Large-Scale Laboratory Testing of Geosynthetics in Roadway Applications

Third Task Report: Test Section Construction

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1 Introduction

This task report describes activities related to Task 3 of the project proposal. Task 3 involves the construction of the three test sections for the project. The test sections were constructed using the subgrade, base course, geosynthetics, and asphalt materials described in the Task 2 report. Instrumentation was installed in the subgrade and base course layers. Construction of the test sections was originally completed in June 2019 with trafficking beginning in late June. The sections were seen to rut more quickly than expected. The HMA and base layers were removed and replaced. This task report provides details of the construction and instrumentation for the final sections that were reconstructed.

2 Quality Control Testing Plan

Measurements were made on each layer during construction to provide quality control. Measurements were made using the methods and devices listed below.

- Elevation and thickness surveys
- In-situ shear strength of the subgrade-hand-held vane shear
- In-situ moisture content oven
- Dynamic stiffness lightweight deflectometer (LWD)
- Strength dynamic cone penetrometer (DCP) and in-field CBR
- Density sand cone and nuclear densometer

Most of the QC measurements were concentrated in the center region within the anticipated wheel path. A list of the measurements made within each test section on the subgrade and base course are outlined in Table 2-1 and Table 2-2, respectively. Each of the three test sections were delineated into six 2-foot wide longitudinal segments (labeled A through F) to position the measurements made during construction. A plan view of the measurement locations within each test section and for each material type is provided in Appendix A. The only measurement made on the asphalt during construction was density using a nuclear densometer. Three density measurements were made on the asphalt in each of the sub-sections (A-F) for a total of 18 measurements per test section.

Eighteen survey measurements were made in each test section after each layer was constructed. The position of these measurements is provided in Appendix B. Elevations were taken by measuring down from a stiff steel member that spanned the concrete trench (Figure 2-1).

Measurement Type	Layer	Measurements per Layer	Measurement Locations
In-situ shear strength	All	24	A, B, C, D, E, F
Moisture content	All	12	A, B, C, D, E, F
Bearing strength (CBR)	All	2	Variable
Dynamic stiffness (LWD)	4, 5, 6	6	A, B, C, D, E, F
Strength (DCP)	Final	6	A, B, C, D, E, F
Unit weight (sand cone)	Final	4	B-C, D-E

Table 2-1: Subgrade QC measurements in each test section during construction

Table 2-2: Base course QC measurements in each test section during construction

Measurement Type	Layer	Measurements per Layer	Measurement Locations
Moisture content	All	3	B, C-D, E
Dynamic stiffness (LWD)	All	6	A, B, C, D, E, F
Strength (DCP)	Final	6	A, B, C, D, E, F
Unit weight (sand cone)	Final	2	B-C, D-E
Unit weight (nuclear densometer)	Final	2	B-C, D-E



Figure 2-1: Survey measurement technique during construction.

3 Subgrade Construction

The clay subgrade was built in six layers approximately 6 inches deep. The process began by mixing the subgrade using a skid-steer tractor and adding water to bring it to the target moisture content and shear strength associated with a bearing strength of 2.5% CBR. Periodic measures of moisture content and vane shear strength were taken during the mixing process to ensure uniformity. Once the subgrade had reached the target strength and moisture content, the skid-steer tractor was used to deposit, spread and track the prepared clay in the concrete-lined trench (Figure 3-1). Using this method, it took approximately three batches of clay to make one 6-inch layer across the entire the test area. The clay was kept covered with plastic to maintain its moisture content when not in use. Compaction of the subgrade was accomplished using a 54-inch smooth drum vibrating compactor (Hamm, Model H 5i), as shown in Figure 3-2. The sixth and final layer of the subgrade was leveled by hand to a tolerance of ± 0.20 inches (Figure 3-3). A small double smooth drum roller was used to smooth and finish the final top surface of the subgrade, which is shown in Figure 3-4.



Figure 3-1: Spread and tracked subgrade prior to compaction.



Figure 3-2: Compacting the subgrade.



Figure 3-3: Leveling the final surface of the subgrade.



Figure 3-4: Finished surface of the subgrade.

3.1 Vane Shear Strength

Average vane shear strengths for each compacted layer of subgrade are summarized in Table 3-1 for each test section. Averages for individual layers are based on 24 measurements per test section and the composite average is based on 144 measurements. Due to the proximity of the concrete wall associated with the end of the trench, measurements nearest the wall (first four vane shear strength measurements within sub-section A) within Test Section 1 were not used.

L avou [†]	Average Vane Shear Strength (kPa)			
Layer [†]	Test Section 1	Test Section 2	Test Section 3	
All	107.4	104.3	105.1	
6	147.1	138.4	141.8	
5	97.8	91.4	94.5	
4	103.9	99.4	99.2	
3	103.4	107.5	104.0	
2	103.4	99.5	103.2	
1	88.7	89.7	88.0	

 Table 3-1: Average vane shear strengths for the compacted subgrade

[†] Layer 1 is at the bottom of the subgrade, and Layer 6 is at the top.

3.2 Moisture Content

Average moisture content results for each compacted layer of subgrade are summarized in Table 3-2 for each test section. Averages for individual layers are based on 12 measurements per test section and the composite average is based on 72 measurements. Due to the proximity of the concrete wall associated with the end of the trench, measurements nearest the wall (first two measurements within sub-section A) within Test Section 1 were not used in the average.

3.3 CBR Strength

In-field CBR tests were conducted in substantial accordance with ASTM D4429 using the minimum recommended surcharge of 30 lb. Two tests were conducted on each subgrade layer within each test section. The exact locations of these tests varied from layer to layer but were generally concentrated toward the center of each test section. The average CBR strengths are reported in Table 3-3.

L avor [†]	Average Moisture Content (%)			
Layer [†]	Test Section 1	Test Section 2	Test Section 3	
All	27.7	27.7	27.7	
6	25.9	25.9	25.8	
5	28.6	28.5	28.6	
4	27.6	28.1	27.9	
3	27.5	27.5	27.3	
2	27.7	27.8	27.9	
1	28.7	28.5	28.7	

Table 3-2: Average moisture content for the compacted subgrade

[†] Layer 1 is at the bottom of the subgrade, and Layer 6 is at the top.

Layer [†]		Average CBR (%)	
Layer	Test Section 1	Test Section 2	Test Section 3
All	2.21	2.27	2.01
6	1.90	1.94	1.56
5	1.93	2.59	1.94
4	2.47	2.02	2.34
3	2.64	2.77	2.25
2	2.29	2.33	1.92
1	2.01	1.96	2.08

 Table 3-3: Average CBR strength for the compacted subgrade

[†] Layer 1 is at the bottom of the subgrade, and Layer 6 is at the top.

3.4 Dynamic Stiffness

A Zorn ZFG 3000 Light Weight Deflectometer (LWD) was used to measure the dynamic stiffness of the last three layers of subgrade. Six LWD measurements were made in each test section. The LWD has a 1 foot diameter plate, 22 pound drop weight, and calculates stiffness by measuring the acceleration as the drop weight impacts the load plate resting on top of the soil. The average results of the LWD tests are summarized in Table 3-4. As previously mentioned, the measurements from

Test Section 1, sub-section A were not used in the results due to the proximity of the concrete end wall.

L avor [†]	Average Dynamic Stiffness (MN/mm ²)			
Layer [†]	Test Section 1	Test Section 2	Test Section 3	
6	6.73	5.74	6.09	
5	5.05	4.56	4.64	
4	6.36	5.95	5.71	

Table 3-4: Average dynamic stiffness of the compacted subgrade

[†] Layer 4 is near the center of the subgrade layer, and Layer 6 is at the top.

3.5 Strength (DCP)

A Kessler Dual Mass Dynamic Cone Penetrometer (DCP) with a magnetic ruler and a 10.1 pound hammer was used to evaluate the strength of the subgrade after it had been fully constructed. Six tests were conducted in each test section, the results of which are shown in Figure 3-5 in terms of CBR. The bearing strength of the subgrade was calculated as a function of depth using Equation 1 developed by Kleyn (1975). As before, the measurements from Test Section 1, sub-section A were not used in the results. Average strengths based on the DCP tests were as follows: Test Section 1 CBR = 2.27%, Test Section 2 CBR = 2.27%, and Test Section 3 CBR = 2.24%.

$$CBR = \frac{292}{(mm/blow)^{1.12}}$$
(1)

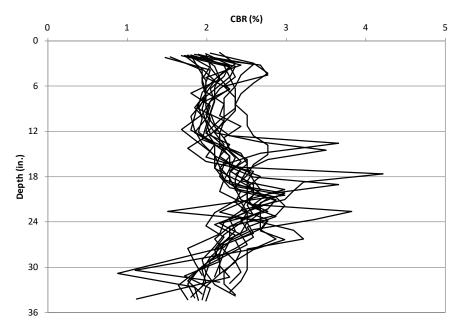


Figure 3-5: Subgrade DCP results as a function of depth

3.6 Unit Weight

In-place dry unit weight of the final layer of subgrade was measured using the sand cone method (ASTM D1556). Four measurements were made within each test section. The average dry unit weights for each test section were as follows: Test Section 1 = 96.3 lb/ft³, Test Section 2 = 93.4 lb/ft³, and Test Section 3 = 92.3 lb/ft³In-field.

4 Instrumentation

Linear variable differential transducers (LVDTs) were installed to measure the displacement of subgrade and base course surfaces during trafficking. Three sensors were installed in the subgrade and three sensors were installed in the base course, as shown in the illustrations in Appendix C for each test section. The position of these measurements was designed to capture vertical movements caused by the load wheels during trafficking.

The first step during the installation process was to excavate a hole in the vicinity of the measurement point to allow each sensor to be inserted into the ground. The size of the access holes was kept as small as possible to minimize disturbance of the soil in the anticipated wheel path. All the soil that was extracted from each hole was temporarily stored in a sealed bucket so that it could be replaced once the sensor was in place. The datum for each displacement measurement was the bottom of the concrete trench, as illustrated in Figure 4-1. This was accomplished by driving a steel rod through the subgrade until it reached the trench floor (see Figure 4-2). A small piece of ³/₄ in. thick plastic was placed on the floor prior to constructing the

subgrade in the area where each of the metal anchors was to be located. A small nail was welded to the bottom of the steel rod so that when driven it would penetrate the plastic and keep the anchor from floating upward during construction and trafficking.

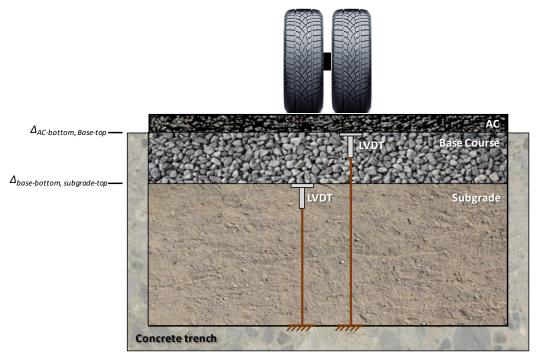


Figure 4-1: Cross-section of LVDT installation in the subgrade and base course.



Figure 4-2: Installing LVDT anchor.

The bodies of the LVDTs were attached to the anchors using two u-bolts that extended through a metal plate welded to the top of the anchor. Each LVDT was outfitted with a sealed mechanism that extended the core of the LVDT to a round plate that would be positioned at the point of measurement (top of subgrade or base course layers). This extension mechanism was designed to keep the soil from jamming the LVDT as it allowed free movement of the LVDT core throughout the duration of the test. A photo of a typical LVDT setup is shown in Figure 4-3 prior to installation. The body of the LVDT was positioned on the anchor plate so that the vertical alignment of the plate at the end of the LVDT was level with the surface of the subgrade or base course, as shown in Figure 4-4.

