NO. 2024 **DATE** 8/15/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-2.0": ASPHALT CONCRETE. 2.0"-7.5": PORTLAND CEMENT CONCRETE. NOTE: Core hole located on edge of PCC boundary, roughly 7.5' from edge of curb.							
	SC			B	8A		MOIST	7.5"-9.0": CLAYEY SAND WITH GRAVEL, mostly fine to medium sand, little fine to coarse rounded to subrounded gravel, reddish brown.							
1								Core hole terminated at 0.75 feet.							
2															
3															
4															
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		8/15/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2v**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. C-9

PROJECT CITY OF RENO GORDON/MASRH STREET REHABILITATION **EQUIPMENT TYPE** CORE RIG
CLIENT FARR WEST ENGINEERING **LOCATION** GORDON AVENUE BETWEEN LA RUE AND TAYLOR STREET
PROJECT NO. 2024 **DATE** 8/15/2017 **LOGGED BY:** SH **SURFACE ELEVATION**

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0								0.0"-1.5": ASPHALT CONCRETE. 1.5"-5.0": PORTLAND CEMENT CONCRETE.							
	SC			B	9A		MOIST	5.0"-8.0": CLAYEY SAND WITH GRAVEL, mostly fine to medium sand, few fine to medium gravels, low plasticity, light brown to medium brown. Core hole terminated at 0.66 feet.							
1															
2															
3															
4															
5															
6															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		8/15/2017
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS **PLATE NO.: A-2w**

A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

UNIFIED SOIL CLASSIFICATION CHART

COARSE-GRAINED SOILS
(more than 50% of material is larger than No. 200 sieve size.)

GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures

FINE-GRAINED SOILS
(50% or more of material is smaller than No. 200 sieve size.)

SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty of 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
SILTS AND CLAYS Liquid limit 50% or greater	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

ESTIMATED PERCENTAGES OF GRAVEL, SAND, AND FINES BASED ON VISUAL DESCRIPTION

TRACE	<5%
FEW	5%-15%
LITTLE	15%-30%
SOME	30%-50%
MOSTLY	>50%

SOIL STRUCTURE COMMON DESCRIPTIVE TERMS

FISSURED: SHRINKAGE OR RELIEF CRACKS OFTEN FILLED WITH SILT OR SAND

POCKET: INCLUSION OF MATERIAL WITH EITHER A DIFFERENT TEXTURE OR CLASSIFICATION FROM THE MAIN SOIL LAYER

LAMINATED: THIN ALTERNATING SOIL LAYERS WITH EITHER A DIFFERENT TEXTURE OR CLASSIFICATION.

SEAM: THIN LAYER OF MATERIAL WITH EITHER A DIFFERENT TEXTURE OR CLASSIFICATION FROM MAIN SOIL LAYER.

MOTTLED: SOILS WITH IRREGULAR MARKS OR SPOTS OF DIFFERENT COLORS. USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. MAY INDICATE A MARKER HORIZON OF A PREVIOUS GROUNDWATER LEVEL.

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

FARR WEST ENGINEERING
GORDON/MARSH REHABILITATION
SOIL CLASSIFICATION CHART
WASHOE COUNTY, NEVADA

PROJECT NO.: 2024 DATE: 8/25/2017

PLATE
A-3

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

APPENDIX B

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.1	3.6	15.0	16.2	64.1	
□	0.0	8.4	3.1	7.3	24.3	20.5	36.4	
△	0.0	22.5	29.4	11.9	16.8	9.2	10.2	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		58	14	0.6606							
□		34	12	2.6969	0.5152	0.2789					
△		21	20	23.1753	8.7453	5.4278	1.1395	0.2311			

	Material Description	USCS	AASHTO
○	sandy fat clay	CH	A-7-6(25)
□	clayey sand	SC	A-6(3)
△	poorly graded gravel with silt and sand	GP-GM	A-1-a

