

# *Final Report*

## **Results of Round-Robin Testing for the Development of Precision Statements for the Surface Resistivity of Water Saturated Concrete**

In Cooperation with the

AASHTO TIG Lead States Team Marketing Plan  
for the Surface Resistivity Test

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### Introduction

One objective of the AASHTO TIG Lead States Team Marketing Plan for the Surface Resistivity Test was to develop precision statements for Surface Resistivity (SR) measurements of water saturated concrete specimens in the laboratory. The data analyzed as part of this effort included SR test results from up to fourteen (14) different participating laboratories, and twelve (12) different Portland Cement Concrete (PCC) mixtures, tested at 28, 56, and 91 days, respectively. The PCC mixes included in this study are summarized below in Table 1.

SR testing was performed using a Wenner linear four-probe array surface resistivity meter (as pictured in Figure 1) meeting the requirements of AASHTO Designation: TP95-11, “Standard Method of Test for Surface Resistivity Indication of Concrete’s Ability to Resist Chloride Ion Penetration<sup>1</sup>.” In general, the specified SR meter should have a range of 0 to 100 KOhm-cm, with a resolution of 0.1 KOhm-cm, and Accuracy of +/- 2% of reading. The specified probe array spacing is 38.1 mm (1.5 inches).

### Data Analysis

Pooled statistics including: mean, variance, and coefficient of variation were calculated from the data, and are summarized in Figures A-1 through A-3 of the Appendix. The laboratory test data collected as part of this study are also summarized in the Figures B-1 through B-36 of the Appendix. As noted, data were collected in triplicate by each lab, and for each mix tested.

**Table 1. Summary of the Different PCC Mixes Tested as Part of this Study.**

MIX NO.	CEMENT (LB/CY)	FLY ASH (LB/CY)	MICRON FLY ASH (LB/CY)	SLAG (LB/CY)	SILICA FUME (LB/CY)	META-KAOLIN (LB/CY)	CA-1 (LB/CY)	CA-2 (LB/CY)	FA (LB/CY)	WATER (LB/CY)	TOTAL CEMENTITIOUS (LB/CY)	FLY ASH (%)	MICRON FLY ASH (%)	SLAG (%)	SILICA FUME (%)	META-KAOLIN (%)	w/cm RATIO	FA/CA RATIO
# 1	400	200		200			1785		1209	275	800	25.0		25.0			0.34	0.68
# 2	480	120					475	1439	1388	242	600	20.0					0.40	0.73
# 3	660	200					1323		1220	335	860	23.3					0.39	0.92
# 4	470	300					1585		1337	267	770	39.0					0.35	0.84
# 5	519	173					1532		1482	277	692	25.0					0.40	0.97
# 6	658						1800		1200	245	658						0.37	0.67
# 7	500	135			41		897	890	1157	270	676	20.0			6.0		0.40	0.65
# 8	423	141					935		2183	220	564	25.0					0.39	0.70
# 9	490	110			25		1740		1175	255	625	17.6		4.0			0.41	0.68
# 10	500	258	75				1700		1076	254	833	31.0	9.0				0.30	0.63
# 11	725	160					1741		972	265	885	18.1					0.30	0.56
# 12	677					75	1701		1052	263	752					10.0	0.35	0.62

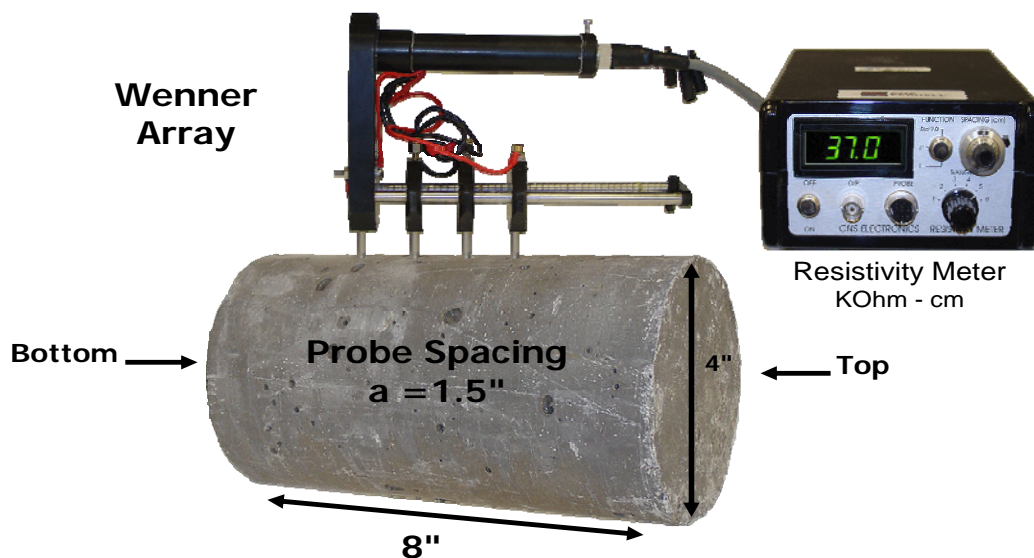
The pooled variance is often used for estimating the variance when multiple samples representing different circumstances where the mean may vary between samples are tested but the true variance is assumed to remain the same. The pooled variance is calculated by:

$$s_p^2 = \frac{\sum_{i=1}^k ((n_i - 1) s_i^2)}{\sum_{i=1}^k (n_i - 1)}$$

where  $s_p^2$  is the pooled variance,  $n_i$  is the sample size of the  $i$ 'th sample,  $s_i^2$  is the variance of the  $i$ th sample, and  $k$  is the number of samples being combined.  $n - 1$  is used instead of  $n$  for the same reason it may be used in estimating variances from samples. The pooled coefficient of variation (COV) is then simply calculated as the ratio of the pooled standard deviation,  $s$  to the pooled mean,  $\bar{x}$ . The pooled COV is often expressed as a percentage, in which case the COV is multiplied by 100, as:

$$\text{COV}\% = (s / \bar{x}) \times 100$$

In this analysis, precision statements were developed, for the repeatability (Single-Operator Precision) and reproducibility (Multilaboratory Precision) of the SR data at a 95% confidence level. It is noted that these precision statements were calculated based on the average of eight (8) SR values measured on the surface of three replicate hardened 100-mm (4-in.) diameter cast cylinders, cured in lime saturated water, under standard laboratory conditions, and in general accordance with AASHTO Designation: TP95-11 and Florida Method FM5-578<sup>2</sup>.



**Figure 1. Typical Surface Resistivity Testing Protocol Using 4-Pin Wenner Array<sup>4</sup>.**

## Precision and Bias

Precision estimates were developed in accordance with ASTM Designation C670, “Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials<sup>3</sup>.” This Practice provides guidance for the calculation of the acceptable difference between two test results, or the “difference-two-sigma” (d2s) as an index of precision. This index indicates a maximum acceptable difference between two test results obtained on test portions of the same material under the same test conditions. The d2s index is calculated by multiplying the appropriate standard deviation by the factor  $2\sqrt{2}$ . The maximum d2s indices based on the pooled statistics at 28, 56, and 91 days, respectively are provided below in Table 2.

When the coefficient of variation is essentially constant, the “one-sigma limit in percent” (1s%) and difference-two-sigma limit in percent (d2s%) are commonly used. The maximum 1s% and d2s% indices based on the pooled statistics at 28, 56, and 91 days, respectively are also presented below in Table 3. Thus, the precision statements based on the maximum pooled statistics from the SR values measured between 28 and 91 days may be stated as follows:

**Single-Operator Precision** - The maximum pooled single operator coefficient of variation was found to be 9% (Note 1). Therefore the results of two properly conducted tests by the same operator on concrete samples from the same batch and of the same diameter should not differ by more than 25.6% of their average (Note 1).

**Multilaboratory Precision** - The maximum pooled multilaboratory coefficient of variation of a single test result has been found to be 16% (Note 1). Therefore results of two properly conducted tests in different laboratories on the same material should not differ by more than 45.4% of their average (Note 1).