Sealed data cables extended from the bottoms of the LVDTs and through protective tubes outside of the trench. These wires were attached to the data acquisition system through individual signal conditioners.



Figure 4-3: LVDT sensor prior to installation.



Figure 4-4: Position of the measurement point with respect to the subgrade surface.

5 Geosynthetics

TenCate RS280i and Propex Geotex 801 were the two geotextile products used in this testing program. A roll of each material was obtained from the manufacturers. Pieces of each material were cut to 11 ft. wide to match the width of the concrete trench. Each test section was 12 ft. long. Test Section 1 was the Control (no geosynthetic), Test Section 2 was reinforced with TenCate RS280i, and Test Section 3 was reinforced with Propex Geotex 801. A cross-sectional illustration of the test section layout is shown in Figure 5-1. The geotextile materials between Test Sections 2 and 3 overlapped one another by 1 ft. (6 in. within each test section). The geotextiles were pulled taut to remove any wrinkles – no stakes or pins were used to hold the materials in place. A photo of the installed geosynthetics is shown in Figure 5-2.

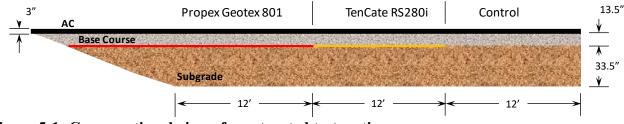


Figure 5-1: Cross-sectional view of constructed test sections.



Figure 5-2: Installed geosynthetics.

6 Crushed Aggregate Base Course

The base aggregate was shipped from Montana in 3000 lb. super sacks and stored on site until construction of the base course. Preparation of the base aggregate began by unloading three to four bags onto the lab floor, mixing with a skid-steer tractor, and adding water until it reached the target moisture content. The aggregate was deposited on the test area without driving on it and spread across the test sections by hand. The base course was constructed in two layers, each of which was screed to a uniform depth prior to compaction (Figure 6-1). Compaction was accomplished using a 54-inch smooth drum vibrating compactor (Hamm, Model H 5i), and a small double smooth drum roller was used to create a smooth, flat surface on the final lift (Figure 6-2). The final average thickness of the base course layer was 13.29 ± 0.20 inches. The target thickness was 13.5 in.



Figure 6-1: First layer of gravel screed to uniform depth.



Figure 6-2: Final compacted surface of the base course.

6.1 Moisture Content

Optimum moisture content of the base course aggregate was 7.7% based on the Modified Proctor results. The base aggregate was prepared to a moisture content of 1 to 2 percent below optimum to yield better compaction. Average moisture contents for each of the test sections and layers are summarized in Table 6-1.

Layer [†]	Average Moisture Content (%)			
	Test Section 1	Test Section 2	Test Section 3	
3	5.9	5.8	6.4	
2	6.4	6.3	7.0	
1	6.6	6.4	6.5	

	Table 6-1: Average	moisture	content	of the	compacted	base course.
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[†] Layer 1 is the bottom base layer, and Layer 3 is the top layer.

6.2 Dynamic Stiffness

Six measures of dynamic stiffness were made within each test section within the anticipated rut path using the Zorn ZFG 3000 Light Weight Deflectometer (LWD). The measurements in subsection 1A were not used in the average calculations because of the proximity of the end wall. Average dynamic stiffnesses for each layer within each test section are summarized in Table 6-2.

Lavor [†]	Average I	Dynamic Stiffness ((MN/mm ²)
Layer [†]	Test Section 1	Test Section 2	Test Section 3
3	123.63	115.54	122.42
2	24.25	19.63	23.77
1	19.40	15.98	17.85

 Table 6-2: Average dynamic stiffness of the compacted base course.

[†] Layer 1 is the bottom base layer, and Layer 3 is the top layer.

6.3 Strength (DCP)

Six DCP measurements were taken within each test section using the dual mass DCP device (drop hammer weight of 17.6 lb.) on the finished surface of the base course. These measurements were taken outside of the wheel path to keep from damaging the geosynthetics in the wheel track area.

The results from these tests are shown in the plot in Figure 6-3. The bearing strength (in terms of CBR) as a function of depth was calculated using Equation 1 developed by Kleyn (1975). The measurements from Test Section 1, sub-section A were not used in the results. Average CBR strengths were calculated using values between about 2 and 10 inches of depth to avoid areas near the top and bottom of the compacted layer. The average strengths were as follows: Test Section 1 CBR = 72.4%, Test Section 2 CBR = 73.9%, and Test Section 3 CBR = 73.8%.

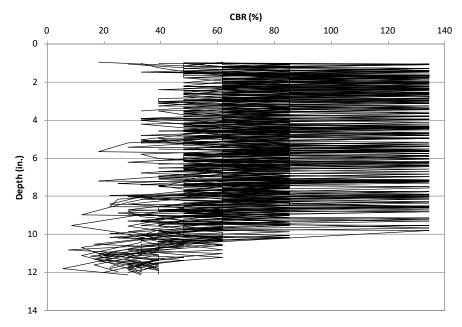


Figure 6-3: Base course DCP results as a function of depth.

6.4 Unit Weight

In-place dry unit weight of the final layer of base course was measured using the sand cone method (four measurements per test section) and a nuclear density gauge (eight measurements per test section). Nuclear density measurements were made at a probe depth of 8 inches. The average dry unit weights for each test section are summarized in Table 6-3. The full report for the nuclear density tests is provided in Appendix D.

Layer [†]	Average Dr	y Unit Weight (lb/f Compaction	t ³) and Percent
	Test Section 1	Test Section 2	Test Section 3
3 (nuclear)	137.5 (100.6%)	136.9 (100.1%)	137.7 (100.7%)
3 (sand cone)	137.7 (100.7%)	138.7 (101.5%)	137.5 (100.6%)
2	137.7 (100.7%)	137.9 (100.9%)	136.5 (99.9%)
1	136.0 (99.5%)	135.5 (99.1%)	137.4 (100.5%)

Table 6-3: Average dry unit weights of the compacted subgrade.

[†] Layer 1 is the bottom base layer, and Layer 3 is the top layer.

7 Asphalt

Surface C asphalt, according to the South Carolina DOT mix design, was purchased from a hotmix plant (Rogers Group – Greer, SC) near the TRI Environmental laboratory. Properties of the mix were determined by the QC lab at the hot-mix plant during the morning that the paving was done and these results are provided in Appendix E. The asphalt was placed in a single lift that had an average thickness of 3.37 ± 0.13 in. It was placed using a full-size paving machine (Figure 7-1), and compacted using a tandem roller (Figure 7-2) and pneumatic roller (Figure 7-3).

Asphalt



Figure 7-1: Placement of the hot-mix asphalt.



Figure 7-2: Compaction of hot-mix asphalt using a smooth drum roller.



Figure 7-3: Compaction of hot-mix asphalt with a pneumatic roller.

Density measurements were made during construction using a nuclear density gauge to ensure adequate compaction. After compaction was complete, 36 measurements of density were made in each test section to fully evaluate the density of the asphalt mat (measurement positions are shown in Appendix A). The average density within each test section and the percent compaction compared to the maximum density of 152.9 lb/ft³ are shown in Table 7-1. Individual nuclear density test results are provided in Appendix E.

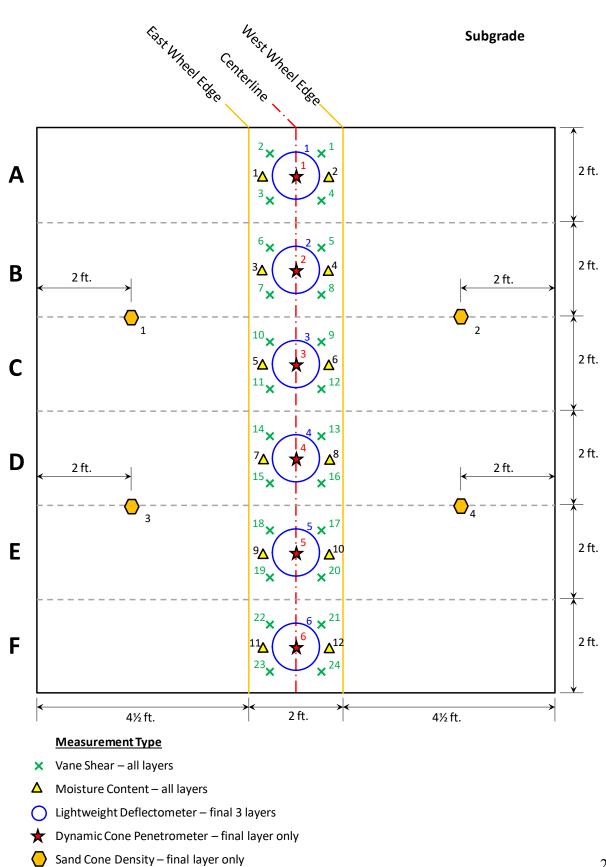
Nuclear Density	Average I	Density and Percent	Compaction
Nuclear Density	Test Section 1	Test Section 2	Test Section 3
Density (lb/ft ³)	137.8	139.4	140.8
Percent Compaction (%)	90.1	91.2	92.1

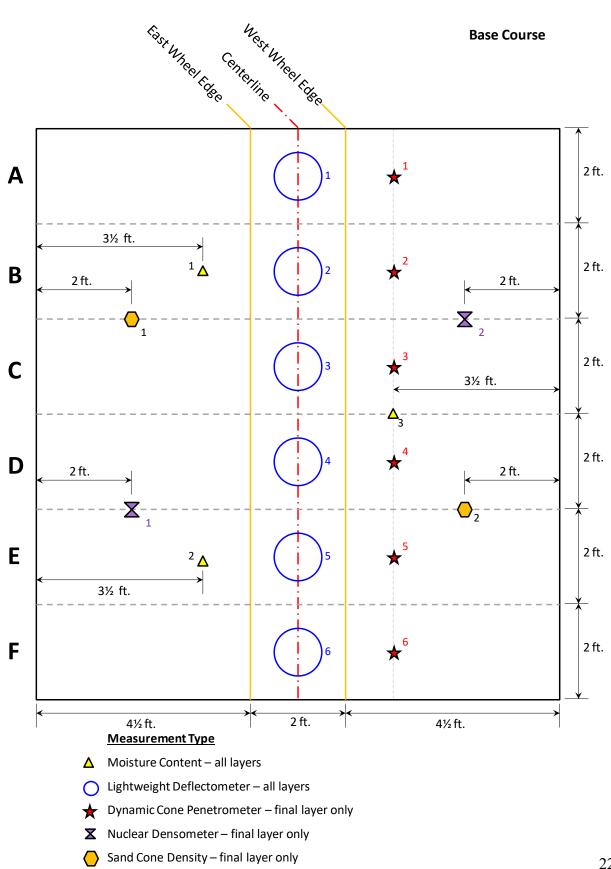
Table 7-1: Average density of the compacted asphalt layer from nuclear density tests.