Project No. 2024 **Client:** FARR WEST ENGINEERING

Project: CITY OF RENO GORDON/MASRH STREET REHABILITATION PROJECT

○ **Location:** TP-1 **Depth:** 10.0"-15.0" **Sample Number:** 1B

□ **Location:** TP-2 **Depth:** 10.0"-18.0" **Sample Number:** 2B

△ **Location:** TP-4 **Depth:** 6.0"-12.0" **Sample Number:** 4A

Date: ○ 7/13/2017 □ 7/13/2017 △ 7/13/2017

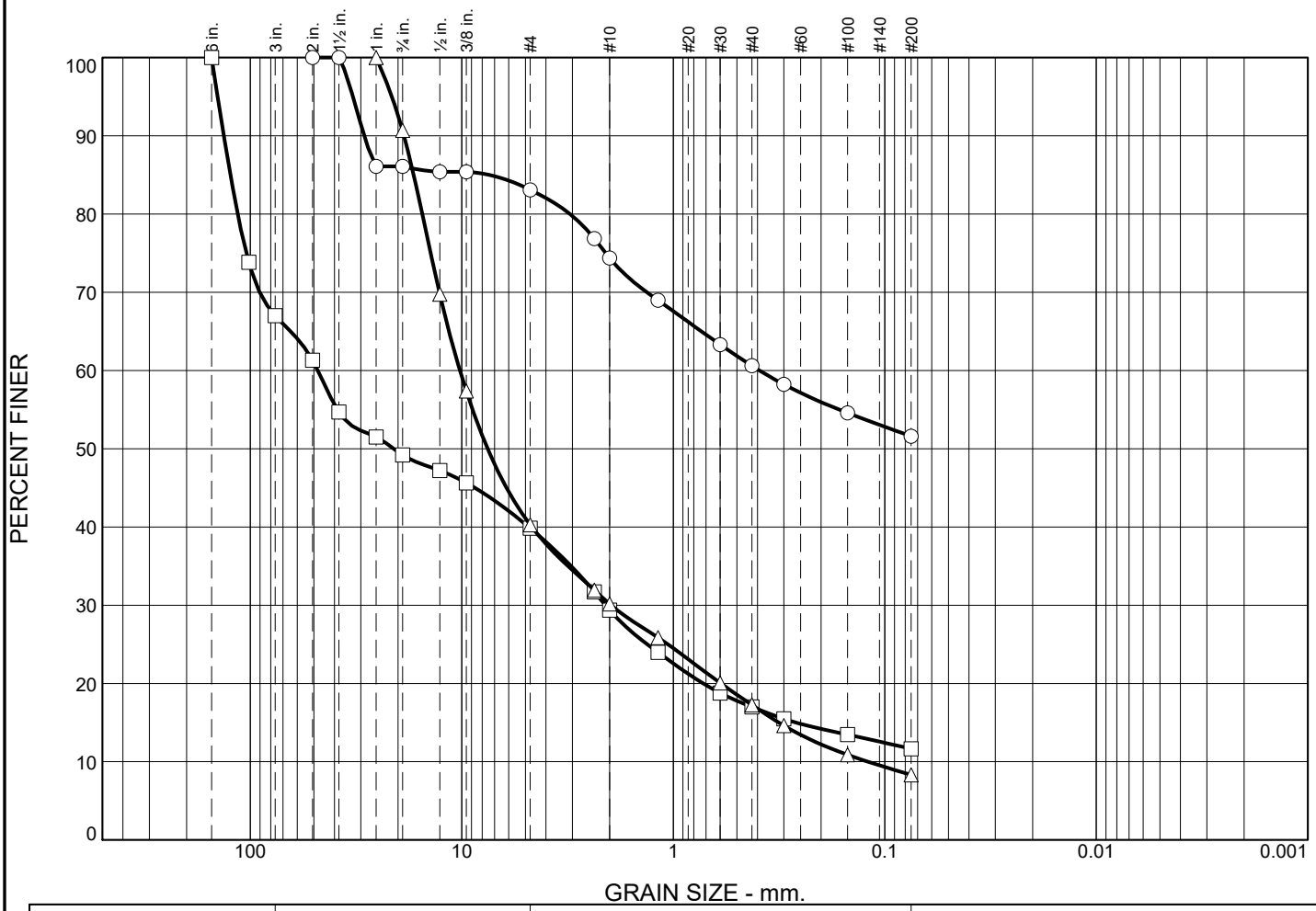
CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Remarks:

PLATE B-1a

Tested By: S. SCHWEITZER **Checked By:** S. HEIN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	13.9	3.0	8.7	13.8	9.0	51.6	
□	33.0	17.8	9.4	10.4	12.4	5.4	11.6	
△	0.0	9.3	50.4	10.1	12.9	9.0	8.3	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		63	18	7.4063	0.3909						
□				124.1504	47.9397	21.0027	2.0941	0.2625			
△		19	18	16.8826	10.2078	7.5447	1.9693	0.3167	0.1202	3.16	84.91

	Material Description	USCS	AASHTO
○	sandy fat clay with gravel	CH	A-7-6(18)
□			
△	poorly graded gravel with silt and sand	GP-GM	A-1-a

Project No. 2024 **Client:** FARR WEST ENGINEERING

Project: CITY OF RENO GORDON/MASRH STREET REHABILITATION PROJECT

○ **Location:** TP-6 **Depth:** 6.0"-15.0" **Sample Number:** 6A

□ **Location:** TP-6 **Depth:** 15.0"-44.0" **Sample Number:** 6B

△ **Location:** TP-7 **Depth:** 5.0"-18.0" **Sample Number:** 7A

Date: ○ 7/13/2017 □ 7/13/2017 △ 7/13/2017

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Remarks:

PLATE B-1b

Tested By: S. SCHWEITZER **Checked By:** S. HEIN

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	22.6	18.7	13.9	20.2	10.6	14.0	
□	0.0	0.7	1.3	3.4	14.1	11.5	69.0	
△	0.0	0.0	1.4	6.8	16.5	13.1	62.2	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		38	15	31.3511	5.2447	2.6073	0.6877	0.1070			
□		61	23	0.6917							
△		60	15	1.0692							

	Material Description	USCS	AASHTO
○	clayey sand with gravel	SC	A-2-6(0)
□	sandy fat clay	CH	A-7-6(25)
△	sandy fat clay	CH	A-7-6(25)