**Table 2. Summary of d2s Precision Indices for 28, 56, and 91-day SR Data.**

Lab Cured Concrete Age	Variance (Kohm-cm) <sup>2</sup>		Standard Deviation (Kohm-cm)		Precision (d2s) Kohm-cm	
	Repeatable (within unit)	Reproducible (between units)	Repeatable (within unit)	Reproducible (between units)	Repeatable (within unit)	Reproducible (between units)
28-days	2.21	4.60	1.49	2.14	4.2	6.1
56-days	2.86	11.01	1.69	3.32	4.8	9.4
91-days	9.08	32.40	3.01	5.69	8.5	16.1

**Table 3. Summary of (d2s%) Precision Indices for 28, 56, and 91-day SR Data.**

Lab Cured Concrete Age	COV (1s%)		Precision (d2s%)	
	Repeatability (within unit)	Reproducibility (between units)	Repeatability (within unit)	Reproducibility (between units)
28-days	9.04	12.25	25.6	34.6
56-days	7.46	12.46	21.1	35.2
91-days	8.11	16.05	22.9	45.4

Note 1 — These numbers represent, respectively, the (1s%) and (d2s%) limits as described in ASTM Designation C670. The precision statements are based on the variations in tests on twelve different concrete mixes, each tested in triplicate in fourteen different laboratories. All specimens tested were 100-mm (4-in.) diameter cast cylinders.

**Bias** - The procedure of this test method for measuring the resistance of concrete to chloride ion penetration has no bias because the value of this resistance can be defined only in terms of the test method.

## References

1. AASHTO Designation: TP95-11, “Standard Method of Test for Surface Resistivity Indication of Concrete’s Ability to Resist Chloride Ion Penetration.”
2. Designation: FM 5-578, “Florida Method of Test for Concrete Resistivity as an Electrical Indicator of its Permeability”
3. ASTM Designation C670, “Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials.”
4. Bergin, Michael, P.E. “Resistivity as an Electrical Indicator of Permeability RCP vs SR” State Structural Materials Engineer Florida Department of Transportation, State Materials Research Park, Gainesville, FL.

# Appendices

<b><u>Appendix</u></b>	<b><u>Figures</u></b>	<b><u>Contents</u></b>	<b><u>Pages</u></b>
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# **Appendix A**

## **Pooled Statistics**

**Figure A-1. Pooled Statistics For Surface Resistivity Data @ 28 Days**

LAB No.	STATISTIC	REPEATABILITY (WITHIN LAB)												POOLED STATISTICS
		MIX 1	MIX 2	MIX 3	MIX 4	MIX 5	MIX 6	MIX 7	MIX 8	MIX 9	MIX 10	MIX 11	MIX 12	
# 1	MEAN	11.25	9.09	9.00	12.93	9.46	9.65	25.25	27.82	17.18	22.39	11.92	31.57	16.5
	VARIANCE	0.24	0.15	0.03	0.77	0.03	0.07	2.48	3.97	0.52	0.01	0.05	18.24	2.21
	COV %	4.33	4.29	2.05	6.79	1.78	2.75	6.24	7.16	4.19	0.52	1.94	13.53	9.04
# 2	MEAN	11.25	9.05	8.73	14.14	9.68	9.10	26.61	30.25	16.56	25.48	12.00	34.73	17.3
	VARIANCE	0.14	0.06	0.12	0.09	0.10	0.07	0.80	0.63	0.51	1.50	0.13	1.46	0.47
	COV %	3.29	2.69	3.98	2.12	3.30	2.99	3.36	2.61	4.32	4.81	2.95	3.48	3.95
# 3	MEAN	11.24	9.03	8.28	13.95	8.89	9.60	26.66	27.10	15.81	32.01	12.22	33.06	17.3
	VARIANCE	0.18	0.10	0.06	0.27	0.05	0.17	3.52	2.18	0.12	2.19	0.21	9.00	1.50
	COV %	3.79	3.43	2.88	3.72	2.54	4.31	7.03	5.45	2.23	4.62	3.79	9.08	7.08
# 4	MEAN	11.24	9.03	8.28	13.95	8.89	9.60	26.66	27.10	15.81	32.01	12.22	33.06	17.3
	VARIANCE	0.18	0.10	0.06	0.27	0.05	0.17	3.52	2.18	0.12	2.19	0.21	9.00	1.50
	COV %	3.79	3.43	2.88	3.72	2.54	4.31	7.03	5.45	2.23	4.62	3.79	9.08	7.08
# 5	MEAN	12.37	15.85	10.42	15.37	9.38	10.59	30.29	31.48	17.24	30.94	12.23	N/A	17.8
	VARIANCE	0.20	0.51	0.52	0.02	0.16	0.12	2.68	2.67	0.43	0.08	0.01	N/A	0.67
	COV %	3.61	4.52	6.90	0.94	4.31	3.21	5.41	5.19	3.79	0.93	0.58	N/A	4.60
# 6	MEAN	10.51	9.45	9.17	14.24	10.20	9.54	28.86	28.21	18.05	27.67	12.66	34.26	17.7
	VARIANCE	0.02	0.34	0.41	0.04	0.06	0.70	0.23	0.38	0.09	0.41	0.02	6.41	0.76
	COV %	1.27	6.15	7.00	1.34	2.45	8.75	1.65	2.18	1.64	2.32	1.13	7.39	4.91
# 7	MEAN	14.79	12.79	12.46	16.92	13.04	13.33	32.83	33.88	19.50	28.15	14.38	37.42	20.8
	VARIANCE	0.08	0.13	0.47	0.10	0.32	0.77	1.52	0.58	0.14	0.63	0.18	8.26	1.10
	COV %	1.95	2.82	5.53	1.86	4.32	6.58	3.76	2.24	1.94	2.82	2.97	7.68	5.04
# 8	MEAN	11.50	9.00	9.67	13.92	10.54	9.88	26.67	28.46	15.80	23.00	12.18	31.60	16.9
	VARIANCE	0.06	0.44	0.33	0.52	0.41	0.20	5.26	2.22	0.69	0.67	0.64	0.94	1.03
	COV %	2.17	7.35	5.97	5.19	6.08	4.56	8.60	5.24	5.26	3.57	6.59	3.06	6.03
# 9	MEAN	11.19	9.76	9.13	13.92	9.43	9.74	28.36	28.81	16.85	24.09	12.57	30.92	17.1
	VARIANCE	0.02	0.02	0.06	0.74	0.25	0.01	1.42	1.19	0.18	1.86	0.04	2.77	0.71
	COV %	1.32	1.43	2.67	6.17	5.32	0.77	4.20	3.79	2.54	5.66	1.65	5.39	4.95
# 10	MEAN	10.80	9.60	9.48	15.08	9.04	9.67	27.19	28.17	16.42	25.16	12.55	36.08	17.4
	VARIANCE	0.03	0.29	0.20	0.11	0.01	0.06	0.59	1.36	1.38	0.46	0.82	1.23	0.55
	COV %	1.61	5.60	4.71	2.23	1.19	2.47	2.82	4.15	7.16	2.70	7.22	3.08	4.24
# 11	MEAN	N/A	9.73	11.06	14.72	9.73	10.03	26.90	26.90	15.93	N/A	11.17	28.28	16.4
	VARIANCE	N/A	0.14	0.34	1.03	0.14	0.35	1.52	0.54	0.17	N/A	0.05	2.66	0.69
	COV %	N/A	3.85	5.30	6.90	3.85	5.91	4.58	2.74	2.58	N/A	1.98	5.77	5.07
# 12	MEAN	10.68	8.88	9.52	12.88	9.25	9.89	25.88	26.47	15.71	22.13	11.83	23.03	15.5
	VARIANCE	0.48	0.01	0.05	0.39	0.24	0.05	4.84	3.10	0.68	0.20	0.50	0.85	0.95
	COV %	6.46	1.34	2.24	4.83	5.31	2.35	8.50	6.65	5.24	2.01	5.95	4.01	6.28
# 13	MEAN	N/A	10.04	10.79	14.17	9.84	11.61	27.63	35.07	18.20	19.10	11.39	33.53	18.3
	VARIANCE	N/A	0.05	0.05	0.48	0.02	0.10	2.11	4.51	0.93	0.35	0.23	0.56	0.85
	COV %	N/A	2.22	1.97	4.91	1.59	2.76	5.26	6.05	5.31	3.10	4.19	2.24	5.05
# 14	MEAN	N/A	9.93	9.66	14.74	9.30	10.23	25.77	26.81	17.09	24.52	12.95	36.96	18.0
	VARIANCE	N/A	0.05	0.08	0.18	0.39	0.34	0.53	3.29	0.66	0.24	0.68	7.82	1.30
	COV %	N/A	2.31	2.92	2.89	6.75	5.69	2.83	6.76	4.74	1.98	6.37	7.57	6.33
REPRODUCIBILITY (BETWEEN LABS)														ALL LABS
ALL LABS	STATISTIC	MIX 1	MIX 2	MIX 3	MIX 4	MIX 5	MIX 6	MIX 7	MIX 8	MIX 9	MIX 10	MIX 11	MIX 12	ALL MIXES
	MEAN	11.59	10.17	9.84	14.32	9.80	10.30	27.62	29.19	17.06	25.42	12.35	32.82	17.5
	VARIANCE	1.42	3.57	1.27	1.26	1.12	1.32	5.27	7.90	1.64	12.70	0.75	17.81	4.60
COV %	10.28	18.58	11.45	7.83	10.79	11.17	8.31	9.63	7.51	14.02	7.01	12.86	12.25	