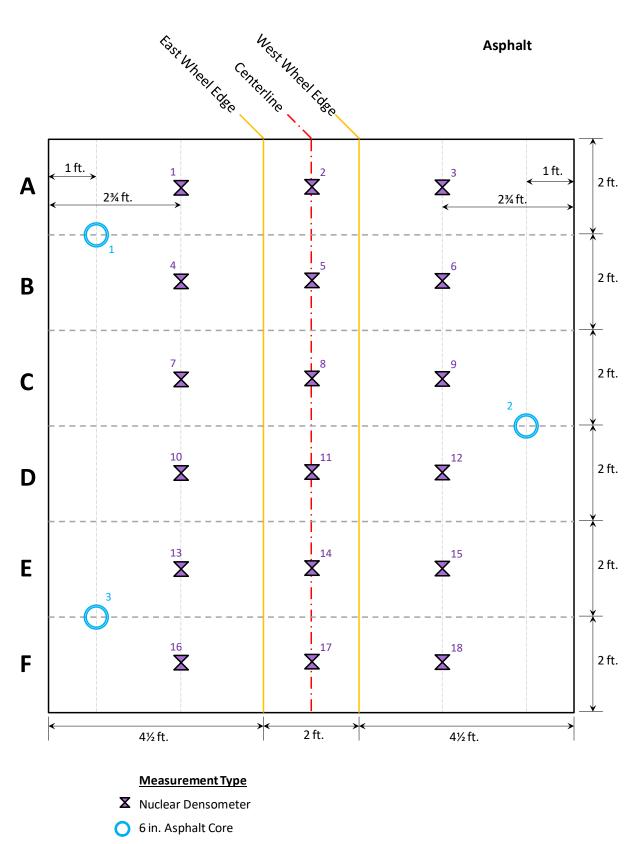
8 References

Kleyn, E.G. (1975) The Use of the Dynamic Cone Penetrometer (DCP), South Africa, Transvaal Roads Department, Materials Branch.

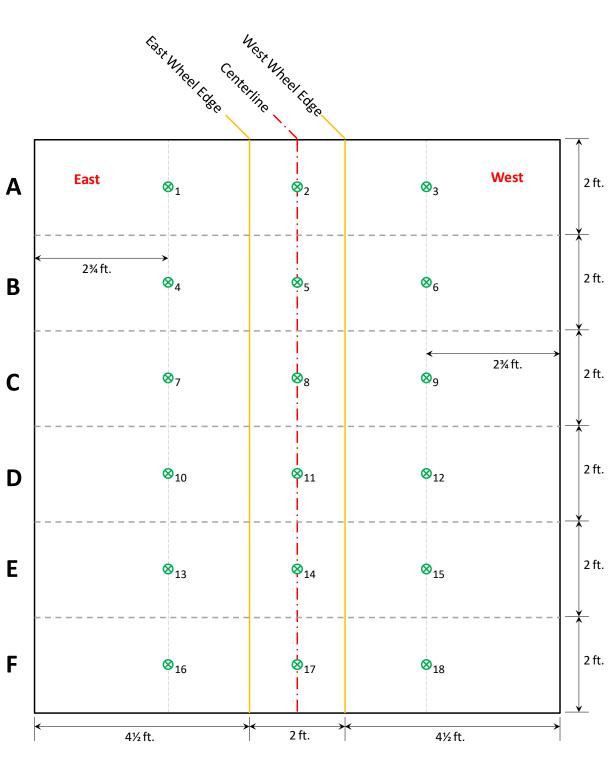
9 Appendix A: Layout of Construction QC Measurement Locations





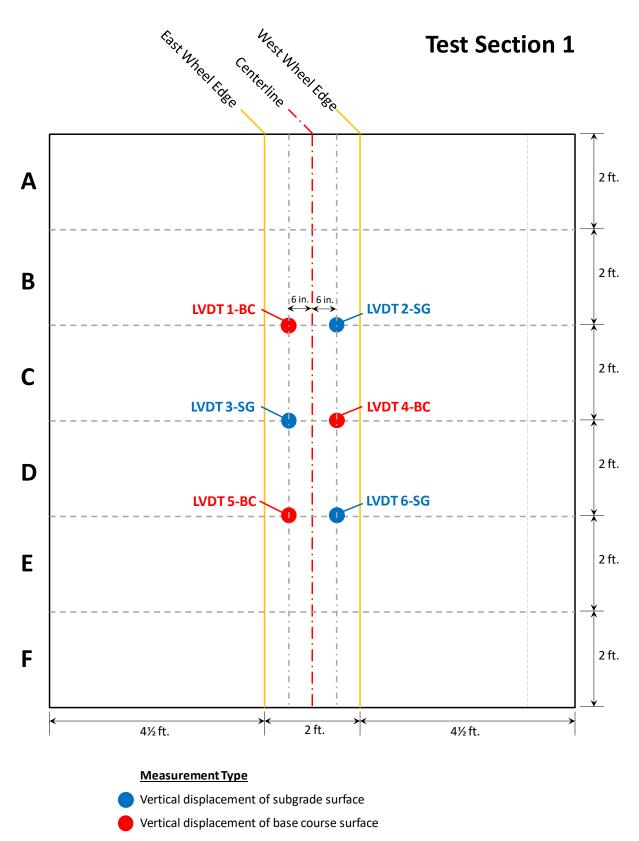


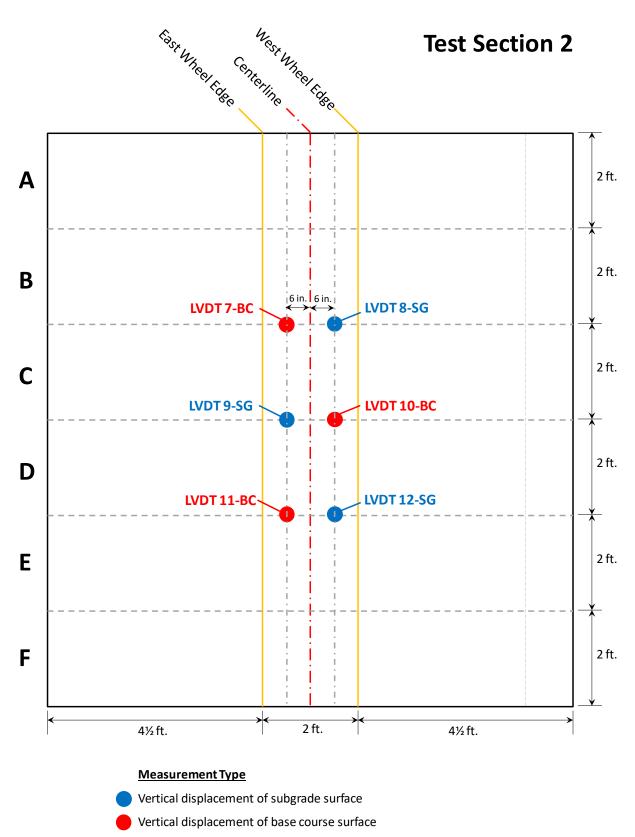
10 Appendix B: Layout of Elevation Measurements

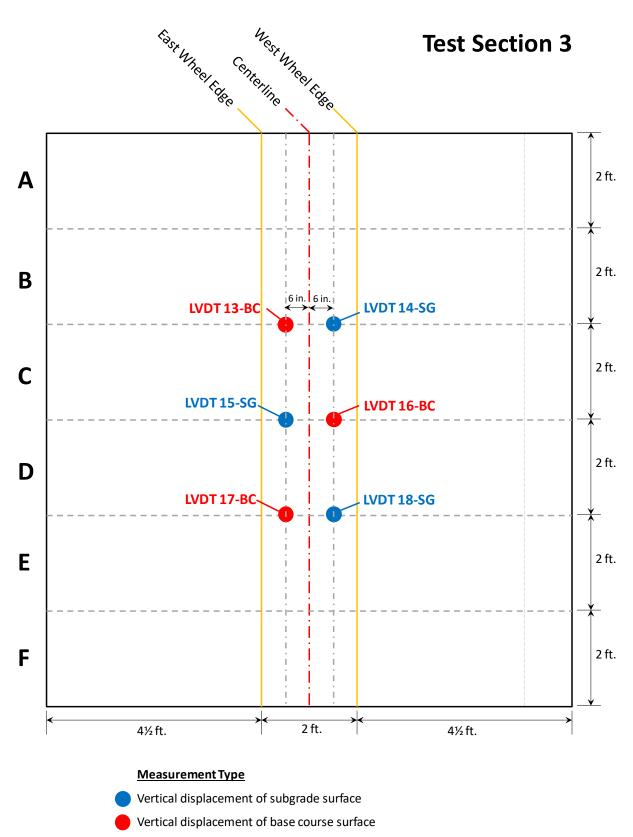


8 Survey Point

11 Appendix C: Position and Layout of Displacement Sensors within Each Test Section







12 Appendix D: Nuclear Density Test Results for the Compacted Base Course

<u>ळ</u>		301 Zima Park Drive Spartanburg, SC 29301 Phone: 864-574-2360 Fax: 864-576-8730
474	- O	n o I

Report #: SNG-00005 Report Date: 11/20/2019 Test Method: ASTM D 6938 METHOD

DENSITY - NUCLEAR

Client:

Project: TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621

TRI On-Call Lab Testing Anderson Anderson, SC 29621 142619038

							Test Results	sults						
	Ř				Soil	Optimum Moisture	Maximum Dry Density	۳Ň	In Place Dry Density	Probe Depth	Percent	Min Comp.		
Test #	ð	Date	Proctor ID	Method	Classification	(%)	(pcf)	(%)	(pcf)	(in)	Compaction	(%)	Remark	Т
62		9/13/19	100	D698-C	GW	7.7	136.7	3.2	138.7	8	101	95	PASS	
63		9/13/19	100	D698-C	GW	7.7	136.7	3.2	133.0	8	97	95	PASS	
64		9/13/19	100	D698-C	GW	7.7	136.7	2.9	137.7	8	101	96	PASS	
65		9/13/19	100	D698-C	GW	7.7	136.7	3.1	139.1	8	102	95	PASS	
99		9/13/19	100	D698-C	GW	7.7	136.7	3.2	137.9	8	101	95	PASS	
67		9/13/19	100	D698-C	GW	7.7	136.7	3.1	138.8	8	102	96	PASS	
68		9/13/19	100	D698-C	GW	7.7	136.7	2.9	138.7	8	101	95	PASS	
69		9/13/19	100	D698-C	GW	7.7	136.7	3.2	136.2	8	100	95	PASS	
							Test Information	mation						
											Gauge			
Test #	Test # Test Location	cation					Elev	Elevation Refe	Reference	Mai	Make / Model / SN / Calibrated	/ Calibrated	Field Technician	
62	PAVEM	PAVEMENT - Base: Location 1	Location 1				0	0.0 SG		Troxle	ır / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN	
63	PAVEM	PAVEMENT - Base: Location 2	Location 2				0	0.0 SG		Troxle	ir / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN	
64	PAVEM	PAVEMENT - Base: Location 3	Location 3				0	0.0 SG		Troxle	ir / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN	
65	PAVEM	PAVEMENT - Base: Location 4	Location 4				0	0.0 SG		Troxle	ir / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN	
99	PAVEM	PAVEMENT - Base: Location 5	Location 5				0	0.0 SG		Troxle	er / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN	
67	PAVEM	PAVEMENT - Base: Location 6	Location 6				0	0.0 SG		Troxle	ır / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN	
68	PAVEM	PAVEMENT - Base: Location 7	Location 7				0	0.0 SG		Troxle	ir / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN	
69	PAVEM	PAVEMENT - Base: Location 8	Location 8				0	0.0 SG		Troxle	r / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN	
		Remarks	arks			0	Comments							
PASS: Moistu	PASS: Density test res Moisture Not Specified.	PASS: Density test results comply with s Moisture Not Specified.	omply with specifi	pecifications.	Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter". Gauge calibration data on file with the testing agency.	ransmission" (N ige calibration d	Aethod A) unless ata on file with th	s probe depth is he testing agen	s noted as icy.					