Project No. 2024 **Client:** FARR WEST ENGINEERING

Project: CITY OF RENO GORDON/MASRH STREET REHABILITATION PROJECT

○ **Location:** TP-7 **Depth:** 18.0"-48.0" **Sample Number:** 7B

□ **Location:** TP-8 **Depth:** 7.0"-21.0" **Sample Number:** 8A

△ **Location:** TP-10 **Depth:** 13.0"-33.0" **Sample Number:** 10B

Date: ○ 7/13/2017 □ 7/13/2017 △ 7/13/2017

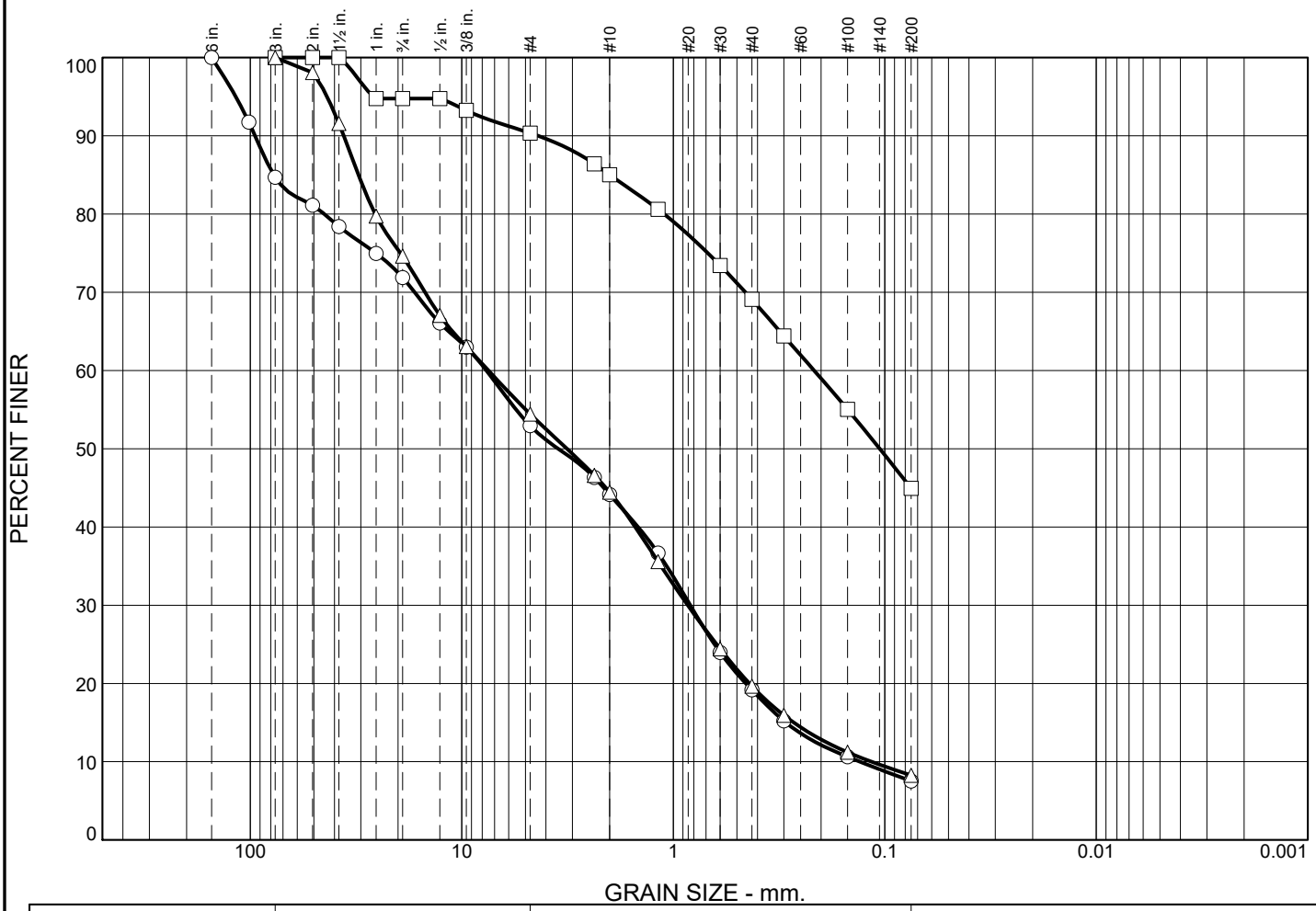
CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Remarks:

PLATE B-1c

Tested By: S. SCHWEITZER **Checked By:** S. HEIN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	15.3	12.8	19.0	8.8	24.9	11.7	7.5	
□	0.0	5.2	4.5	5.3	15.9	24.2	44.9	
△	0.0	25.4	20.2	9.9	24.8	11.4	8.3	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		31	23	77.4175	7.6501	3.5012	0.8308	0.2935	0.1313	0.69	58.26
□		24	16	1.9946	0.2158	0.1057					
△		35	30	30.7810	7.4832	3.1803	0.8540	0.2694	0.1156	0.84	64.73

Material Description	USCS	AASHTO
○ poorly graded gravel with clay and sand	GP-GC	A-2-4(0)
□ clayey sand	SC	A-4(1)
△ poorly graded sand with silt and gravel	SP-SM	A-1-a