**Figure A-2. Pooled Statistics For Surface Resistivity Data @ 56 Days**

LAB No.	STATISTIC	REPEATABILITY (WITHIN LAB)												POOLED STATISTICS
		MIX 1	MIX 2	MIX 3	MIX 4	MIX 5	MIX 6	MIX 7	MIX 8	MIX 9	MIX 10	MIX 11	MIX 12	
# 1	MEAN	15.60	13.67	17.07	23.10	14.37	11.57	46.33	57.47	28.60	40.80	20.37	35.48	27.0
	VARIANCE	0.28	0.30	0.33	1.48	0.06	0.04	12.46	11.64	0.84	1.00	0.20	5.80	2.87
	COV %	3.39	4.03	3.38	5.27	1.75	1.80	7.62	5.94	3.20	2.45	2.21	6.79	6.27
# 2	MEAN	15.33	12.40	15.87	22.50	14.57	12.43	50.00	51.00	25.40	43.23	23.23	35.91	26.8
	VARIANCE	0.26	0.93	0.21	0.31	0.25	0.05	3.01	0.91	1.39	5.50	0.05	2.37	1.27
	COV %	3.35	7.78	2.91	2.47	3.46	1.86	3.47	1.87	4.64	5.43	0.99	4.28	4.20
# 3	MEAN	15.23	15.87	15.90	23.63	14.00	11.00	45.87	50.13	25.73	51.47	N/A	36.75	27.8
	VARIANCE	0.37	0.21	0.19	0.94	0.21	0.19	2.30	6.02	2.36	0.80		12.48	2.37
	COV %	4.01	2.91	2.74	4.11	3.27	3.96	3.31	4.90	5.97	1.74		9.61	5.54
# 4	MEAN	16.77	15.70	18.40	24.77	20.00	12.83	45.30	40.53	27.40	42.03	20.67	37.45	26.8
	VARIANCE	0.00	0.43	0.19	0.16	0.91	0.06	2.08	0.86	3.37	4.50	0.06	6.82	1.62
	COV %	0.34	4.18	2.37	1.63	4.77	1.96	3.18	2.29	6.70	5.05	1.22	6.97	4.75
# 5	MEAN	12.37	14.30	18.47	22.70	13.83	13.17	47.10	51.73	24.03	44.50	20.23	N/A	25.7
	VARIANCE	0.16	0.19	1.45	0.07	0.33	0.37	5.53	4.46	6.14	0.37	0.20		1.75
	COV %	3.27	3.05	6.53	1.17	4.17	4.64	4.99	4.08	10.31	1.37	2.23		5.16
# 6	MEAN	14.17	14.43	18.23	24.10	14.10	12.17	49.13	47.77	Outlier	38.50	19.30	36.26	26.2
	VARIANCE	6.16	2.56	2.24	0.09	0.28	1.10	1.20	1.74		0.97	0.03	4.49	1.90
	COV %	17.52	11.09	8.21	1.24	3.75	8.63	2.23	2.76		2.56	0.90	5.84	5.26
# 7	MEAN	20.43	18.07	22.13	28.43	19.93	15.80	57.03	59.27	33.83	46.57	23.80	42.22	32.3
	VARIANCE	0.20	0.34	1.61	0.26	0.22	0.28	2.86	3.10	0.01	0.41	0.13	8.12	1.46
	COV %	2.21	3.24	5.74	1.80	2.37	3.35	2.97	2.97	0.34	1.38	1.51	6.75	3.75
# 8	MEAN	16.17	11.97	17.10	23.70	15.93	11.53	46.10	51.43	25.93	42.73	22.47	34.69	26.6
	VARIANCE	0.02	1.00	0.37	1.33	0.32	0.26	12.09	10.01	1.34	3.10	1.40	0.43	2.64
	COV %	0.89	8.37	3.56	4.87	3.57	4.45	7.54	6.15	4.47	4.12	5.27	1.89	6.10
# 9	MEAN	15.50	9.77	17.80	25.00	15.37	11.93	49.48	54.07	27.03	45.23	24.00	37.15	27.7
	VARIANCE	0.07	0.02	0.13	2.17	0.25	0.00	1.63	1.45	0.25	0.40	1.72	4.99	1.09
	COV %	1.71	1.56	2.03	5.89	3.28	0.48	2.58	2.23	1.86	1.40	5.46	6.01	3.77
# 10	MEAN	15.83	13.93	17.47	25.83	14.20	11.63	47.83	48.17	26.37	40.37	21.07	41.02	27.0
	VARIANCE	0.00	1.82	0.65	0.24	0.07	0.10	2.77	5.50	1.84	3.64	1.65	3.95	1.85
	COV %	0.36	9.69	4.63	1.91	1.86	2.76	3.48	4.87	5.15	4.73	6.10	4.84	5.05
# 11	MEAN	16.73	13.27	17.20	24.63	15.13	11.80	41.13	41.63	N/A	39.40	18.27	N/A	23.9
	VARIANCE	0.14	0.17	0.84	1.37	0.09	0.37	8.12	3.44		1.72	0.44		1.67
	COV %	2.26	3.14	5.33	4.76	2.02	5.15	6.93	4.46		3.33	3.65		5.41
# 12	MEAN	12.67	11.83	15.67	19.97	13.80	11.00	41.23	39.60	22.00	34.33	17.97	31.73	22.7
	VARIANCE	0.37	0.17	0.02	0.72	0.39	0.04	9.10	16.27	1.33	1.85	0.26	3.76	2.86
	COV %	4.82	3.52	0.98	4.26	4.53	1.82	7.32	10.19	5.24	3.97	2.86	6.11	7.46
# 13	MEAN	N/A	15.83	21.70	24.87	16.67	13.17	41.80	40.67	24.70	N/A	N/A	38.84	26.5
	VARIANCE		0.20	0.02	1.16	0.50	0.00	5.07	4.30	0.37			0.30	0.99
	COV %		2.85	0.58	4.34	4.26	0.44	5.39	5.10	2.46			1.42	3.77
# 14	MEAN	N/A	13.70	16.87	23.63	13.93	12.27	41.07	43.80	26.37	39.27	20.73	N/A	25.2
	VARIANCE		0.31	0.17	0.10	0.54	0.32	6.41	5.97	2.54	1.36	0.01		1.78
	COV %		4.06	2.47	1.36	5.29	4.64	6.17	5.58	6.05	2.97	0.56		5.30
REPRODUCIBILITY (BETWEEN LABS)														ALL LABS
ALL LABS	STATISTIC	MIX 1	MIX 2	MIX 3	MIX 4	MIX 5	MIX 6	MIX 7	MIX 8	MIX 9	MIX 10	MIX 11	MIX 12	ALL MIXES
	MEAN	15.46	13.91	17.85	24.06	15.42	12.31	46.39	48.38	26.45	42.19	21.01	37.05	26.6
	VARIANCE	4.55	4.56	4.02	3.95	4.44	1.58	22.02	42.40	9.04	18.57	4.19	11.23	11.01
COV %	13.80	15.35	11.23	8.26	13.66	10.20	10.12	13.46	11.37	10.22	9.74	9.05	12.46	