Page 1 of 4 The above tests were performed in general accordance with the applicable test method, except for known deviations noted above. The density determined represents the soil density at the test location at the time of the test. The test result relates only to the material tested.

					Ś	Client:				LIUJECL.		
301	:: 864-576-873		METHOD Report #: SNG-00005 Report Date: 11/20/201 Test Method: ASTM D 6	METHOD Report #: SNG-000005 Report Date: 11/20/2019 Test Method: ASTM D 6938	œ	TRI/Environmental, 4915 Clemson Blvd Anderson, SC 2962	TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621	ġ		142619038 TRI On-Call Lab Tes Anderson Anderson, SC 29621	142619038 TRI On-Call Lab Testing Anderson Anderson, SC 29621	
						Test Results	sults					
Test # Of	Test Date	Proctor ID	Method	Soil Classification	Optimum Moisture (%)	Maximum Dry Density (pcf)	In Place Moisture (%)	In Place Dry Density (pcf)	Probe Depth (in)	Percent Compaction	Min Comp. (%)	Remark
70	9/13/19	100	D698-C	GW	7.7	136.7	2.9	138.5	8	101	95	PASS
	9/13/19	100	D698-C	GW	7.7	136.7	2.8	134.7	8	66	95	PASS
72	9/13/19	100	D698-C	GW	7.7	136.7	2.9	135.8	8	66	95	PASS
73	9/13/19	100	D698-C	GW	L.T	136.7	2.6	138.5	8	101	96	PASS
74	9/13/19	100	D698-C	GW	7.7	136.7	3.5	137.3	8	100	95	PASS
	9/13/19	100	D698-C	GW	7.7	136.7	3.8	133.7	8	98	95	PASS
_	9/13/19	100	D698-C	GW	7.7	136.7	3.6	137.0	8	100	95	PASS
77	9/13/19	100	D698-C	GW	7.7	136.7	3.1	139.7	8	102	95	PASS
						Test Information	mation					
Test # Test Location	tion					Elev	Elevation Refe	Reference	Mal	Gauge Make / Model / SN / Calibrated	/ Calibrated	Field Technician
70 PAVEMEN	PAVEMENT - Base: Location 9	ocation 9				0	0.0 SG		Troxle	er / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN
71 PAVEMEN	VT - Base: L	PAVEMENT - Base: Location 10				0	0.0 SG		Troxle	er / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN
72 PAVEMEN	VT - Base: L	PAVEMENT - Base: Location 11				0	0.0 SG		Troxle	er / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN
73 PAVEMEN	VT - Base: L	PAVEMENT - Base: Location 12				0	0.0 SG		Troxle	er / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN
74 PAVEMEN	VT - Base: L	PAVEMENT - Base: Location 13				0	0.0 SG		Troxle	er / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN
75 PAVEMEN	VT - Base: L	PAVEMENT - Base: Location 14				0	0.0 SG		Troxle	er / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN
76 PAVEMEN	VT - Base: L	PAVEMENT - Base: Location 15				0	0.0 SG		Troxle	ir / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN
77 PAVEMEN	VT - Base: L	PAVEMENT - Base: Location 16				0	0.0 SG		Troxle	er / 3411-B / 101	Troxler / 3411-B / 10156 / 11/27/2018	WILLIAM BRIAN VAUGHAN
	Remarks	rks				Comments						
PASS: Density test results comply with specifications.	t results co.	mply with speci		Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Booksontas". Cause calibration data on file with the testion accord.	ransmission" (Method A) unless	probe depth is	s noted as				

The above tests were performed in general accordance with the applicable test method, except for known deviations noted above. The density determined represents the soil density at the test location at the time of the test. The test result relates only to the material tested.

Page 2 of 4

S&ME, Inc.			METHOD Report #: SNG Report Date: 1	METHOD Report #: SNG-000005 Report Date: 11/20/2019		TRI/Environmental, I 4915 Clemson Blvd. Anderson, SC 29621	TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621	ij		142619038 TRI On-Call Anderson	142619038 TRI On-Call Lab Testing Anderson	
Spartanburg, SC 29301 Phone: 864-574-2360	our Line Faith Dive Spartanburg, SC 29301 Phone: 864-574-2360 Fax: 864-576-8730		est Method	Test Method: ASTM D 6938	8					Anderson, SC 29621	C 29021	
						Test Results	sults					
Retest Test # Of	est Test f Date	Proctor ID	Method	Soil Classification	Optimum Moisture (%)	Maximum Dry Density (pcf)	In Place Moisture (%)	In Place Dry Density (pcf)	Probe Depth (in)	Percent Compaction	Min Comp. (%)	Remark
⊢	۳.	100	D698-C	GW	7.7	136.7	2.7	139.3	8	102	95	PASS
	9/13/19	100	D698-C	GW	7.7	136.7	2.8	136.3	8	100	95	PASS
	9/13/19	100	D698-C	GW	7.7	136.7	3.0	139.0	8	102	95	PASS
	9/13/19	100	D698-C	GW	7.7	136.7	2.9	137.5	8	101	95	PASS
	9/13/19	100	D698-C	GW	7.7	136.7	2.9	139.1	8	102	95	PASS
	9/13/19	100	D698-C	GW	7.7	136.7	3.1	134.3	8	98	95	PASS
	9/13/19	100	D698-C	GW	7.7	136.7	2.8	137.1	8	100	95	PASS
	9/13/19	100	D698-C	GW	7.7	136.7	3.0	138.8	8	102	95	PASS
						Test Information	mation					
# Test	Test # Test Location					Eleva	Elevation Refer	Reference	Ma	Gauge Make / Model / SN / Calibrated	/ Calibrated	Field Technician
PAV	PAVEMENT - Base: Location 17	Location 17				Ö	0.0 SG		Troxle	Troxler / 3411-B / 10156 / 11/27/2018	56 / 11/27/2018	WILLIAM BRIAN VAUGHAN
PAV	PAVEMENT - Base: Location 18	Location 18				Ö	0.0 SG		Troxle	Troxler / 3411-B / 10156 / 11/27/2018	56 / 11/27/2018	WILLIAM BRIAN VAUGHAN
PAV	PAVEMENT - Base: Location 19	Location 19				Ö	0.0 SG		Troxle	Troxler / 3411-B / 10156 / 11/27/2018	56 / 11/27/2018	WILLIAM BRIAN VAUGHAN
PAV	PAVEMENT - Base: Location 20	Location 20				Ö	0.0 SG		Troxle	Troxler / 3411-B / 10156 / 11/27/2018	56 / 11/27/2018	WILLIAM BRIAN VAUGHAN
PAV	PAVEMENT - Base: Location 21	Location 21				Ö	0.0 SG		Troxle	Troxler / 3411-B / 10156 / 11/27/2018	56 / 11/27/2018	WILLIAM BRIAN VAUGHAN
PAV	PAVEMENT - Base: Location 22	Location 22				Ö	0.0 SG		Troxle	Troxler / 3411-B / 10156 / 11/27/2018	56 / 11/27/2018	WILLIAM BRIAN VAUGHAN
PAV	PAVEMENT - Base: Location 23	Location 23				O	0.0 SG		Troxle	Troxler / 3411-B / 10156 / 11/27/2018	56 / 11/27/2018	WILLIAM BRIAN VAUGHAN
PAV	PAVEMENT - Base: Location 24	Location 24				0	0.0 SG		Troxle	Troxler / 3411-B / 10156 / 11/27/2018	56 / 11/27/2018	WILLIAM BRIAN VAUGHAN
	Remarks	arks				Comments						
· Dans	tv test results co	PASS: Density test results comply with specifications	fications.	Tests are "Direct Transmission" (Method A) unless probe depth is noted as	ransmission" (I	Method A) unless	probe depth is	noted as				

The above tests were performed in general accordance with the applicable test method, except for known deviations noted above. The density determined represents the soil density at the test location at the time of the test. The test result relates only to the material tested.

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13 Appendix E: Mix Properties and Nuclear Density Test Results for the Asphalt

ROGERS GROUP GREER - ASPHALT PLANT WORKSHEET NO. 1

File No.:	Pro	oject vict	ory	Da	ite:	9/23	3/19	SC-	-101:	7	3
Type Mix:		Surface (Tir	ne:	08	:30	Tonnag	e Taken:	80	.00
Job Mix No.:		E0130		Samp	le No.:	8	- 1		Neight:	20	.30
Temp. Corr. Factor:		0.23		Mix T		30)Oº	Load	d No.:	1	4
Mix Corr. Factor:		0.03		Silo	No.:	-	1	0			
Oven Type:		NCAT		Teste	ed By:		iordan	milford			
		a numero orti interv		i i	330	-				20	
Extr Weight of Bas	action	Sampla			1.4	68.4		ľ			
	of Baske				(0-01)s	91.4					
21 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -	of Samp	1800				91.4 77.0		-	Tolorar	ice (-/+)	
% Asphalt Binder	PROVE REPORT OF THE	2010	221		15/8/5/5	.55	10	5	34		06
	Content	(FO 04-	22)	(§.*	5.			J	54	0.	00
MSG	/ ESG			Sam	ple 1	Sam	ple 2				
(A) Weight of Bov	vl and Sa	ample in	Air		'0.5	370)1.2				
(B) Weight	of Bowl	in Air		215	54.9	220)4.2				
(C) Weight of S	ample in	Air (A-B)	151	5.6	149	97.0	0			
(D) Weight of Bowl a	nd Samp	ole under	water	225	58.0	227	77.5		Averag	e MSG	2.451
(E) Weight of E	Bowl und	er Water		136	60.3	139	91.9		Averag	e ESG	2.665
(F) Weight of Sam	ole undei	r water (l	D-E)	89	7.7	88	5.6	8			
Specific Gra	avity of B	Binder		1.0)34	1.0)34				
	ISG			2.4	153	2.4	148				
E	SG			2.6	668	2.6	62				
Core Bulk SG F	roportio							19			
WEIGHT IN A		:5	1. 12	4740.6		1	4742.3	2	1		1
WEIGHT IN WA		IC .		2718.4			2721.8				1
SSD WEIGH		15.		4742.0			4743.4	ÿ	-		7
VOLUM				2023.6			2021.6				
BSG			(2023.0			2.346				
MSG				2.345			2.340				
% AIR VO				4.41			4.28				
% VM/	Contraction of the second s			16.99			4.20	1			
STABILI	5			10.99			10.07				
			/201 12/01/02		ŕ						
			2.345		Ť		. P. X.	ŕ			
AVERAGE DENSIT		-	146.33			lerance (
AVERAGE % AIR V		-	4.35 16.93		3.21	15	5.51 18.56				
AVERAGE % VN AVERAGE STABIL		-	10.95		10.20	12	10.00	58			
AVERAGE STADI											
Mix Grada	tion		Refere 9	Sieve We	hight (SC	T 102	r	10	07.0		
SIEVE, mm		25 0mm					236000		0.150mm	0.075mm	
SIEVE, Standard	1.5"	25.0mm 1"	3/4"	12.5mm 1/2"	9.5mm	4.75mm #4	2.36mm #8	#30	#100	#200	
WEIGHT	1.5		5/4	1/2	5/8	#4	#8	#30			
PASSING	1207.0	1207.0	1207.0	1185.3	1117.3	815.0	585.8	352.0	109.5	53.8	
PERCENT PASSING	100.0	100.0	100.0	98.2	<u>92.6</u>	67.5	<u>48.5</u>	29.2	9.1	4.46	D/A Ratio
JOB MIX TARGET	100.0	100.0	100.0	99.0	94.0	68.0	50.0	30.0	11.0	5.0	
JOB MIX USL	100.0	100.0	100.0	100.0	100.0	75.0	56.0	35.0	15.0	7.0	
JOB MIX LSL	100.0	100.0	100.0	97.0	87.0	61.0	44.0	25.0	7.0	3.0	
(PERCENT PASSING	0.00	0.00	0.00	(0.00)	(4.30)	(0.50)	14 50	(0.00)	(1.00)	0 EA	0.00
- TARGET)	0.00	0.00	0.00	(0.80)	(1.40)	(0.50)	(1.50)	(0.80)	(1.90)	(0.54)	0.80