Project No. 2024 **Client:** FARR WEST ENGINEERING

Project: CITY OF RENO GORDON/MASRH STREET REHABILITATION PROJECT

○ **Location:** TP-12 **Depth:** 18.0"-42.0" **Sample Number:** 12C

□ **Location:** TP-14 **Depth:** 14.0"-23.0" **Sample Number:** 14C

△ **Location:** TP-14 **Depth:** 23.0"-48.0" **Sample Number:** 14D

Date: ○ 7/13/2017 □ 7/19/2017 △ 7/19/2017

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Remarks:

PLATE B-1d

Tested By: ● S. SCHWEITZER ■ S. BRUKETTA ▲ S. BRUKETTA **Checked By:** S. HEIN

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	30.5	7.4	4.1	11.5	17.7	28.8	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		28	19	36.8966	2.8075	0.6181	0.0841				

Material Description	USCS	AASHTO
○ clayey gravel with sand	GC	A-2-4(0)

Project No. 2024 **Client:** FARR WEST ENGINEERING

Project: CITY OF RENO GORDON/MASRH STREET REHABILITATION PROJECT

○ **Location:** TP-15 **Depth:** 13"-20.0" **Sample Number:** 15C

Date: ○ 7/19/2017

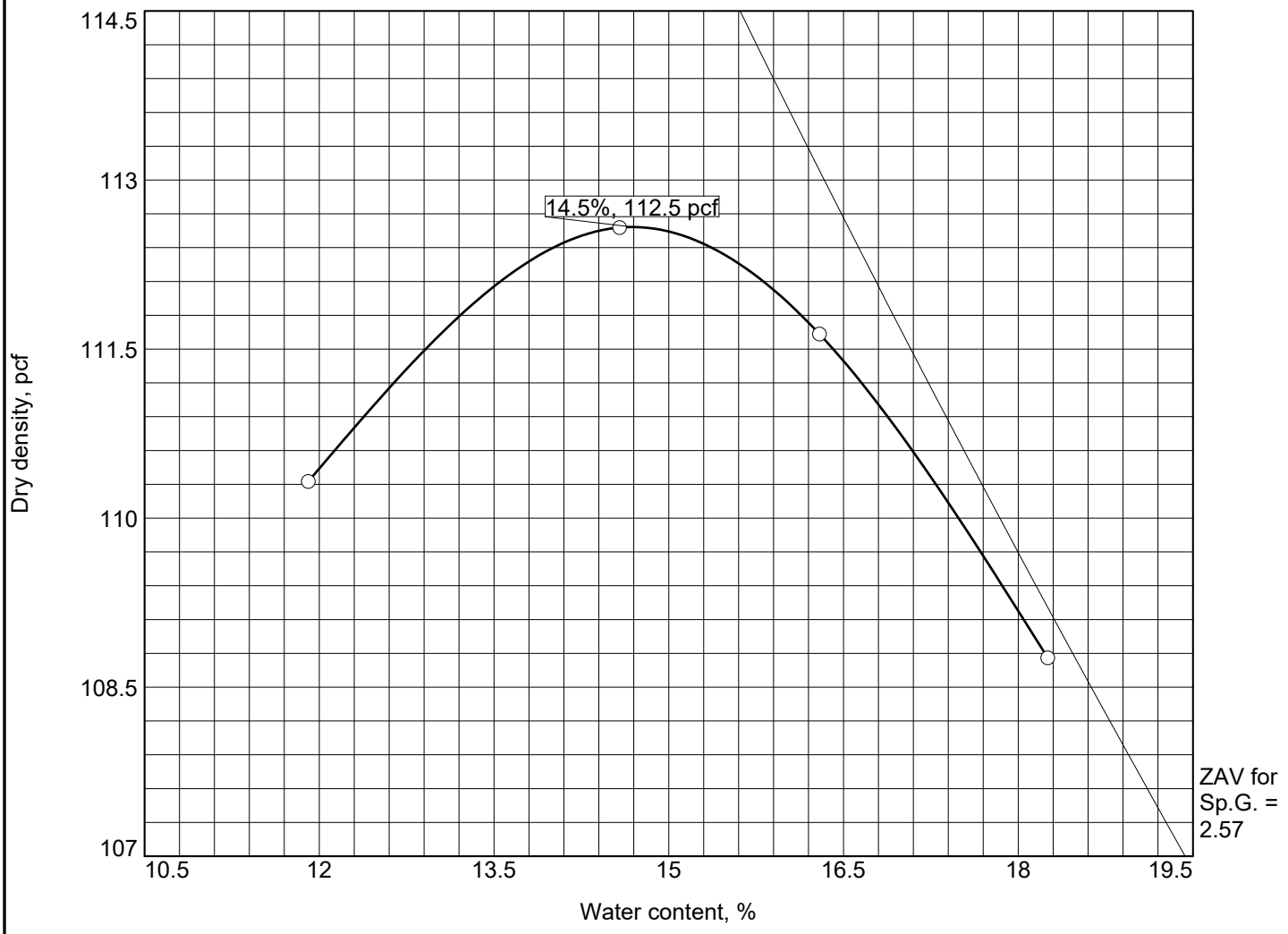
Remarks:

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

PLATE B-1e

Tested By: S. SCHWEITZER **Checked By:** S. HEIN

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
10.0"-30.0"							0.4	

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 112.5 pcf Optimum moisture = 14.5 %	

Project No. 2024 **Client:** FARR WEST ENGINEERING

Project: CITY OF RENO GORDON/MASRH STREET REHABILITATION PROJECT

Date:

○ **Location:** TP-3 **Sample Number:** 3E

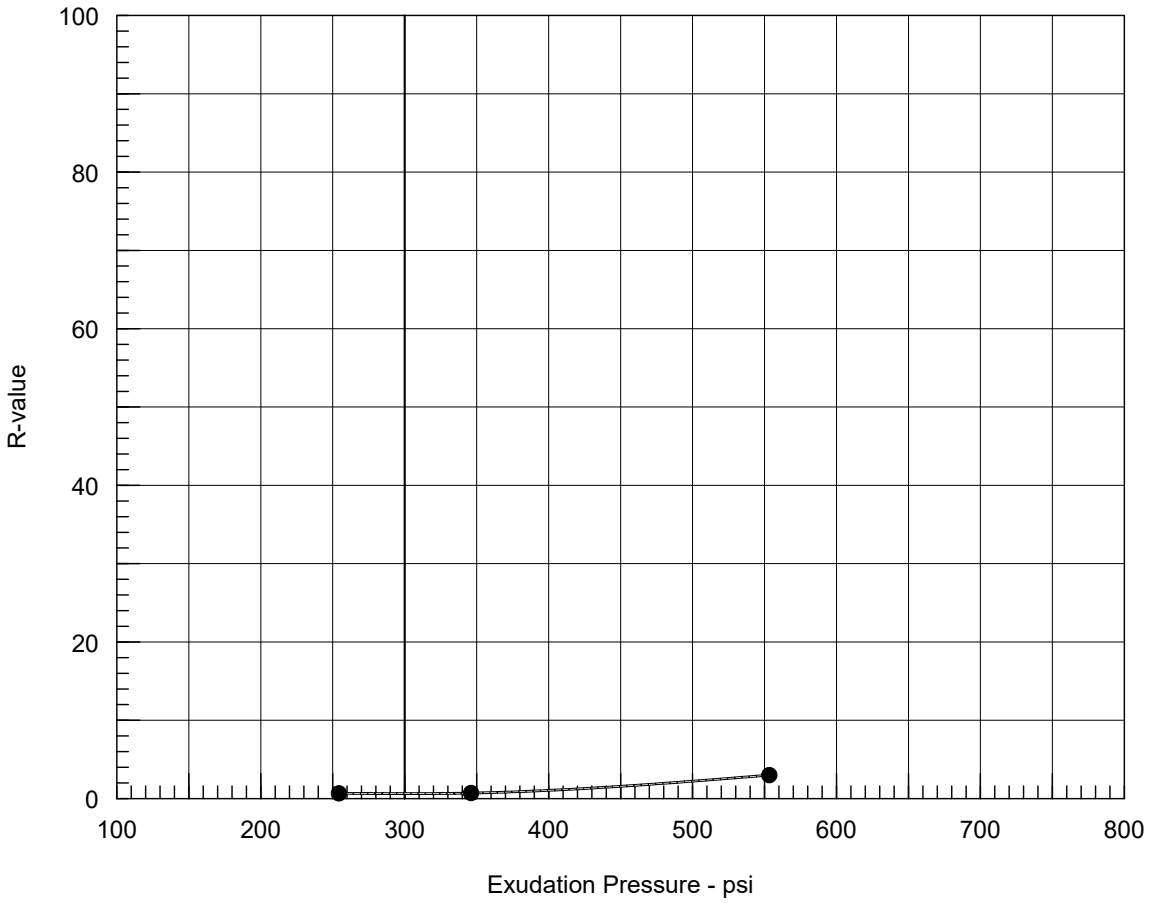
CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Remarks:

PLATE B-2

Tested By: A. SALAZAR **Checked By:** S. HEIN

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	35	94.0	28.5	0.00	152	2.60	553	3	3
2	30	89.6	33.1	0.00	158	2.60	346	1	1
3	25	83.8	37.1	0.00	158	2.65	254	1	1