**Figure A-3. Pooled Statistics For Surface Resistivity Data @ 91 Days**

LAB No.	STATISTIC	REPEATABILITY (WITHIN LAB)												POOLED STATISTICS
		MIX 1	MIX 2	MIX 3	MIX 4	MIX 5	MIX 6	MIX 7	MIX 8	MIX 9	MIX 10	MIX 11	MIX 12	
# 1	MEAN	19.57	15.50	23.07	33.13	20.67	13.40	67.87	78.13	35.33	64.93	32.73	35.30	36.6
	VARIANCE	0.26	0.49	0.24	3.24	0.01	0.07	33.01	11.80	1.56	2.08	0.20	6.56	4.96
	COV %	2.62	4.52	2.14	5.44	0.56	1.97	8.47	4.40	3.54	2.22	1.38	7.26	6.08
# 2	MEAN	17.63	15.90	24.27	35.53	24.63	13.70	67.07	75.67	35.07	58.33	30.77	42.40	36.7
	VARIANCE	0.16	6.19	1.20	2.77	3.94	0.13	16.86	2.58	1.52	1.54	0.25	0.54	3.14
	COV %	2.29	15.65	4.52	4.69	8.06	2.63	6.12	2.12	3.52	2.13	1.64	1.73	4.82
# 3	MEAN	18.67	15.27	22.20	33.13	18.77	12.83	66.53	80.33	33.37	65.50	34.33	41.08	36.8
	VARIANCE	0.14	0.17	0.63	0.56	0.08	0.26	1.56	16.30	0.64	22.39	1.86	45.15	7.48
	COV %	2.03	2.73	3.58	2.27	1.54	4.00	1.88	5.03	2.40	7.22	3.98	16.36	7.43
# 4	MEAN	22.57	20.07	25.70	34.87	22.27	14.17	63.57	69.30	36.50	52.47	N/A	47.15	37.1
	VARIANCE	0.30	0.74	0.84	0.12	0.52	1.20	60.65	1.83	4.99	4.12	N/A	24.55	9.08
	COV %	2.44	4.30	3.57	1.01	3.25	7.74	12.25	1.95	6.12	3.87	N/A	10.51	8.11
# 5	MEAN	21.63	17.37	24.70	31.30	20.40	15.43	64.10	29.40	33.57	55.27	29.40	N/A	31.1
	VARIANCE	1.00	0.90	1.69	0.19	0.09	0.01	15.91	0.39	1.34	2.72	0.39	N/A	2.24
	COV %	4.63	5.47	5.26	1.39	1.47	0.75	6.22	2.12	3.45	2.99	2.12	N/A	4.81
# 6	MEAN	20.70	17.53	27.37	39.87	21.07	14.33	58.20	59.63	30.10	57.30	29.67	34.97	34.2
	VARIANCE	0.07	4.84	1.80	1.14	0.86	1.56	0.52	0.65	0.04	8.71	0.37	7.11	2.31
	COV %	1.28	12.55	4.91	2.68	4.41	8.72	1.24	1.36	0.66	5.15	2.06	7.63	4.44
# 7	MEAN	25.60	23.63	32.77	43.13	27.50	15.13	80.50	74.67	41.63	63.53	36.67	40.10	42.1
	VARIANCE	0.07	1.70	3.76	3.02	0.61	0.56	15.25	1.29	0.22	2.92	0.50	2.03	2.66
	COV %	1.03	5.52	5.92	4.03	2.84	4.96	4.85	1.52	1.14	2.69	1.93	3.56	3.88
# 8	MEAN	20.30	15.87	25.50	35.07	22.10	12.83	67.37	84.37	33.90	62.83	33.87	32.83	37.2
	VARIANCE	0.49	2.06	1.21	2.54	0.49	0.46	29.12	29.56	2.41	8.37	2.65	0.66	6.67
	COV %	3.45	9.05	4.31	4.55	3.17	5.30	8.01	6.44	4.58	4.61	4.81	2.47	6.94
# 9	MEAN	20.33	18.73	26.77	36.83	21.20	13.53	70.57	81.33	35.57	64.30	35.97	36.83	38.5
	VARIANCE	0.00	0.17	0.80	6.09	0.31	0.00	8.84	2.64	0.25	4.81	6.81	3.61	2.86
	COV %	0.28	2.22	3.35	6.70	2.63	0.43	4.21	2.00	1.42	3.41	7.26	5.16	4.40
# 10	MEAN	20.53	17.90	26.60	37.33	20.40	13.00	69.03	71.87	33.30	56.60	31.40	39.48	36.5
	VARIANCE	0.24	3.13	1.27	0.44	0.09	0.07	5.29	10.57	4.71	8.04	1.99	2.97	3.23
	COV %	2.40	9.88	4.24	1.78	1.47	2.04	3.33	4.52	6.52	5.01	4.49	4.36	4.93
# 11	MEAN	21.03	18.27	24.20	34.90	20.23	11.03	72.07	68.70	30.50	47.33	27.70	N/A	34.2
	VARIANCE	0.17	0.09	0.91	2.17	0.12	0.14	23.20	5.08	0.01	4.92	0.93	N/A	3.63
	COV %	1.98	1.67	3.94	4.22	1.74	3.43	6.68	3.28	0.33	4.69	3.48	N/A	5.57
# 12	MEAN	16.80	14.27	20.50	28.37	18.93	12.63	57.80	52.60	26.00	45.33	24.33	32.90	29.2
	VARIANCE	0.49	0.02	0.16	0.06	0.30	0.02	24.39	3.13	0.81	22.45	0.52	5.23	4.80
	COV %	4.17	1.07	1.95	0.89	2.91	1.21	8.54	3.36	3.46	10.45	2.97	6.95	7.50
# 13	MEAN	N/A	20.60	26.66	31.60	22.93	12.27	N/A	N/A	29.73	58.33	31.07	39.17	30.3
	VARIANCE	N/A	0.03	0.20	1.96	0.37	0.02	N/A	N/A	2.81	2.44	2.33	0.91	0.92
	COV %	N/A	0.84	1.66	4.43	2.66	1.25	N/A	N/A	5.64	2.68	4.92	2.43	3.18
# 14	MEAN	N/A	16.87	22.10	33.37	18.53	13.50	58.43	64.17	29.37	52.27	30.77	N/A	33.9
	VARIANCE	N/A	0.46	0.61	0.04	0.80	0.37	5.45	11.09	4.85	1.92	0.16	N/A	2.58
	COV %	N/A	4.04	3.53	0.62	4.84	4.51	4.00	5.19	7.50	2.65	1.31	N/A	4.73
REPRODUCIBILITY (BETWEEN LABS)														ALL LABS
ALL LABS	STATISTIC	MIX 1	MIX 2	MIX 3	MIX 4	MIX 5	MIX 6	MIX 7	MIX 8	MIX 9	MIX 10	MIX 11	MIX 12	ALL MIXES
	MEAN	20.39	17.70	25.17	34.89	21.40	13.41	66.39	68.47	33.14	57.45	31.44	38.38	35.46
	VARIANCE	5.17	6.93	9.25	14.19	6.02	1.48	50.27	212.71	15.30	38.93	11.78	23.98	32.40
COV %	11.15	14.87	12.08	10.80	11.47	9.08	10.68	21.30	11.81	10.86	10.92	12.76	16.05	