 PAY ITEMS:
 % Binder
 5.55
 3/8 in. Sieve
 92.6
 No. 8 Sieve
 48.5

Form No. 400.03

PDF Created: 9/23/2019 10:26:04 AM by jmilford

		1	Drive	Spartanburg, SC 29301	Phone: 864-574-2360 Fax: 864-576-8730
જ	U	j g	a Park	urg, S	64-57
III		S&ME, Inc.	301 Zima Park Drive	Spartanb	Phone: 8

ASPHALT PLACEMENT Client: DENSITY TRI/Env Report #: BNG-000007 4915 Cl Report Date: 11/21/2019 Anderso Test Method: ASTM D2950

 Client:
 Project:

 TRI/Environmental, Inc.
 14261903

 4915 Clemson Blvd.
 TRI On-Ci

 Anderson, SC 29621
 Anderson, Anderson, Anderson, Anderson

142619038 TRI On-Call Lab Testing Anderson Anderson, SC 29621

Ratact	Tect				Mix	Thickness	Thickness Max Density Density	esults Max Density	In Place Density	Probe	Parcent	Min/Max		Gaine	
Date		Test Location	tion	Material	L	(in)	(pcf)	Source	(pcf)	(in)	Comp.	(%)	Remark	SN	Technician
9/23/19		PAVEMEN	9/23/19 PAVEMENT: Test Strip 1	Surface	E0130		152.9	Supplied Value	140.6	Backscatter	92	92 / 95		31917	WESLEY EDWARDS
		A - West (1)	(
9/23/19			PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	140.6	Backscatter	92	92 / 95		31917	WESLEY
		1 A - West (2)	(Value							EUWARDS
9/23/19		PAVEMEN	PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	136.6	Backscatter	89	92 / 95	FAIL	31917	WESLEY
		A - Center (1)	(1)					value							EUVARUS
9/23/19		PAVEMEN	PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	138.2	Backscatter	06	92 / 95	FAIL	31917	WESLEY
		A - Center (2)	(2)					value							מחשאאחם
9/23/	19	PAVEMEN	9/23/19 PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	137.3	Backscatter	06	92 / 95	FAIL	31917	WESLEY
		1 A - East (1)						Value							EUWARUS
9/23/	6	PAVEMEN	9/23/19 PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	137.1	Backscatter	06	92 / 95	FAIL	31917	WESLEY
		A - East (2)						Adiuc							
			Remarks								ŭ	Comments			
s DO I	NOT	F comply wit	FAIL: Tests results DO NOT comply with specifications					Tests are "L	Direct Tran	smission" (Me	∋thod A) un	less probe	depth is note	Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"	atter"
							Gauge Information	ormation							
Make			Model		Density Count		Moisture Count		standard C	Standard Count Date	Last	Last Calibration Date		Last Calibrated By	d By
Troxler			3430		1925		510		9/23/19	1/19		12/26/18		InstroTek Inc.	

Nov 21, 2019 Reviewed/Prepared by: WILLIAM BRIAN VAUGHAN

Page 1 of 18

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অ	1)	301 Zima Park Drive	Spartanburg, SC 29301 Phone: 864-574-2360 Fax: 864-576-8730
III		S&ME, Inc.	301 Zima	Spartanb Phone: 8

ASPHALT PLACEMENT Client: DENSITY TRI/Env Report #: BNG-000026 4915 Cli Report Date: 11/21/2019 Anderso Test Method: ASTM D2950

Client: TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621

Project: 142619038 TRI On-Call Lab Testing Anderson Anderson, SC 29621

								Test Results	sults							
Test #	Retest Of	Test Date	Test Location	6	Material	Mix Design	Thickness (in)	Thickness Max Density Density (in) (pcf) Source	Max Density Source	In Place Density (pcf)	Probe Depth (in)	Percent Comp.	Min/Max Comp. (%)	Remark	Gauge SN	Technician
61		9/23/19	PAVEMENT: Test Strip 1 B - West (1)	C: Test Strip	Surface	E0130		152.9	Supplied Value	142.3	Backscatter	93	92 / 95		31917	WESLEY EDWARDS
62		9/23/19	PAVEMEN 1 B - West (2	T: Test Strip)	Surface	E0130		152.9	Supplied Value	138.1	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
63		9/23/19	PAVEMEN ⁻ 1 B - Center (T: Test Strip (1)	Surface	E0130		152.9	Supplied Value	138.4	Backscatter	91	92 / 95	FAIL	31917	WESLEY EDWARDS
64		9/23/19	PAVEMENT: Test Strip 1 B - Center (2)	 Test Strip 2) 	Surface	E0130		152.9	Supplied Value	139.7	Backscatter	91	92 / 95	FAIL	31917	WESLEY EDWARDS
65		9/23/19		F: Test Strip	Surface	E0130		152.9	Supplied Value	139.1	Backscatter	91	92 / 95	FAIL	31917	WESLEY EDWARDS
99		9/23/19	PAVEMENT 1 B - East (2)	T: Test Strip	Surface	E0130		152.9	Supplied Value	139.2	Backscatter	91	92 / 95	FAIL	31917	WESLEY EDWARDS
				Remarks								Ŭ	Comments			
FAIL: Te:	sts resu	lts DO NOT	FAIL: Tests results DO NOT comply with	specifications				Tests are " Gauge Information	ests are "L	Direct Tran	smission" (Me	thod A) un	less probe	depth is not	Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter" ormation	atter"
Gauge SN		Make	2	Model		Density Count		Moisture Count		standard C	Standard Count Date	Last	Last Calibration Date		Last Calibrated By	d By
31917		Troxler	3	3430		1925		510		9/23/19	1/19		12/26/18		InstroTek Inc.	

WILLIAM BRIAN VAUGHAN Nov 21, 2019 Page 2 of 18

Reviewed/Prepared by:

Client: TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621	Test Results	
ASPHALT PLACEMENT DENSITY Report #: BNG-000010 Report Date: 11/21/2019 Test Method: ASTM D2950		
SaME. Inc. 301 Zima Park Drive Spatranturg, SC 29301 Phone: 864-574-2360 Fax: 864-576-8730		

142619038 TRI On-Call Lab Testing Anderson Anderson, SC 29621

Project:

-		-					Test Results	sults							
Test #	Retest To Of Do	Test Date Test Location	ation	Material	Mix Design	Thickness (in)	Thickness Max Density Density (in) (pcf) Source	Max Density Source	In Place Density (pcf)	Probe Depth (in)	Percent Comp.	Min/Max Comp. (%)	Remark	Gauge SN	Technician
67	9/2	9/23/19 PAVEMENT: Test Strip1 C - West (1)	NT: Test Strip1 (1)	Surface	E0130		152.9	Supplied Value	136.1	Backscatter	89	92 / 95	FAIL	31917	WESLEY EDWARDS
68	9/2	9/23/19 PAVEMEN 1 C - West (2	PAVEMENT: Test Strip 1 C - West (2)	Surface	E0130		152.9	Supplied Value	137.9	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
69	9/2	9/23/19 PAVEMENT: ⁻ 1 C - Center (1)	PAVEMENT: Test Strip 1 C - Center (1)	Surface	E0130		152.9	Supplied Value	136.5	Backscatter	89	92 / 95	FAIL	31917	WESLEY EDWARDS
02	9/2	9/23/19 PAVEMENT: ⁻ 1 C - Center (2)	PAVEMENT: Test Strip 1 C - Center (2)	Surface	E0130		152.9	Supplied Value	135.1	Backscatter	88	92 / 95	FAIL	31917	WESLEY EDWARDS
71	9/2	9/23/19 PAVEMEN 1 C - East (1)	PAVEMENT: Test Strip 1 C - East (1)	Surface	E0130		152.9	Supplied Value	139.2	Backscatter	91	92 / 95	FAIL	31917	WESLEY EDWARDS
72	9/2	9/23/19 PAVEMEN 1 C - East (2)	PAVEMENT: Test Strip 1 C - East (2)	Surface	E0130		152.9	Supplied Value	137.9	Backscatter	90	92 / 95	FAIL	31917	WESLEY EDWARDS
			Remarks								ŏ	Comments			
FAIL: Test	s results D	FAIL: Tests results DO NOT comply wit	ith specifications					ests are "[Direct Trans	Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"	thod A) un	ess probe	depth is note	ed as "Backsc	atter"
							Gauge Information	rmation							
Gauge SN	N Make		Model		Density Count		Moisture Count		tandard C	Standard Count Date	Last	Last Calibration Date		Last Calibrated By	d By
31917	Troxler		3430		1925		510		9/23/19	/19		12/26/18		InstroTek Inc.	

Reviewed/Prepared by: WILLIAM BRIAN VAUGHAN Nov 21, 2019

		ve	9301	Phone: 864-574-2360 Fax: 864-576-8730
જ	١,	301 Zima Park Drive	Spartanburg, SC 29301	2-4/6-60
III	SeME Inc	301 Zima	Spartant	Phone: 8

ASPHALT PLACEMENT Report #: BNG-000011 Report Date: 11/21/2019 Test Method: ASTM D2950 DENSITY

TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621 Client:

142619038 TRI On-Call Lab Testing Anderson Anderson, SC 29621 Project:

								Test Results	sults							
Test #	Retest Of	Test Date	Test Location	ion	Material	Mix Design	Thickness (in)	Thickness Max Density Density Cource (in) (pcf)	Max Density Source	In Place Density (pcf)	Probe Depth (in)	Percent Comp.	Min/Max Comp. (%)	Remark	Gauge SN	Technician
73	5	9/23/19 1	PAVEMEN1 1 D - West (1)	PAVEMENT: Test Strip 1 D - West (1)	Surface	E0130	,		Supplied Value	136.8	Backscatter	. 68	92 / 95	FAIL	31917	WESLEY EDWARDS
74	5,	9/23/19	PAVEMENT 1 D - West (2)	PAVEMENT: Test Strip 1 D - West (2)	Surface	E0130		152.9	Supplied Value	136.9	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
75	5,	9/23/19	PAVEMEN D - Center	9/23/19 PAVEMENT: Test Stript D - Center (1)	Surface	E0130		152.9	Supplied Value	137.5	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
76		9/23/19	PAVEMENT: ' D - Center (2)	PAVEMENT: Test Strip1 D - Center (2)	Surface	E0130		152.9	Supplied Value	135.8	Backscatter	68	92 / 95	FAIL	31917	WESLEY EDWARDS
77	5	9/23/19	PAVEMEN 1 D - East (1)	9/23/19 PAVEMENT: Test Strip 1 D - East (1)	Surface	E0130		152.9	Supplied Value	136.9	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
78		9/23/19	PAVEMEN 1 D - East (2)	PAVEMENT: Test Strip 1 D - East (2)	Surface	E0130		152.9	Supplied Value	137.4	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
				Remarks	(*							ŭ	Comments			
FAIL: Tests results DO NOT comply	sts results	DO NOT	>	vith specifications	\$			-	ests are "L	Direct Tran	smission" (Me	ethod A) un.	less probe	depth is note	Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"	atter"
								Gauge Information	ormation							
Gauge SN	sN Make	e		Model		Density Count		Moisture Count		standard C	Standard Count Date	Last	Last Calibration Date		Last Calibrated By	ed By
31917	Troxler	tler		3430		1925		510		9/23/19	/19		12/26/18		InstroTek Inc.	