Test Results	Material Description
R-value at 300 psi exudation pressure = 1	

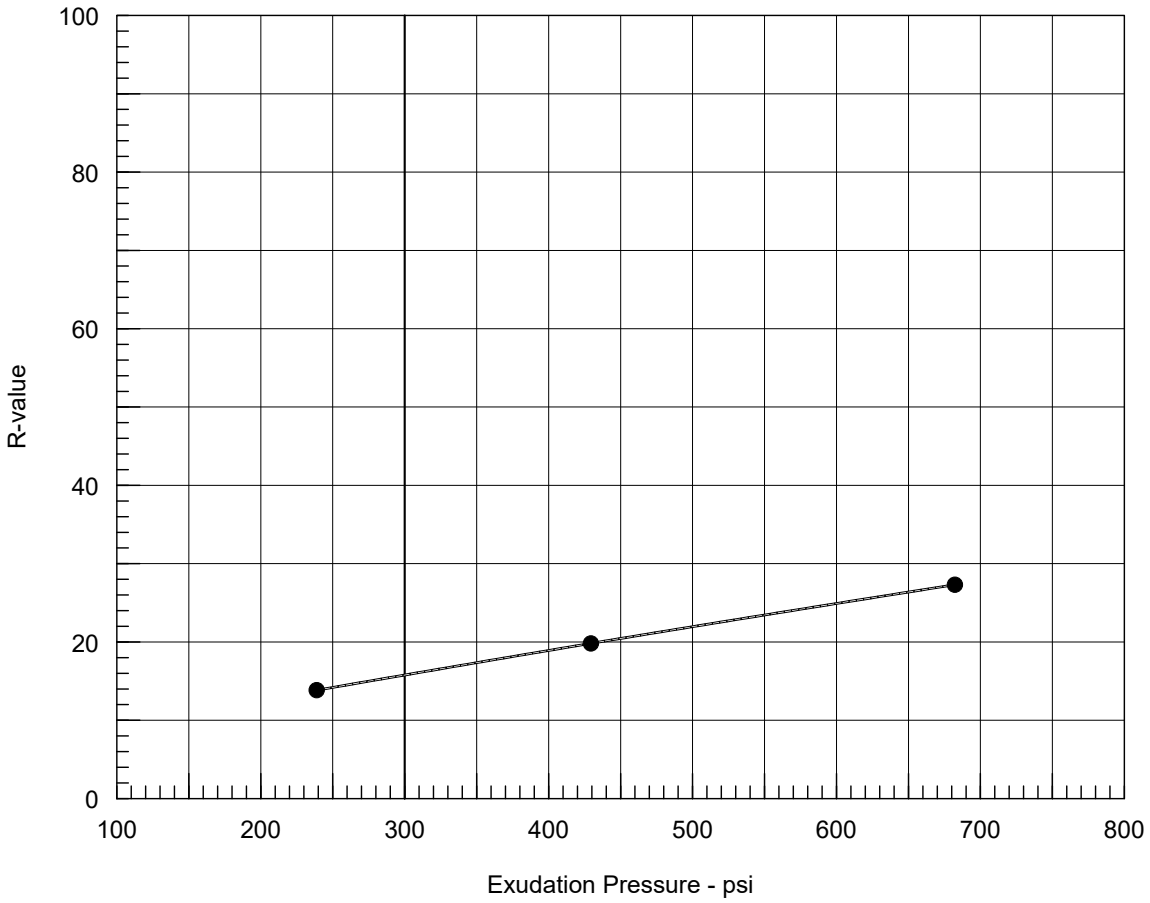
Project No.: 2024
Project: CITY OF RENO GORDON/MASRH STREET REHABILITATION PROJECT
Location: TP-2
Sample Number: 2E **Depth:** 10.0"-29.0"
Date: 8/18/2017

Tested by: G. MORALES
Checked by: S. HEIN
Remarks:

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

PLATE B-3a

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	250	118.5	14.1	2.73	105	2.35	682	30	27
2	80	115.9	15.1	1.58	121	2.52	429	20	20
3	60	117.4	16.7	0.33	127	2.43	239	15	14

Test Results	Material Description
R-value at 300 psi exudation pressure = 16	

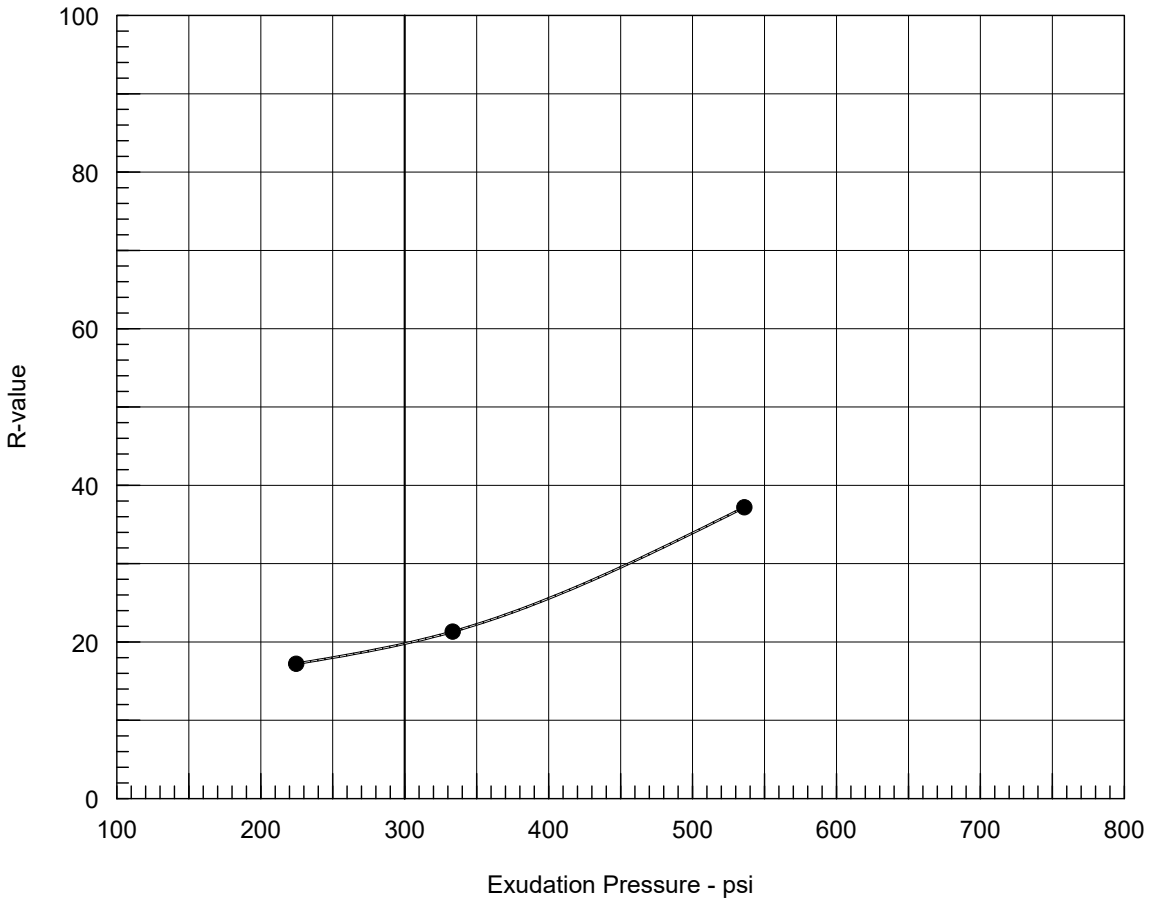
Project No.: 2024
Project: CITY OF RENO GORDON/MASRH STREET REHABILITATION PROJECT
Location: TP-6
Sample Number: 6B **Depth:** 15.0"-44.0"
Date: 8/18/2017