# **Appendix B**

## **Pooled Statistics Surface Resistivity Data**

**Figure B-1. Surface Resistivity Data Reported For Mix #1 @ 28 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	11.5	11.5	10.5	11.2	11.2	10.7	10.6	11.1	11.0	0.39
	10.8	10.7	9.9	11.0	10.2	11.8	11.6	11.3	10.9	0.66
	12.0	11.2	12.3	11.7	12.2	11.8	11.7	11.6	11.8	0.35
# 2	11.1	12.0	11.7	11.9	11.1	11.9	11.6	11.8	11.6	0.35
	11.2	11.2	11.0	11.5	11.2	11.1	11.0	11.5	11.2	0.20
	10.5	11.9	10.4	10.9	10.5	11.9	10.2	10.9	10.9	0.66
# 3	11.3	10.8	10.9	11.0	11.4	10.7	10.3	10.8	10.9	0.37
	12.2	11.2	10.9	12.6	12.4	11.3	10.9	12.1	11.7	0.70
	11.1	10.8	11.1	11.5	11.2	10.4	11.3	11.7	11.1	0.41
# 4	11.7	11.2	11.6	12.5	11.3	11.0	11.9	11.9	11.6	0.48
	12.3	11.8	11.2	11.3	11.7	12.1	11.2	11.5	11.6	0.41
	11.6	12.2	12.5	13.0	11.6	12.1	12.4	13.0	12.3	0.54
# 5	11.5	11.9	11.8	12.3	11.4	12.0	12.4	12.3	12.0	0.37
	12.2	12.5	12.6	12.0	12.2	12.5	12.5	12.0	12.3	0.24
	12.8	12.2	13.2	13.2	12.9	12.3	13.1	13.0	12.8	0.39
# 6	10.1	10.3	11.3	10.9	10.2	10.3	11.3	10.7	10.6	0.46
	10.3	10.5	10.2	11.1	10.4	10.7	9.9	11.1	10.5	0.43
	10.7	10.0	10.3	10.5	10.6	10.1	10.3	10.5	10.4	0.26
# 7	15	14	16	14	14	14	16	14	14.6	0.92
	15	14	14	15	14	14	15	16	14.6	0.74
	15	14	15	16	15	15	15	16	15.1	0.64
# 8	11	12	11	11	11	12	11	11	11.3	0.46
	12	11	12	11	12	11	12	11	11.5	0.53
	12	11	12	12	12	11	12	12	11.8	0.46
# 9	12.2	12.0	11.1	10.5	11.5	12.1	10.9	10.5	11.4	0.70
	10.8	11.0	11.2	11.5	10.1	11.1	11.3	11.5	11.1	0.46
	11.4	10.5	11.6	11.1	11.4	10.5	11.6	11.1	11.2	0.44
# 10	10.5	9.8	10.7	10.6	10.5	11.0	10.8	10.9	10.6	0.37
	10.7	10.8	10.8	10.8	10.8	10.9	11.5	11.0	10.9	0.25
	10.8	10.8	10.7	11.1	11.0	10.9	10.9	10.9	10.9	0.12
# 11	N/A									
# 12	10.7	11.3	11.7	11.3	11.0	11.7	10.8	11.1	11.2	0.37
	9.2	10.1	10.0	9.7	10.0	10.2	10.0	10.0	9.9	0.32
	11.7	10.7	11.0	10.3	11.6	10.7	11.0	10.6	11.0	0.49
# 13	N/A									
# 14	N/A									

**Figure B-2. Surface Resistivity Data Reported For Mix #2 @ 28 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	10.5	8.9	8.9	9.5	10.5	8.7	9.1	9.5	9.5	0.71
	9.2	8.6	8.4	8.1	9.2	8.6	8.4	8.9	8.7	0.40
	10.3	9.0	8.5	8.4	10.5	9.1	8.6	8.7	9.1	0.82
# 2	9.1	8.3	8.6	9.5	9.1	8.3	8.6	9.5	8.9	0.49
	10.0	8.6	8.5	8.7	9.8	8.8	8.3	8.8	8.9	0.62
	8.9	9.5	9.8	9.1	8.9	9.6	10.0	8.8	9.3	0.46
# 3	8.5	8.5	8.8	8.8	8.5	8.9	8.6	9.3	8.7	0.27
	9.2	9.2	8.4	8.9	9.5	9.1	8.7	9.3	9.0	0.36
	8.6	9.4	10.6	8.3	8.7	9.6	10.8	8.7	9.3	0.93
# 4	10.4	10.1	10.7	10.3	10.5	9.7	11.0	10.3	10.4	0.39
	9.8	9.5	10.3	10.4	10.0	9.3	10.2	10.4	10.0	0.42
	9.9	10.2	10.9	10.2	9.9	10.3	10.5	10.2	10.3	0.32
# 5	16.1	15.4	17.0	17.1	16.1	15.5	16.9	17.3	16.4	0.75
	16.2	16.5	16.3	15.4	16.2	16.6	16.2	15.3	16.1	0.48
	14.4	15.2	14.8	15.9	14.7	15.4	14.9	15.1	15.1	0.46
# 6	8.4	8.3	8.2	10.5	8.4	8.3	8.1	10.5	8.8	1.04
	10.5	10.0	8.4	9.2	10.7	10.1	8.3	9.2	9.5	0.91
	10.5	10.0	8.4	9.2	10.7	9.7	11.3	10.3	10.0	0.92
# 7	13	13	13	13	13	13	13	13	13.0	0.00
	13	13	12	11	13	13	12	12	12.4	0.74
	12	13	13	13	13	13	14	13	13.0	0.53
# 8	10	9	9	10	10	9	9	10	9.5	0.53
	9	8	8	8	9	8	8	8	8.3	0.46
	9	9	9	10	9	9	9	10	9.3	0.46
# 9	10.0	9.7	9.6	10.3	10.0	9.7	9.5	10.3	9.9	0.31
	9.6	9.8	9.6	9.9	9.7	10.0	9.9	9.8	9.8	0.15
	9.2	10.0	10.2	9.3	9.2	10.0	9.7	9.3	9.6	0.41
# 10	10.3	8.9	10.3	9.5	10.0	9.1	10.2	9.6	9.7	0.55
	9.2	9.8	8.2	8.4	9.9	9.9	8.3	8.4	9.0	0.77
	10.9	10.0	9.7	10.2	9.9	9.9	9.5	10.4	10.1	0.44
# 11	10.4	10.2	9.2	9.1	9.7	10.2	9.5	9.5	9.7	0.49
	10.5	10	9.4	10.6	10.7	9.7	9.5	10.5	10.1	0.53
	9.2	9.1	9.7	9.1	9.1	9.6	9.7	9.4	9.4	0.27
# 12	8.5	10	8.3	8.7	8.4	10	8.4	8.6	8.9	0.71
	8	8.3	9.3	9.6	8.2	8.2	9.2	9.3	8.8	0.64
	8.4	9.1	9.3	9.4	8.5	9	8.9	9.4	9.0	0.39
# 13	9.9	9.9	9.6	10.6	10.1	10.3	9.8	10.5	10.1	0.33
	9.4	9.2	10.1	10.2	9.3	9.2	10.3	10.7	9.8	0.58
	10.5	9.7	10.6	10.1	10.6	9.7	10.5	10.2	10.2	0.36
# 14	9.8	9.6	10.3	10.7	9.9	9.7	10.0	10.9	10.1	0.48
	9.3	9.3	9.8	10.3	9.3	9.4	9.6	10.4	9.7	0.45
	11.1	10.4	9.2	9.6	11.0	10.3	9.1	9.4	10.0	0.80

**Figure B-3. Surface Resistivity Data Reported For Mix #3 @ 28 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	8.6	8.8	8.9	8.9	8.6	8.7	8.9	8.9	8.8	0.14
	8.7	9.2	9.6	9.2	8.7	9.0	9.6	9.1	9.1	0.35
	9.0	9.1	9.1	8.8	9.1	9.1	9.1	9.2	9.1	0.12
# 2	9.2	9.1	9.1	9.1	9.0	9.3	9.1	9.1	9.1	0.09
	8.7	8.5	8.3	8.5	8.5	8.5	8.3	8.5	8.5	0.13
	8.7	8.3	8.6	8.6	8.7	8.4	8.6	8.8	8.6	0.16
# 3	8.3	8.3	8.4	8.6	8.3	8.6	8.3	8.5	8.4	0.14
	8.3	7.9	8.1	7.9	7.7	8.1	8.0	8.0	8.0	0.18
	8.3	8.5	8.5	8.7	8.5	8.3	8.3	8.2	8.4	0.16
# 4	9.6	10.2	10.4	10.1	10.4	10.4	10.8	10.3	10.3	0.34
	11.0	10.6	10.0	10.2	10.8	10.3	10.4	10.6	10.5	0.33
	10.5	10.4	10.0	10.1	10.7	10.6	9.9	10.3	10.3	0.29
# 5	9.9	9.7	9.6	9.5	9.9	9.6	10.1	9.3	9.7	0.26
	10.9	10.9	11.6	10.8	11.5	10.9	11.5	11.0	11.1	0.33
	10.7	9.9	10.7	10.5	10.5	10.2	10.5	10.4	10.4	0.27
# 6	9.0	8.6	8.7	8.4	9.0	8.6	8.7	8.3	8.7	0.25
	9.5	10.1	10.0	10.1	9.5	10.0	10.0	10.0	9.9	0.26
	9.0	9.1	8.9	8.8	9.0	9.1	8.9	8.8	8.9	0.12
# 7	12	12	12	12	12	12	12	13	12.1	0.35
	12	12	12	12	12	12	12	12	12.0	0.00
	13	13	14	13	13	13	13	14	13.3	0.46
# 8	9	9	9	9	9	9	9	9	9.0	0.00
	10	10	10	10	10	10	10	10	10.0	0.00
	10	10	10	10	10	10	10	10	10.0	0.00
# 9	8.9	9.4	8.5	9.1	8.9	9.5	8.8	9.1	9.0	0.32
	9.2	9.3	9.6	9.6	9.0	9.2	9.6	9.8	9.4	0.27
	9.1	8.8	9.0	9.0	9.3	9.0	8.7	8.8	9.0	0.19
# 10	10.2	10.0	9.9	9.9	10.2	10.0	9.9	9.8	10.0	0.15
	8.9	9.3	9.1	9.2	8.9	9.4	9.1	9.5	9.2	0.22
	8.9	9.5	9.7	8.8	8.8	9.5	9.7	9.2	9.3	0.39
# 11	10.7	10.8	10.8	10.7	10.6	10.8	10.9	10.9	10.8	0.10
	11.4	11.6	12.2	11.9	11.6	11.4	12	11.8	11.7	0.29
	10.3	10.7	11	10.5	10.4	10.9	10.9	10.7	10.7	0.25
# 12	9	9.2	9	9.8	9.1	9.3	9.3	9.8	9.3	0.32
	9.3	10.1	9.2	9.3	9.3	10	9.5	9.3	9.5	0.35
	9.5	9.6	10.1	9.5	9.5	10.1	10.1	9.5	9.7	0.30
# 13	11.5	10.9	10.9	10.4	11.7	10.9	11.1	10.8	11.0	0.41
	10.4	10.5	11.1	10.9	10.5	10.6	11.0	10.9	10.7	0.25
	10.9	10.6	10.5	10.7	10.8	10.6	10.5	10.5	10.6	0.16
# 14	10.1	9.7	9.7	9.8	10.1	9.7	9.8	9.8	9.8	0.17
	8.9	9.4	9.3	9.6	9.1	9.3	9.4	9.7	9.3	0.26
	10.0	9.7	9.7	9.6	9.9	9.6	10.0	10.0	9.8	0.18