WILLIAM BRIAN VAUGHAN Nov 21, 2019 Reviewed/Prepared by:

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Client:	TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621	
ASPHALT PLACEMENT	DENSITY Report #: BNG-000012 Report Date: 11/21/2019 Test Method: ASTM D2950	
∞	SaME, Inc. SaME, Inc. Spartahury, Sc 29301 Phone: 864-574-2360 Fax 884-576-8730	

TRI On-Call Lab Testing Anderson Anderson, SC 29621

Project:

							Test Results	sults							
	Retest				Mix	Thickness	Thickness Max Density Density	Max Density	In Place Density	Probe Depth	Percent	Min/Max Comp.		Gauge	
16SI #	5	Date 0/22/10	DAV/EMENT: Toot Strip	Curfood		(III)		Source	(pcr)	Docksoottor	comp.	(%)		24047	
8/		81/23/18	9/23/19 PAVEMENT: LEST SUID	Surrace	EU130		A.ZCI	supplied	139.2	Backscatter	R	CR / ZR	FAIL	31817	
			E - West (1)					value							EUVVARUS
80		9/23/19	9/23/19 PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	138.5	Backscatter	91	92 / 95	FAIL	31917	WESLEY
			1 E - West (2)					Value							EDWARDS
81	ſ	9/23/19	9/23/19 PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	138.6	Backscatter	91	92 / 95	FAIL	31917	WESLEY
			1 E - Center (1)					Value							EDWARDS
82		9/23/19	9/23/19 PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	136.5	Backscatter	89	92 / 95	FAIL	31917	WESLEY
			1 E - Center (2)					Value							EDWARDS
83		9/23/19	9/23/19 PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	137.5	Backscatter	06	92 / 95	FAIL	31917	WESLEY
			1 E - East (1)					Value							EDWARDS
84		9/23/19	9/23/19 PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	139.0	Backscatter	91	92 / 95	FAIL	31917	WESLEY
			E - East (2)					Adluc							
			Remarks	(S							Ŭ	Comments			
FAIL: Tes	sts result	Its DO NOT	FAIL: Tests results DO NOT comply with specifications	su			T	ests are "L	Direct Tran	Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"	ethod A) un	less probe	depth is not	ed as "Backso	catter"
							Gauge Information	rmation							
Gauge SN		Make	Model		Density Count		Moisture Count		standard C	Standard Count Date	Last	Last Calibration Date		Last Calibrated By	ed By
31917		Troxler	3430	$\left \right $	1925		510	\parallel	9/23/19	/19		12/26/18		InstroTek Inc.	

Reviewed/Prepared by: WILLIAM BRIAN VAUGHAN Nov 21, 2019

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Appendix E: Mix Properties and Nuclear Density Test Results for the Asphalt

જ		ASH	ASPHALT PLACEMENT	LACE	MENT	Client:					Project:			
S&ME, Inc. 301 Zima Park Drive Spartanburg, SC 29301 Phone: 864-574-23501	S&ME. Inc. S&ME. Inc. 301 Zman Park Drive Phone: 084-574-3360 Fax: 864-576-8730		DENSITY Report #: BNG-000013 Report Date: 11/21/2019 Test Method: ASTM D2950	0013 /2019 M D2950		TRI/Envir 4915 Clen Anderson,	TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621	luc.			142619038 TRI On-Cal Anderson Anderson, \$	142619038 TRI On-Call Lab Testing Anderson Anderson, SC 29621	ting	
						Test Results	sults							
Test # Of	est Test f Date	Test Location	Material	Mix Design	Thickness (in)	Thickness Max Density Density Cource (in) (pcf)	Max Density Source	In Place Density (pcf)	Probe Depth (in)	Percent Comp.	Min/Max Comp. (%)	Remark	Gauge SN	Technician
85	9/23/19	PAVEMENT: Test Strip 1 F - West (1)	rip Surface	E0130	,		Supplied Value	136.6	Backscatter	. 89	92 / 95	FAIL	31917	WESLEY EDWARDS
86	9/23/19	PAVEMENT: Test Strip 1 F - West (2)	rip Surface	E0130		152.9	Supplied Value	135.6	Backscatter	89	92 / 95	FAIL	31917	WESLEY EDWARDS
87	9/23/19		rip Surface	E0130		152.9	Supplied Value	137.8	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
88	9/23/19		rip Surface	E0130		152.9	Supplied Value	137.9	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
68	9/23/19	PAVEMENT: Test Strip 1 F - East (1)	rip Surface	E0130		152.9	Supplied Value	136.7	Backscatter	89	92 / 95	FAIL	31917	WESLEY EDWARDS
06	9/23/19		rip Surface	E0130		152.9	Supplied Value	135.3	Backscatter	88	92 / 95	FAIL	31917	WESLEY EDWARDS
Tests		Remarks	arks				The second	Toront Terror	AAA Horizonta	C C	Comments	then is discut	o alla alla alla de	
IL: LESIS	FAIL: LESIS LESUIS DO NOT COMPIY WITH	r compry with specifications	suous			Gauge Information	ormation		resis are bried. Italismission (wennod A) unless probe deput is noted as backscatter ormation	un (Y nous	less prope		a as backso	alle
Gauge SN	Make	Model	F	Density Count	F	Moisture Count	_	standard C	Standard Count Date	Last	Last Calibration Date		Last Calibrated By	ed By
31917	Troxler	3430		1925		510		9/23/19	/19		12/26/18		InstroTek Inc.	

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3- Type

X	11		301 Zima Park Drive	Spartanburg, SC 29301 Phone: 864-574-2360 Fax: 864-576-8730	
III		S&ME, Inc.	301 Zima	Spartant Phone: 8	

Report #: BNG-000014 Report Date: 11/21/2019 Test Method: ASTM D2950

TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621 ASPHALT PLACEMENT Client: DENSITY

Δ.	÷	⊢	A	A	

Project:	142619038	TRI On-Call Lab Testing	Anderson	Anderson, SC 29621	

								Test Results	sults							
Test #	Retest Of	Test Date	Test Location	io	Material	Mix Design	Thickness (in)	Thickness Max Density Density Cource	Max Density Source	In Place Density (pcf)	Probe Depth (in)	Percent Comp.	Min/Max Comp. (%)	Remark	Gauge SN	Technician
91		9/23/19	PAVEMEN 2 A - West (1	T: Test Strip)	Surface	E0130		152.9	Supplied Value	141.3	Backscatter	92	92 / 95		31917	WESLEY EDWARDS
92		9/23/19	PAVEMEN 2 A - West (2	T: Test Strip)	Surface	E0130		152.9	Supplied Value	138.0	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
93		9/23/19	PAVEMEN 2 A - Center	T: Test Strip (1)	Surface	E0130		152.9	Supplied Value	136.3	Backscatter	68	92 / 95	FAIL	31917	WESLEY EDWARDS
94		9/23/19		PAVEMENT: Test Strip 2 A - Center (2)	Surface	E0130		152.9	Supplied Value	136.3	Backscatter	68	92 / 95	FAIL	31917	WESLEY EDWARDS
95		9/23/19	PAVEMENT 2 A - East (1)	PAVEMENT: Test Strip 2 A - East (1)	Surface	E0130		152.9	Supplied Value	140.6	Backscatter	92	92 / 95		31917	WESLEY EDWARDS
96		9/23/19	PAVEMEN1 2 A - East (2)	T: Test Strip	Surface	E0130		152.9	Supplied Value	143.7	Backscatter	94	92 / 95		31917	WESLEY EDWARDS
				Remarks	(0)							Ŭ	Comments			
FAIL: Te	sts resu	lts DO NOT	FAIL: Tests results DO NOT comply with	h specifications	\$				ests are "I	Direct Tran	smission" (Me	ethod A) un	lless probe	depth is note	Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"	atter"
								Gauge Information	ormation							
Gauge SN		Make	ŭ	Model		Density Count		Moisture Count		standard C	Standard Count Date	Last	Last Calibration Date		Last Calibrated By	d By
31917	П	Troxler		3430		1925		510		9/23/19	1/19		12/26/18		InstroTek Inc.	

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Appendix E: Mix Properties and Nuclear Density Test Results for the Asphalt

_		301 Zima Park Drive Spartanburg, SC 29301 Phone: 864-574-2360 I Fax: 864-576-8730	
త	III <u>.</u>	Park I urg, S(64-574	
III	S&ME, Inc.	301 Zima Park Drive Spartanburg, SC 29301 Phone: 864-574-2360	

Report #: BNG-000015 Report Date: 11/21/2019 Test Method: ASTM D2950

DENSITY

TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621 ASPHALT PLACEMENT client:

Projec	14261	TRI O	Anden	Anden	

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142619038	TRI On-Cal	Anderson	Anderson, S	
	142619038	142619038 TRI On-Call	142619038 TRI On-Call Anderson	142619038 TRI On-Call Anderson Anderson, S

						Test Results	sults							
Retest Test # Of	est Test of Date	Test Location	Material	Mix al Design	Thickness (in)	Thickness Max Density Density (in) (pcf)		In Place Density (pcf)	Probe Depth (in)	Percent Comp.	Min/Max Comp. (%)	Remark	Gauge SN	Technician
26	9/23/19	PAVEMENT: Test Strip 2 B - West (1)	trip Surface	e E0130		152.9	Supplied Value	139.8	Backscatter	91	92 / 95	FAIL	31917	WESLEY EDWARDS
86	9/23/19	PAVEMENT: Test Strip 2 B - West (2)	trip Surface	e E0130		152.9	Supplied Value	138.8	Backscatter	91	92 / 95	FAIL	31917	WESLEY EDWARDS
66	9/23/19	9/23/19 PAVEMENT: Test Strip 2 B - Center (1)	trip Surface	e E0130		152.9	Supplied Value	143.1	Backscatter	94	92 / 95		31917	WESLEY EDWARDS
100	9/23/19	9/23/19 PAVEMENT: Test Strip 2 B - Center (2)	trip Surface	e E0130		152.9	Supplied Value	140.9	Backscatter	92	92 / 95		31917	WESLEY EDWARDS
101	9/23/19	PAVEMENT: Test Strip 2 B - East (1)	trip Surface	e E0130		152.9	Supplied Value	137.7	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
102	9/23/19	PAVEMENT: Test Strip 2 B - East (2)	trip Surface	e E0130		152.9	Supplied Value	136.6	Backscatter	89	92 / 95	FAIL	31917	WESLEY EDWARDS
		Ren	Remarks							ö	Comments			
FAIL: Tests	results DO NO	FAIL: Tests results DO NOT comply with specifications	cations			_	Fests are "D	irect Tran:	smission" (Me	ethod A) unl	ess probe	depth is note	Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"	atter"
						Gauge Information	ormation							
Gauge SN	Make	Model		Density Count		Moisture Count		tandard C	Standard Count Date	Last	Last Calibration Date		Last Calibrated By	d By
31917	Troxler	3430		1925	5	510		9/23/19	/19		12/26/18	I	InstroTek Inc.	