Tested by: S. VINEIS
Checked by: S. HEIN
Remarks:

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

PLATE B-3b

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	240	117.9	12.3	0.00	92	2.46	536	37	37
2	150	120.1	13.1	0.00	112	2.33	333	24	21
3	120	120.7	14.2	0.00	121	2.40	225	18	17

Test Results	Material Description
R-value at 300 psi exudation pressure = 20	clayey sand with gravel

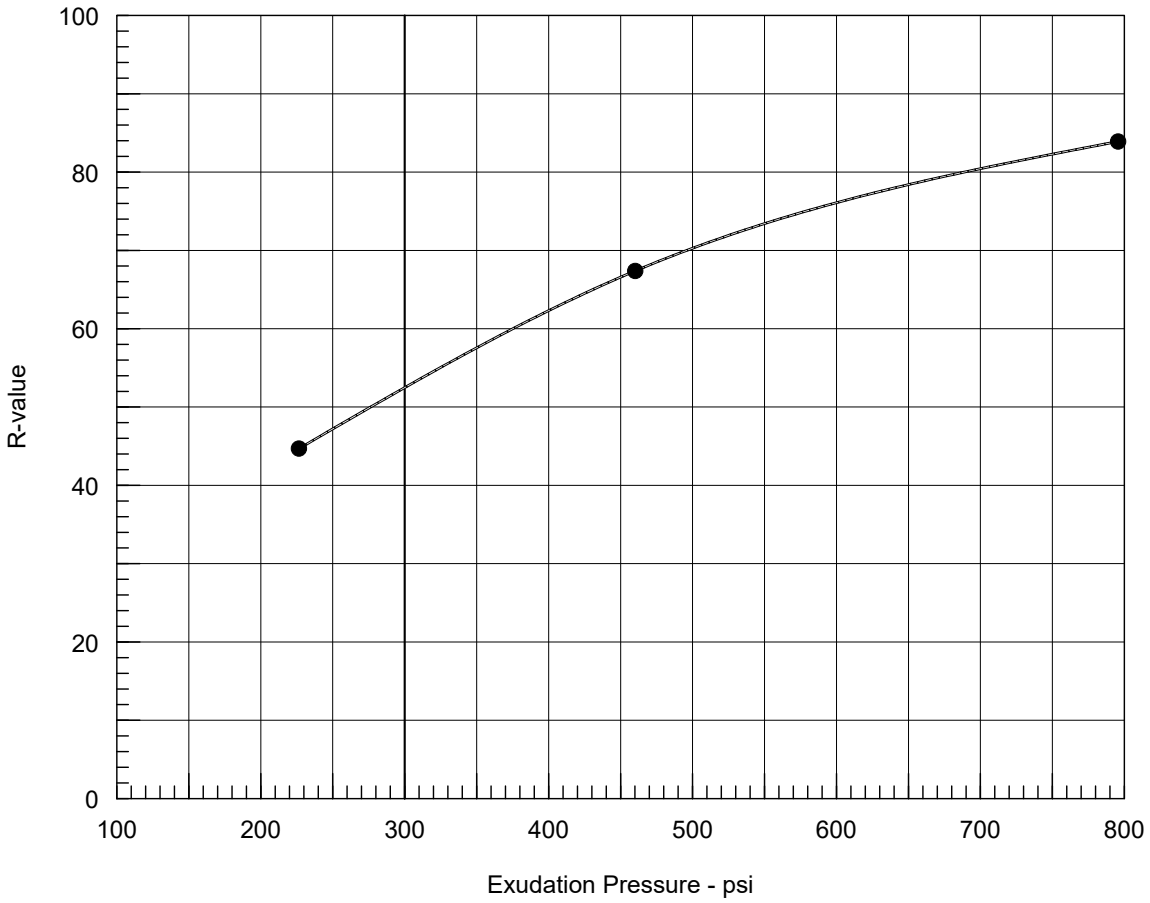
Project No.: 2024
Project: CITY OF RENO GORDON/MASRH STREET REHABILITATION PROJECT
Location: TP-7
Sample Number: 7B **Depth:** 18.0"-48.0"
Date: 8/18/2017