**Figure B-4. Surface Resistivity Data Reported For Mix #4 @ 28 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	13.8	13.6	14.5	13.8	13.8	13.7	14.5	13.8	13.9	0.35
	12.2	12.5	12.7	12.1	12.1	12.6	12.8	12.0	12.4	0.31
	13.5	12.3	12.3	11.8	13.4	12.3	12.3	11.8	12.5	0.65
# 2	14.0	14.2	14.1	15.6	14.0	14.2	14.1	15.7	14.5	0.72
	14.9	13.1	14.7	13.2	14.8	13.1	14.7	13.1	14.0	0.88
	14.6	13.3	13.6	14.5	14.5	13.3	13.6	14.5	14.0	0.59
# 3	13.7	13.4	14.5	13.6	14.6	13.5	14.0	14.1	13.9	0.45
	13.6	13.8	13.7	13.0	13.2	13.4	13.9	13.0	13.5	0.35
	14.3	13.9	14.3	15.2	14.5	14.5	14.4	14.8	14.5	0.38
# 4	13.5	12.8	12.9	12.8	13.8	12.6	12.9	12.6	13.0	0.43
	13.3	13.4	13.4	14.4	14.8	13.8	13.6	13.8	13.8	0.53
	13.7	13.9	13.8	13.7	13.8	14.1	13.7	13.9	13.8	0.14
# 5	16.8	14.8	15.8	14.8	16.9	14.8	15.7	14.7	15.5	0.92
	15.1	15.9	15.0	15.1	15.8	15.5	14.9	14.9	15.3	0.40
	16.8	14.9	14.9	14.6	16.9	14.7	14.9	14.7	15.3	0.96
# 6	15.1	13.9	14.3	13.2	15.0	14.0	14.3	13.3	14.1	0.68
	14.8	14.0	15.1	14.0	14.7	14.0	15.1	14.0	14.5	0.51
	14.7	13.8	14.0	13.9	14.7	14.1	13.9	13.9	14.1	0.35
# 7	17	17	18	17	16	17	18	18	17.3	0.71
	16	17	17	16	16	17	18	16	16.6	0.74
	18	16	17	16	18	17	16	17	16.9	0.83
# 8	13	14	14	13	13	14	14	13	13.5	0.53
	14	13	14	13	14	13	14	13	13.5	0.53
	15	15	14	15	15	15	14	15	14.8	0.46
# 9	14.3	14.0	14.6	13.6	14.2	13.9	14.2	13.1	14.0	0.46
	15.1	13.9	13.6	15.1	15.2	15.3	14.6	15.1	14.7	0.65
	12.8	12.7	12.6	14.1	12.7	13.0	12.6	13.7	13.0	0.57
# 10	15.0	15.3	15.5	13.7	15.0	15.4	15.5	13.6	14.9	0.78
	14.6	14.5	15.2	15.4	14.2	14.4	15.3	15.5	14.9	0.51
	14.4	15.1	17.1	15.1	14.4	15.2	17.1	15.3	15.5	1.07
# 11	13.9	14.1	13.3	13.1	13.8	13.9	13.8	13.2	13.6	0.38
	14.2	15.1	14	15.9	14.7	15.1	14.1	15.9	14.9	0.76
	15.5	15.8	14.2	17	15.3	16.1	14.2	17.1	15.7	1.10
# 12	11.9	12	11.9	13.2	11.9	11.7	11.4	13.5	12.2	0.75
	13.1	13.2	13.2	13.4	13.4	13.5	13.8	13.5	13.4	0.22
	12.6	12.8	12.8	13.4	12.9	12.9	13.4	13.8	13.1	0.41
# 13	13.6	14.8	13.8	13.3	13.6	14.8	13.8	13.4	13.9	0.60
	15.2	15.0	14.9	14.8	15.1	15.1	14.8	14.9	15.0	0.14
	13.1	14.2	14.1	13.3	13.0	14.0	14.2	13.3	13.6	0.51
# 14	14.5	15.0	14.1	13.5	14.6	14.6	14.1	13.7	14.3	0.50
	14.9	15.0	15.2	13.5	15.2	15.4	14.7	15.0	14.9	0.59
	14.8	14.3	16.7	14.5	14.9	14.1	17.0	14.4	15.1	1.12

**Figure B-5. Surface Resistivity Data Reported For Mix #5 @ 28 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	9.4	9.2	9.8	10.0	9.4	9.2	9.3	9.8	9.5	0.31
	9.3	9.0	10.0	10.0	9.3	9.0	10.1	10.1	9.6	0.50
	9.4	9.5	9.1	9.1	9.4	9.6	9.1	9.0	9.3	0.23
# 2	9.6	10.5	9.8	10.2	9.6	10.6	9.8	10.3	10.1	0.40
	9.2	9.8	9.3	9.7	9.4	9.8	9.2	9.9	9.5	0.29
	9.3	9.6	9.8	9.2	9.2	9.5	9.9	9.2	9.5	0.28
# 3	9.0	9.4	9.0	9.0	9.1	9.3	9.1	9.1	9.1	0.15
	8.9	8.4	8.8	8.9	8.9	7.8	8.8	8.9	8.7	0.39
	8.5	9.3	8.6	9.1	8.3	9.3	8.6	9.2	8.9	0.40
# 4	9.9	9.0	8.9	8.9	10.0	9.3	8.9	8.6	9.2	0.51
	9.9	9.0	8.5	9.7	9.5	9.3	9.5	9.7	9.4	0.45
	9.7	9.8	9.6	9.7	9.6	9.5	9.8	9.5	9.7	0.12
# 5	9.0	10.0	9.5	9.2	9.2	10.0	9.5	9.2	9.5	0.38
	8.8	8.9	9.1	9.2	8.5	9.0	9.0	9.1	9.0	0.22
	10.1	9.7	9.1	10.1	10.1	9.7	9.3	9.9	9.8	0.38
# 6	9.7	9.6	11.0	10.7	9.7	9.8	10.9	10.7	10.3	0.60
	10.1	9.2	10.0	10.2	10.0	9.3	10.2	10.4	9.9	0.43
	10.8	9.9	11.1	9.8	10.9	10.0	11.1	9.8	10.4	0.61
# 7	14	14	13	13	14	14	14	13	13.6	0.52
	12	13	13	12	12	12	13	13	12.5	0.53
	12	13	13	14	12	13	13	14	13.0	0.76
# 8	10	11	10	11	10	10	10	11	10.4	0.52
	11	12	11	11	11	12	11	11	11.3	0.46
	10	10	10	10	10	10	10	10	10.0	0.00
# 9	9.0	9.2	8.3	10.1	9.0	9.3	8.1	10.2	9.2	0.75
	9.6	9.3	8.8	9.1	9.5	8.7	8.8	9.3	9.1	0.34
	10.2	9.6	9.3	10.2	10.2	10.5	10.0	10.1	10.0	0.38
# 10	8.7	8.9	9.3	9.2	8.7	8.8	9.6	9.3	9.1	0.33
	8.3	8.5	8.7	9.8	8.4	8.5	9.4	9.8	8.9	0.64
	9.3	9.1	9.0	9.2	8.8	9.4	9.0	9.3	9.1	0.20
# 11	10.4	10.2	9.2	9.1	9.7	10.2	9.5	9.5	9.7	0.49
	10.5	10	9.4	10.6	10.7	9.7	9.5	10.5	10.1	0.53
	9.2	9.1	9.7	9.1	9.1	9.6	9.7	9.4	9.4	0.27
# 12	9.2	8.8	8.7	8.7	9.3	8.8	9	8.6	8.9	0.25
	9.4	9.3	8.6	8.7	9.5	9.2	8.9	8.9	9.1	0.33
	9.6	10	10.1	9.6	9.3	9.9	10.2	9.8	9.8	0.30
# 13	10.0	10.0	9.9	9.5	10.0	10.2	10.0	9.6	9.9	0.21
	10.1	9.4	10.9	9.7	10.0	9.1	10.8	9.6	10.0	0.64
	9.2	9.6	9.8	9.8	9.3	9.9	9.8	9.9	9.7	0.27
# 14	9.5	9.7	10.0	9.6	9.5	9.6	9.7	9.7	9.7	0.16
	9.3	10.0	9.9	9.8	9.3	9.6	9.4	10.0	9.7	0.30
	8.6	7.9	8.8	8.9	8.6	8.1	8.7	9.0	8.6	0.38