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Appendix E: Mix Properties and Nuclear Density Test Results for the Asphalt

				Spartanburg, SC 29301 Phone: 864-574-2360 Fax: 864-576-8730
ৰ্প	U	ļ	301 Zima Park Drive	Spartanburg, SC 29301 Phone: 864-574-2360
Ш		S&ME, Inc.	301 Zima	Spartanb Phone: 8

Report #: BNG-000016 Report Date: 11/21/2019 Test Method: ASTM D2950 DENSITY

TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621 ASPHALT PLACEMENT Client:

142619038 TRI On-Call Lab Testing Anderson Anderson, SC 29621 Project:

5 FAIL 5 FAIL 5 FAIL 5 FAIL 5 International Control International		ation Date Last Calibrated By	i/18 InstroTek Inc.
Min/Max Percent Min/Max 91 92/95 90 92/95 92 95 92 95 92 95 92 95 92 95 92 92/95 94 92/95 94 92/95 91 92/95 92 95 93 92/95 94 92/95 91 92/95 91 92/95 91 92/95		Last Calibration Date	12/26/18
Probe Depth Depth (in) Backscatter Backscatter Backscatter Backscatter		Standard Count Date	9/23/19
In Place Density (pcf) 139.3 140.2 140.2 140.5 139.7 139.7		Standard C	9/2:
esuits Max A Bax Supplied Supplied Value Supplied Value Supplied Value Supplied Value	ormation		
Test Results Test Results Max Thickness Max Density Density (in) 500 Supplied 152.9 Supplied Value 152.9 Supplied Value 152.9 Supplied 152.9 152.9 Supplied Value	Gauge Information	Moisture Count	510
Thickness		\vdash	2
E0130 E0130 E0130 E0130 E0130 E0130		Density Count	1925
Material Material Surface Surface Surface			
Test # Test Location 103 9/23/19 PAVEMENT: Test Strip 104 9/23/19 PAVEMENT: Test Strip 104 9/23/19 PAVEMENT: Test Strip 105 9/23/19 PAVEMENT: Test Strip 106 9/23/19 PAVEMENT: Test Strip 105 9/23/19 PAVEMENT: Test Strip 106 9/23/19 PAVEMENT: Test Strip 107 9/23/19 PAVEMENT: Test Strip 108 9/23/19 PAVEMENT: Test Strip 107 9/23/19 PAVEMENT: Test Strip 108 9/23/19 PAVEMENT: Test Strip		Model	3430
tt Test Location 19 PAVEMENT: 10 PAVEMENT: 11 PAVEMENT: 12 C. Conter (2) 13 C. East (2)			
F Test P Date 9/23/19 9/23/19 9/23/19 9/23/19 9/23/19 9/23/19		Make	Troxler
Test # Retest 103 0f 104 0f 105 105 106 107 107 108		Gauge SN	31917

Reviewed/Prepared by:

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Project:	142619038 TRI On-Call Lab Testing Anderson, SC 29621 Anderson, SC 29621	
Client:	TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621	
ASPHALT PLACEMENT	DENSITY Report #: BNG-000017 Report Date: 11/21/2019 Test Method: ASTM D2950	
<u>م</u>	SaME. Inc. SaME. Inc. Sortame Park Drive Sortamerug. Sc. 23301 Phone: 864-574-2360 Fax: 664-576-6730	

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SaME, Inc. 301 Zim Park Drive Seatraburg, SC 23301 Phone: 664-574-2360 | Fax: 864-576-8730 ø Ш

Report #: BNG-000018 Report Date: 11/21/2019 Test Method: ASTM D2950 DENSITY

ASPHALT PLACEMENT

TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621 Client:

Project: 142619038 TRI On-Call Lab Testing Anderson Anderson, SC 29621

								Test Results	sults							
Test #	Retest Of	Test Date	Test Location		Material	Mix Design	Thickness (in)	Thickness Max Density Density (in) (pcf) Source	Max Density Source	In Place Density (pcf)	Probe Depth (in)	Percent Comp.	Min/Max Comp. (%)	Remark	Gauge SN	Technician
115		9/23/19		Fest Strip	Surface	E0130		152.9	Supplied Value	138.7	Backscatter	91	92 / 95	FAIL	31917	WESLEY EDWARDS
116		9/23/19		Fest Strip	Surface	E0130		152.9	Supplied Value	137.8	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
117		9/23/19	9/23/19 PAVEMENT: Test Strip 2 E - Center (1)	Fest Strip	Surface	E0130		152.9	Supplied Value	139.4	Backscatter	91	92 / 95	FAIL	31917	WESLEY EDWARDS
118		9/23/19	PAVEMENT: Test Strip 2 E - Center (2)	Fest Strip	Surface	E0130		152.9	Supplied Value	137.3	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
119		9/23/19		Fest Strip	Surface	E0130		152.9	Supplied Value	140.1	Backscatter	92	92 / 95		31917	WESLEY EDWARDS
120		9/23/19	9/23/19 PAVEMENT: Test Strip 2 E - East (2)	Fest Strip	Surface	E0130		152.9	Supplied Value	142.4	Backscatter	93	92 / 95		31917	WESLEY EDWARDS
				Remarks								ŭ	Comments			
FAIL:	Tests resu	ults DO NO	FAIL: Tests results DO NOT comply with specifications	pecifications					Tests are "L	Direct Tran	Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"	thod A) un	less probe	depth is note	ed as "Backso	catter"
								Gauge Information	ormation							
Gauge SN		Make	Mode	del		Density Count		Moisture Count		standard C	Standard Count Date	Last	Last Calibration Date		Last Calibrated By	ed By
31917		Troxler	3430	0		1925		510		9/23/19	/19		12/26/18		InstroTek Inc.	

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		/e	Spartanburg, SC 29301 Phone: 864-574-2360 Fax: 864-576-8730
જ	إ g	301 Zima Park Drive	Spartanburg, SC 29301 Phone: 864-574-2360
III	S&ME, Inc.	301 Zimá	Spartant Phone: 8

ASPHALT PLACEMENT Client: DENSITY

Report #: BNG-000019 Report Date: 11/21/2019 Test Method: ASTM D2950

Anderson, SC 29621 Project: TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621

	142619038	TRI On-Call Lab Testing	Anderson	
5	1426	TRI (Ande	- F - V

	Technician	WESLEY EDWARDS	WESLEY EDWARDS	WESLEY EDWARDS	WESLEY EDWARDS	WESLEY EDWARDS	WESLEY EDWARDS		atter"		d By	
	Gauge SN	31917	31917	31917	31917	31917	31917		Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"		Last Calibrated By	InstroTek Inc.
	Remark	FAIL	FAIL	FAIL	FAIL				depth is not		on Date	
	Min/Max Comp. (%)	92 / 95	92 / 95	92 / 95	92 / 95	92 / 95	92 / 95	Comments	less probe		Last Calibration Date	12/26/18
	Percent Comp.	06	91	06	91	94	92	0	ethod A) ur		Last	
	Probe Depth (in)	Backscatter	Backscatter	Backscatter	Backscatter	Backscatter	Backscatter		Ismission" (M		Standard Count Date	9/23/19
	In Place Density (pcf)	138.3	139.0	137.5	139.0	143.1	141.2		Direct Trar		Standard (9/2:
esults	Max / Density Source	Supplied Value	Supplied Value	Supplied Value	Supplied Value	Supplied Value	Supplied Value		Tests are "	ormation		
Test Results	Thickness Max Density Density (in) (pcf)	152.9	152.9	152.9	152.9	152.9	152.9			Gauge Information	Moisture Count	510
	Thickness (in)										ount	
	Mix Design	E0130	E0130	E0130	E0130	E0130	E0130				Density Count	1925
	Material	Surface	Surface	Surface	Surface	Surface	Surface	s	s			
	ation	PAVEMENT: Test Strip 2 F - West (1)	:NT: Test Strip (2)	9/23/19 PAVEMENT: Test Strip 2 F - Center (1)	PAVEMENT: Test Strip 2 F - Center (2)	ENT: Test Strip (1)	9/23/19 PAVEMENT: Test Strip 2 F - East (2)	Remarks	FAIL: Tests results DO NOT comply with specifications		Model	3430
	Test Location		9/23/19 PAVEMENT: ' 2 F - West (2)	PAVEMENT: T. 2 F - Center (1)		9/23/19 PAVEMENT 2 F - East (1)	9 PAVEMENT 2 F - East (2)		T comply v			
	Test Date	9/23/19	9/23/19	9/23/19	9/23/19	9/23/19	9/23/19		ults DO NC		Make	Troxler
	Retest Of								Tests res		Gauge SN N	
	Test #	121	122	123	124	125	126		FAIL:		Gaug	31917

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The above tests were performed in general accordance with the applicable test method, except for known deviations noted above.

Client:	TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621	
ASPHALT PLACEMENT	DENSITY Report #: BNG-000021 Report Date: 11/21/2019 Test Method: ASTM D2950	
∞ ∭	SAME. Inc. 36 AME. Inc. 301 Zima Park Drive Seatrahugu Scr. 23301 Farx 984-576-8730 Phone: 964-574-2360 Farx	

142619038 TRI On-Call Lab Testing Anderson Anderson, SC 29621

Project:

	1											
	Technician	WESLEY EDWARDS	WESLEY EDWARDS	WESLEY EDWARDS	WESLEY EDWARDS	WESLEY EDWARDS	WESLEY EDWARDS		atter"		ed By	
	Gauge SN	31917	31917	31917	31917	31917	31917		Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"		Last Calibrated By	InstroTek Inc.
	Remark	FAIL							depth is not			
	Min/Max Comp. (%)	92 / 95	92 / 95	92 / 95	92 / 95	92 / 95	92 / 95	Comments	less probe		Last Calibration Date	12/26/18
	Percent Comp.	06	92	93	92	95	95	C	ethod A) ur		Last	
	Probe Depth (in)	Backscatter	Backscatter	Backscatter	Backscatter	Backscatter	Backscatter		Ismission" (M		Standard Count Date	9/23/19
	In Place Density (pcf)	137.7	140.1	142.4	140.7	145.0	144.9		Direct Tran		Standard (9/23
esults	Max Density Source	Supplied Value	Supplied Value	Supplied Value	Supplied Value	Supplied Value	Supplied Value		Tests are "	ormation		
Test Results	Thickness Max Density Density (in) (pcf) Source	152.9	152.9	152.9	152.9	152.9	152.9			Gauge Information	Moisture Count	510
	Thickness (in)											2
	Mix Design	E0130	E0130	E0130	E0130	E0130	E0130				Density Count	1925
	Material	Surface	Surface	Surface	Surface	Surface	Surface	s	S			
	ation	NT: Test Strip (1)	9/23/19 PAVEMENT: Test Strip 3 B - West (2)	NT: Test Strip r (1)	NT: Test Strip3 r (2)	NT: Test Strip3 1)	NT: Test Strip 2)	Remarks	ith specifications		Model	3430
	Test Location	PAVEMENT: 3 B - West (1)	PAVEMENT: 3 B - West (2)	PAVEMENT 3 B - Center (1	9/23/19 PAVEMENT B - Center (9/23/19 PAVEMENT B - East (1)	9/23/19 PAVEMENT 3 B - East (2)		T comply w			
	Test Date	9/23/19	9/23/19	9/23/19	9/23/19	9/23/19	9/23/19		FAIL: Tests results DO NOT comply with		Make	Troxler
	Retest Of								Tests resu			
	Test #	133	134	135	136	137	138		FAIL:		Gauge SN	31917