Tested by: S. VINEIS
Checked by: S. HEIN
Remarks:

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

PLATE B-3c

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	117.2	14.6	1.64	21	2.70	796	81	84
2	280	117.0	15.8	0.09	42	2.45	460	67	67
3	80	115.9	16.8	0.27	76	2.45	226	45	45

Test Results	Material Description
R-value at 300 psi exudation pressure = 52	

Project No.: 2024
Project: CITY OF RENO GORDON/MASRH STREET REHABILITATION PROJECT
Location: TP-14 and TP-15
Sample Number: 14D & 15E
Date: 8/18/2017

Tested by: J. WALTZ
Checked by: S. HEIN
Remarks:

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

PLATE B-3d

CONSTRUCTION MATERIALS ENGINEERS, INC.

APPENDIX C

Field exploration and Laboratory Test Result Summary

Streets		Test Pit or Coring	Asphaltic Concrete (inches)	Base Course (inches)	Structural Section Thickness (inches)	Subgrade Soil Classification	Liquid Limit	Plastic limit	% passing #200	Natural moisture Content (%)	Maximum density /optimum moisture	R-value
Marthiam Avenue	South of Susileen Drive	TP-14	6	silty, clayey sand overlying D.G. sand	14	Clayey Sand **(SC)**	24	16	44.9	14.0		52
	North of Susileen Drive	TP-15	5		12	Clayey Sand **(SC)**	28	19	28.8	10.1		
Marsh Avenue	West of Nixon	TP-1	3	7	10	Sandy Fat Clay **(CH)**	58	14	64.1	22.7		
	West of Nixon	TP-2	3½	6½	10	Clayey Sand **(SC)**	34	12	36.4	9.5		Less than 5
	Between Nixon and Gordon	TP-3	4	6	10	Clayey Sand **(SC)**				14.4	112.5pcf / 14.5%	
	East of Gordon	TP-13	6	5	11	Fat Clay **(CH)**				20.4		
Reno Avenue	West of Gordon	TP-5 (southside)	2 inches AC over 5 inches of concrete	N.E.	7	Fat Clay with Sand and Gravel **(CH)**				20.6		
	East of Gordon	TP-6	2 inches AC over 4 inches of concrete	N.E.	6	Fat Clay with sand and gravel **(CH)**	63	18	51.6	16.1		16
	West of Gordon	C-7 (centerline)	5 inches of AC	N.E.	5	Sandy Fat Cay with gravel **(CH)**				11.5		
Taylor Street	West of Gordon	TP-8	2 inches AC over 5 inches of concrete	N.E.	7	Sandy Fat Clay **(CH)**	61	38	69	14.9		
	East of Gordon	TP-9	4 inches AC over 5½ inches of concrete	N.E.	9½	Fat clay with sand & gravel **(CH)**				22.3		
	West of Gordon	C-5	1¾ inches AC over 5 inches of concrete	N.E.	6¾	Clayey Sand with gravel **(SC)**						
	West of Gordon	C-6 (centerline)	2 inches AC over 5½ inches of concrete	2	9½	Sandy Fat Cay **(CH)**						
Walker Avenue	West of Gordon	TP-11	5	4	9	Clayey sand **(SC)**				10.1		
	East of Gordon	TP-12	3½	9½	13	Five Inch thick layer Sandy Fat Clay **(CH)** over Poorly graded gravel with clay and sand **(GP-GC)**	31	23	7.5	7.7		
	East of Gordon	C-3	4¾	3¾	8½	Clayey sand **(SC)**						
Gordon Avenue	North of Newlands	C-1	5¾	18¼	24	Fat Clay with sand and gravel **(CH)**						
	Between La Rue and Walker	C-2	1½ inches AC over 4½ inches of concrete	N.E.	6	Clayey sand **(SC)**				12.6		
	Between La Rue and Walker	C-8	2 inches AC over 5½ inches of concrete	N.E.	7½	Clayey sand **(SC)**						
	Between La Rue and Taylor	C-9	1½ inches AC over 3½ inches of concrete	N.E.	5	Clayey sand with gravel **(SC)**						
	Between Walker and Monroe	C-4	2 inches AC over 5½ inches of concrete	N.E.	7½	Clayey Sand **(SC)**				19.6		
	Intersection with Saint Lawrence	TP-4	6½	6½	13	Fat clay with sand & gravel **(CH)**	21 (Base Course)	20 (Base Course)	10.2 (Base Course)	4.3 (Base Course)		
	Between Reno and Taylor	TP-7	5	12	17	Clayey Sand **(SC)**	38	15	14.0	5.5		20
	Intersection with LaRue	TP-10	7½	6	13½	Sandy Fat Cay **(CH)**	60	15	62.2	24.7		