**Figure B-6. Surface Resistivity Data Reported For Mix #6 @ 28 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	9.8	10.4	9.9	9.5	10.0	10.6	9.8	9.6	10.0	0.38
	9.5	9.3	9.6	9.8	9.2	9.3	9.6	9.9	9.5	0.25
	9.0	9.0	9.6	10.1	9.0	9.0	9.9	10.1	9.5	0.52
# 2	9.2	9.4	9.6	9.5	9.2	9.3	9.5	9.5	9.4	0.15
	8.9	8.9	8.5	9.2	8.9	9.0	8.4	9.2	8.9	0.29
	9.1	8.8	8.8	9.2	9.2	8.8	8.9	9.3	9.0	0.21
# 3	9.5	8.8	9.7	9.3	9.4	8.5	9.8	9.3	9.3	0.43
	10.2	9.9	9.8	10.3	9.8	9.9	9.9	10.8	10.1	0.35
	9.0	10.0	9.3	9.3	8.9	9.9	9.6	9.8	9.5	0.42
# 4	12.0	11.1	11.7	11.3	11.9	10.6	12.0	10.9	11.4	0.54
	11.8	11.0	11.5	10.6	11.6	11.6	11.4	10.5	11.3	0.49
	11.5	11.0	10.7	11.4	11.3	11.0	10.9	11.4	11.2	0.29
# 5	11.8	11.1	10.5	10.6	11.2	11.4	10.5	10.6	11.0	0.49
	10.3	10.1	10.7	10.0	10.0	10.5	10.9	10.0	10.3	0.35
	10.8	10.3	10.8	10.3	10.7	10.4	10.8	10.2	10.5	0.26
# 6	9.8	9.6	8.8	9.8	9.8	9.7	8.8	10.0	9.5	0.47
	11.1	9.8	10.7	9.9	11.2	9.8	10.8	9.9	10.4	0.61
	8.9	8.9	8.5	8.6	8.8	8.9	8.5	8.6	8.7	0.19
# 7	12	13	12	13	12	13	12	13	12.5	0.53
	14	15	14	14	14	15	14	14	14.3	0.46
	14	13	13	13	14	13	13	13	13.3	0.46
# 8	10	10	9	10	10	10	9	10	9.8	0.46
	10	10	10	11	10	11	10	11	10.4	0.52
	10	9	9	10	10	9	9	10	9.5	0.53
# 9	10.4	8.9	9.5	9.9	10.1	9.1	9.6	9.8	9.7	0.50
	9.9	9.7	9.5	10.2	10.4	9.6	9.4	9.8	9.8	0.34
	9.7	10.2	9.3	9.7	9.6	10.2	9.5	9.8	9.8	0.32
# 10	9.7	8.9	9.7	10.0	10.0	8.9	9.8	10.1	9.6	0.48
	9.2	9.4	8.7	10.3	9.2	9.4	8.9	10.5	9.5	0.63
	10.1	9.7	9.6	10.3	10.1	9.8	9.5	10.3	9.9	0.32
# 11	10.1	9.7	10.7	10.7	10.2	9.8	10.6	10.9	10.3	0.45
	10.1	10.2	11.1	9.7	10.7	11.2	10	10.3	10.4	0.54
	8.8	9.7	9.4	9.7	8.8	9.2	9.6	9.6	9.4	0.38
# 12	10	9.6	10.6	8.9	10.1	10	10.7	9	9.9	0.66
	9.3	10.2	9.6	9.5	9.4	10.1	9.7	9.6	9.7	0.32
	9.6	10.3	9.8	10.7	9.6	10.3	9.8	11	10.1	0.52
# 13	11.0	10.9	11.5	12.2	11.0	10.9	11.5	12.5	11.4	0.63
	12.1	11.9	11.8	12.1	12.3	11.9	11.8	12.1	12.0	0.17
	11.9	11.4	11.4	10.9	12.0	11.4	11.4	11.0	11.4	0.41
# 14	11.1	9.2	10.7	9.5	11.0	9.4	10.3	9.8	10.1	0.75
	11.2	11.0	10.9	10.4	11.0	11.2	10.9	10.3	10.9	0.34
	9.7	10.6	9.0	9.9	9.6	10.2	9.1	9.6	9.7	0.53