Reviewed/Prepared by: WILLIAM BRIAN VAUGHAN Nov 21, 2019

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					Phone: 864-574-2360 Fax: 864-576-8730
৵ঽ		ö	301 Zima Park Drive	Spartanburg, SC 29301	i4-574-2360 Fa
1	E	S&ME, Inc.	301 Zima	Spartanbu	Phone: 86

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ASPHALT PLACEMENT DENSITY

Report #: BNG-000022 Report Date: 11/21/2019 Test Method: ASTM D2950

TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621 Client:

142619038 TRI On-Call Lab Testing Anderson Anderson, SC 29621 Project:

							Test Results	sults							
Retest Test Mix Of Date Test Location Material Design	Test Location Material	Material		Mix Desig		Thickness (in)	Thickness Max Density Density (in) (pcf) Source	Max Density Source	In Place Density (pcf)	Probe Depth (in)	Percent Comp.	Min/Max Comp. (%)	Remark	Gauge SN	Technician
9/23/19 PAVEMENT: Test Strip Surface E0130 3 C - West (1)	Surface	Surface		E0130			152.9	Supplied Value	141.1	Backscatter	92	92 / 95		31917	WESLEY EDWARDS
9/23/19 PAVEMENT: Test Strip Surface E0130 3 C - West (2)	PAVEMENT: Test Strip Surface 3 C - West (2)	PAVEMENT: Test Strip Surface 3 C - West (2)		E0130	-		152.9	Supplied Value	138.1	Backscatter	06	92 / 95	FAIL	31917	WESLEY EDWARDS
9/23/19 PAVEMENT: Test Strip Surface E0130 3 C - Center (1)	PAVEMENT: Test Strip Surface 3 C - Center (1)	PAVEMENT: Test Strip Surface 3 C - Center (1)		E0130			152.9	Supplied Value	138.4	Backscatter	91	92 / 95	FAIL	31917	WESLEY EDWARDS
9/23/19 PAVEMENT: Test Strip Surface E0130 3 C - Center (2)	PAVEMENT: Test Strip Surface 3 C - Center (2)	PAVEMENT: Test Strip Surface 3 C - Center (2)		E0130			152.9	Supplied Value	142.6	Backscatter	93	92 / 95		31917	WESLEY EDWARDS
9/23/19 PAVEMENT: Test Strip Surface E0130 3 C - East (1)	PAVEMENT: Test Strip Surface 3 C - East (1)	PAVEMENT: Test Strip Surface 3 C - East (1)		E0130			152.9	Supplied Value	139.1	Backscatter	91	92 / 95	FAIL	31917	WESLEY EDWARDS
9/23/19 PAVEMENT: Test Strip3 Surface E0130 C - East (2)	PAVEMENT: Test Strip3 Surface C - East (2)	PAVEMENT: Test Strip3 Surface C - East (2)	Surface	E0130			152.9	Supplied Value	138.7	Backscatter	91	92 / 95	FAIL	31917	WESLEY EDWARDS
Remarks	Remarks	Remarks	s								ŭ	Comments			
FAIL: Tests results DO NOT comply with specifications	Its DO NOT comply with specifications	T comply with specifications	S				T	Fests are "L	Direct Trans	smission" (Me	thod A) un	ess probe	depth is note	Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"	atter"
							Gauge Information	ormation							
Gauge SN Make Model Density Count	Model		Density (Density (()		Moisture Count		Standard C	Standard Count Date	Last	Last Calibration Date		Last Calibrated By	d By

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InstroTek Inc.

12/26/18

9/23/19

510

1925

3430

Troxler

31917

Report #: BNG-000023 Report Date: 11/21/2019 Test Method: ASTM D2950

ASPHALT PLACEMENT Client: DENSITY TRI/Environmental, Inc. 1915 Clemson Blvd. Anderson, SC 29621

Project: 142619038 TRI On-Call Lab Testing Anderson Anderson, SC 29621

	Min/Max Comp. (%) Remark SN Technician	92 / 95 31917 WESLEY EDWARDS	92 / 95 31917 WESLEY EDWARDS	92/95 FAIL 31917 WESLEY EDWARDS	92/95 FAIL 31917 WESLEY EDWARDS	92/95 FAIL 31917 WESLEY EDWARDS	92/95 FAIL 31917 WESLEY EDWARDS	Comments	Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"		Last Calibration Date Last Calibrated By	12/26/18 InstroTek Inc.
	Percent Comp.	94	92	68	06	91	91	Cor	fethod A) unle		Last C	
	Probe Depth (in)	Backscatter	Backscatter	Backscatter	Backscatter	Backscatter	Backscatter		Insmission" (N		Standard Count Date	9/23/19
	In Place Density (pcf)	143.5	140.1	1 136.8	137.4	139.5	139.1		"Direct Tra	-	Standard	9/2
Test Results	Max y Density Source	Supplied Value	Supplied Value	Supplied Value	Supplied Value	Supplied Value	Supplied Value		Tests are	Gauge Information	ount	
Test F	Thickness Max Density Density Cource (in)	152.9	152.9	152.9	152.9	152.9	152.9			Gauge In	Moisture Count	510
	Thickness (in)										Count	10
	Mix Design	E0130	E0130	E0130	E0130	E0130	E0130				Density Count	1925
	Material	Surface	Surface	Surface	Surface	Surface	Surface	s	SL			
	cation	9/23/19 PAVEMENT: Test Strip3 D - West (1)	AENT: Test Strip st (2)	PAVEMENT: Test Strip 3 D - Center (1)	PAVEMENT: Test Strip 3 D - Center (2)	PAVEMENT: Test Strip 3 D - East (1)	9/23/19 PAVEMENT: Test Strip 3 D - East (2)	Remarks	with specifications		Model	3430
	Test Location) PAVEN D - We) PAVEMEN 3 D - West (PAVEMENT: 3 D - Center (1)			PAVEME 3 D - East		UT comply			
	t Test Date	9/23/19	9/23/19	9/23/19	9/23/19	9/23/19	9/23/19		FAIL: Tests results DO NOT comply		Make	Troxler
	Retest								Tests res		Gauge SN N	Γ
	Test #	145	146	147	148	149	150		FAIL:		Gaug	31917

WILLIAM BRIAN VAUGHAN Nov 21, 2019 Reviewed/Prepared by:

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Appendix E: Mix Properties and Nuclear Density Test Results for the Asphalt

অ	11		301 Zima Park Drive	Spartanburg, SC 29301 Phone: 864-574-2360 Fax: 864-576-8730
III		S&ME, Inc.	301 Zima	Spartanbu Phone: 86

ASPHALT PLACEMENT Client: DENSITY

Report #: BNG-000024 Report Date: 11/21/2019 Test Method: ASTM D2950

TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621

142619038 TRI On-Call Lab Testing Anderson Anderson, SC 29621 Project:

							Test Results	sults							
	Retest				Mix	Thickness	Thickness Max Density Density	Max Density	In Place Density	Probe Depth	Percent	Min/Max Comp.		Gauge	1
lest #	5		Lest Location	Material	Design	(III)		Source	(pcr)	(III)	Comp.	(%)	Kemark	NN	Lechnician
151		9/23/19	PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	137.4	Backscatter	06	92 / 95	FAIL	31917	WESLEY
			E - West (1)					value							
152		9/23/19	9/23/19 PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	139.4	Backscatter	91	92 / 95	FAIL	31917	WESLEY
			5 E - West (2)					Aalue							
153		9/23/19	9/23/19 PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	140.1	Backscatter	92	92 / 95		31917	WESLEY
			3 E - Center (1)					Value							EDWARDS
154		9/23/19	9/23/19 PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	141.6	Backscatter	93	92 / 95		31917	WESLEY
			5 E - Center (2)					value							EUVVARUS
155		9/23/19	9/23/19 PAVEMENT: Test Strip3	Surface	E0130		152.9	Supplied	142.7	Backscatter	93	92 / 95		31917	WESLEY
			E - Edst (1)					value							
156		9/23/19	9/23/19 PAVEMENT: Test Strip	Surface	E0130		152.9	Supplied	143.9	Backscatter	94	92 / 95		31917	WESLEY
			E - East (2)					vaiuc							
			Remarks	S							Ŭ	Comments			
FAIL: Te:	sts resu	Its DO NOT	FAIL: Tests results DO NOT comply with specifications	IS			L	ests are "C	Direct Tran:	smission" (Me	thod A) un	less probe	depth is not	Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"	atter"
							Gauge Information	rmation							
Gauge SN		Make	Model		Density Count	_	Moisture Count		tandard C	Standard Count Date	Last	Last Calibration Date	n Date	Last Calibrated By	ed By
31917		Troxler	3430		1925		510		9/23/19	/19		12/26/18		InstroTek Inc.	

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Appendix E: Mix Properties and Nuclear Density Test Results for the Asphalt

ৰ্প্ত		2. Park Drive	Spartanburg, SC 29301 Phone: 864-574-2360 Fax: 86
	Ξ	S&ME, Inc. 301 Zima Park Drive	spartanburg, hone: 864-6

4-576-8730

ASPHALT PLACEMENT Report #: BNG-000025 DENSITY

Report Date: 11/21/2019 Test Method: ASTM D2950

TRI/Environmental, Inc. 4915 Clemson Blvd. Anderson, SC 29621 Client:

Project:	142619038	TRI On-Call Lal	Anderson	Anderson, SC 2

 142619038	TRI On-Call L	Anderson	Anderson, SC

142619038	TRI On-Call La	Anderson	Anderson, SC	

	Lab Tes		SC 29621
2619038	I On-Call	derson	derson, S

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ate Last Calibrated By	InstroTek Inc.	
Last Calibration Date	12/26/18	E

Nov 21, 2019 WILLIAM BRIAN VAUGHAN Reviewed/Prepared by:

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4h

WESLEY EDWARDS

31917

92 / 95

92

Backscatter

141.0

Supplied Value

152.9

E0130

Surface

PAVEMENT: Test Strip

9/23/19

161

F - East (1)

9/23/19

162

- Center (2)

WESLEY EDWARDS

31917

92 / 95

93

Backscatter

141.8

Supplied Value

152.9

E0130

Surface

PAVEMENT: Test Strip 3 F - East (2)

Remarks

FAIL: Tests results DO NOT comply with specifications

Tests are "Direct Transmission" (Method A) unless probe depth is noted as "Backscatter"

Standard Count Date

Gauge Information

Moisture Count

Density Count 1925

Model 3430

Troxler Make

31917

Gauge SN

510

9/23/19

Comments

WESLEY EDWARDS

31917

FAIL

92 / 95

91

Backscatter

138.8

Supplied Value

152.9

E0130

Surface

F - West (1) PAVEMENT: Test Strip

9/23/19

158

PAVEMENT: Test Strip

9/23/19

Test Date

Retest Of

Test #

157

Test Location

WESLEY EDWARDS

31917

92 / 95

95

Backscatter

145.6

Supplied Value

152.9

E0130

Surface

PAVEMENT: Test Strip3 F - Center (1)

9/23/19

159

= - West (2)

WESLEY EDWARDS

31917

92 / 95

94

Backscatter

144.0

Supplied Value

152.9

E0130

Surface

PAVEMENT: Test Strip

9/23/19

160

WESLEY EDWARDS

Technician

Gauge SN 31917

Remark FAIL

92 / 95

Backscatter

136.2

Supplied Value

Min/Max Comp. (%)

Percent Comp. 89

Probe Depth (ii

In Place Density (pcf)

s Max Density Density (pcf) Source 152.9 Summer

Thickness (in)

Mix

Design E0130

Material Surface

Test Results