**Figure B-7. Surface Resistivity Data Reported For Mix #7 @ 28 days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	26.6	26.5	27.1	27.5	26.8	26.5	27.1	27.3	26.9	0.38
	23.3	23.7	25.2	23.0	23.1	24.0	24.8	23.3	23.8	0.81
	25.7	23.2	24.0	26.6	25.5	22.8	24.8	27.5	25.0	1.63
# 2	25.5	26.2	25.9	28.9	25.3	26.5	26.0	28.9	26.7	1.44
	26.2	25.7	25.7	25.4	26.1	25.6	25.5	25.4	25.7	0.30
	28.6	26.6	28.4	26.3	28.5	26.6	28.4	26.5	27.5	1.06
# 3	28.3	25.9	26.4	26.9	28.7	26.0	27.0	26.5	27.0	1.03
	29.7	27.6	29.2	27.2	30.0	26.7	29.5	27.0	28.4	1.36
	24.2	25.5	25.8	28.4	23.9	25.2	26.0	18.2	24.7	2.94
# 4	28.6	27.9	26.9	30.5	29.3	30.9	30.1	31.2	29.4	1.53
	27.2	25.9	28.2	28.4	28.7	25.8	28.1	28.1	27.6	1.13
	26.0	25.4	27.5	26.4	26.1	25.0	27.2	26.9	26.3	0.87
# 5	32.9	28.8	30.9	30.6	32.8	30.0	29.8	29.7	30.7	1.47
	29.1	33.4	31.9	32.0	29.4	33.4	32.0	32.3	31.7	1.62
	28.3	29.6	29.1	26.6	29.6	29.7	27.8	27.2	28.5	1.20
# 6	26.6	30.8	28.8	28.7	27.1	31.1	28.8	28.7	28.8	1.56
	30.5	29.3	29.4	28.3	30.6	29.1	29.4	28.2	29.4	0.88
	29.2	27.2	27.7	29.2	29.2	27.3	27.7	29.7	28.4	1.02
# 7	38	36	33	33	34	35	32	33	34.3	1.98
	34	31	31	35	33	31	30	33	32.3	1.75
	33	31	32	32	33	32	32	31	32.0	0.76
# 8	26	27	26	24	26	27	27	24	25.9	1.25
	29	29	29	29	30	29	30	29	29.3	0.46
	24	24	25	26	23	24	26	27	24.9	1.36
# 9	28.0	28.1	25.3	25.2	28.2	28.6	26.9	25.6	27.0	1.43
	26.7	28.0	29.7	30.8	27.8	28.2	29.5	31.3	29.0	1.59
	26.7	30.6	28.5	30.9	26.1	30.7	28.1	31.2	29.1	2.02
# 10	26.2	25.3	29.7	29.9	27.5	25.8	30.3	29.6	28.0	2.07
	25.6	25.2	28.8	27.5	24.9	25.2	27.5	27.6	26.5	1.48
	27.9	26.8	27.8	25.6	27.6	26.6	27.9	25.8	27.0	0.94
# 11	28.5	27.1	26.9	28.8	28.1	27.1	27.5	30.1	28.0	1.09
	26.8	24.1	25.6	26.2	27.1	24.2	25.7	24.9	25.6	1.12
	24.9	28	27.7	27.4	25.2	27.9	28.3	27.5	27.1	1.31
# 12	23.8	26	24.9	23.6	23.5	25.1	25.3	24	24.5	0.92
	23	26.1	24.8	23.4	25.8	25.1	25.3	24	24.7	1.12
	27.7	29.8	27.1	28.9	28.5	29.4	26.8	29.1	28.4	1.10
# 13	27.7	29.2	26.7	29.7	27.5	29.5	26.6	30.8	28.5	1.54
	24.7	26.1	26.7	26.3	24.5	26.0	26.6	26.7	26.0	0.88
	27.7	27.4	30.8	28.0	27.1	27.1	30.9	28.8	28.5	1.57
# 14	25.6	28.1	26.0	26.3	25.8	28.6	25.6	26.3	26.5	1.16
	25.9	26.1	24.6	24.0	25.5	25.8	25.1	23.7	25.1	0.90
	26.9	24.9	25.6	25.3	25.3	26.4	25.4	25.6	25.7	0.65

**Figure B-8. Surface Resistivity Data Reported For Mix #8 @ 28 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	28.9	25.6	25.9	28.8	29.0	25.3	26.4	28.9	27.4	1.69
	31.8	30.4	27.8	29.8	32.1	30.2	28.0	29.9	30.0	1.55
	26.7	26.5	25.5	25.8	26.9	26.0	25.7	25.7	26.1	0.53
# 2	30.2	28.4	30.1	30.7	30.1	28.6	29.9	30.1	29.8	0.81
	30.1	29.1	29.3	29.8	30.4	30.4	29.4	30.1	29.8	0.51
	30.3	31.6	31.8	30.6	30.2	31.8	32.0	31.0	31.2	0.73
# 3	26.8	25.4	26.7	29.3	27.5	25.3	26.4	29.7	27.1	1.63
	25.1	25.5	25.4	26.4	25.3	26.1	25.2	25.8	25.6	0.46
	28.9	29.7	26.7	27.5	30.1	29.3	28.9	27.3	28.6	1.23
# 4	28.9	29.6	29.1	29.4	29.6	28.1	29.3	29.5	29.2	0.50
	30.9	28.4	29.4	27.1	30.4	27.6	29.4	28.3	28.9	1.32
	28.2	31.1	27.6	31.5	27.7	31.4	28.9	31.4	29.7	1.78
# 5	31.1	34.4	32.8	31.5	34.1	33.9	32.5	31.2	32.7	1.34
	31.9	28.7	29.8	28.8	31.7	27.7	29.2	29.2	29.6	1.47
	31.7	33.0	33.2	31.4	30.4	33.3	32.3	31.8	32.1	1.01
# 6	28.5	30.1	28.4	29.3	29.1	29.7	28.3	27.9	28.9	0.76
	29.5	28.5	27.1	26.6	29.0	28.9	27.2	26.7	27.9	1.16
	28.6	27.7	27.0	28.0	27.9	27.8	27.1	28.1	27.8	0.52
# 7	34	34	36	34	33	35	35	34	34.4	0.92
	33	33	33	33	33	33	33	33	33.0	0.00
	34	34	34	34	34	35	34	35	34.3	0.46
# 8	31	29	31	29	32	29	31	29	30.1	1.25
	27	29	28	28	28	28	28	28	28.0	0.53
	28	27	27	27	28	28	26	27	27.3	0.71
# 9	30.0	30.3	29.2	28.6	29.6	30.3	29.5	28.5	29.5	0.70
	26.2	27.6	28.2	28.6	26.6	26.9	28.1	28.2	27.6	0.88
	29.4	28.8	29.5	29.5	29.5	29.0	29.7	29.6	29.4	0.31
# 10	29.2	27.1	25.8	28.6	29.2	26.9	25.7	28.0	27.6	1.41
	25.1	29.4	27.2	27.7	25.4	29.6	27.3	27.7	27.4	1.62
	31.2	28.4	30.3	29.1	30.4	27.5	30.6	28.6	29.5	1.29
# 11	25.4	26.6	26	26.9	26.7	27.6	26.4	27.3	26.6	0.70
	25.3	28.7	28.7	26.4	27	29.5	29.4	26.9	27.7	1.54
	24	25.1	27.6	29	25.8	26.5	26.2	26.6	26.4	1.52
# 12	27.6	29.1	26.3	26.2	26.6	29.2	26.4	26.9	27.3	1.23
	27	22.6	23.7	24.6	26.8	22.9	23.6	24.4	24.5	1.65
	27.7	28.7	25.3	29	27.6	28.3	25.1	29.7	27.7	1.67
# 13	35.7	36.4	37.3	38.5	36.8	36.0	37.3	38.5	37.1	1.05
	33.3	32.4	33.7	33.2	32.4	31.2	33.9	32.6	32.8	0.87
	37.0	34.1	35.3	33.9	36.7	35.1	36.1	34.3	35.3	1.19
# 14	27.8	29.8	29.1	27.8	27.5	29.5	29.2	28.1	28.6	0.89
	27.3	26.6	27.4	26.5	27.4	26.1	27.5	26.1	26.9	0.60
	26.0	23.1	25.0	25.8	26.0	23.1	25.0	25.8	25.0	1.22

**Figure B-9. Surface Resistivity Data Reported For Mix #9 @ 28 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	16.6	19.4	17.7	17.3	17.5	19.5	17.7	17.0	17.8	1.06
	16.0	17.6	18.0	16.4	17.2	18.2	18.3	16.7	17.3	0.87
	16.8	16.7	16.7	15.5	16.9	16.2	16.8	15.7	16.4	0.55
# 2	15.9	16.4	17.1	16.6	15.8	16.4	17.1	16.6	16.5	0.48
	17.2	17.0	17.6	17.4	17.4	17.1	17.4	17.4	17.3	0.20
	15.9	15.8	15.9	15.9	15.8	15.9	16.0	15.9	15.9	0.06
# 3	15.7	16.7	16.6	15.7	15.9	16.8	16.8	15.5	16.2	0.57
	16.2	15.8	15.8	15.6	15.6	15.6	15.4	15.6	15.7	0.25
	15.5	15.8	14.5	15.9	15.4	16.2	14.8	16.0	15.5	0.59
# 4	18.3	19.3	19.1	17.9	19.1	20.0	19.3	18.4	18.9	0.68
	18.9	18.7	18.7	20.4	20.5	18.2	18.8	20.4	19.3	0.94
	16.1	17.4	18.3	16.2	16.9	17.8	17.8	17.4	17.2	0.78
# 5	17.7	17.1	17.8	15.8	18.0	17.0	18.2	17.0	17.3	0.77
	18.1	18.2	18.3	17.5	18.5	17.3	17.4	17.5	17.9	0.47
	16.5	15.6	16.5	17.0	16.8	16.7	16.4	16.9	16.6	0.44
# 6	17.0	18.6	18.9	16.9	16.9	18.2	18.3	16.9	17.7	0.87
	17.9	17.4	19.7	17.9	17.6	17.6	18.9	18.2	18.2	0.78
	18.6	18.4	17.4	18.8	17.9	19.1	17.3	18.7	18.3	0.67
# 7	19.2	19.2	18.9	18.8	19.4	19.3	18.8	19.1	19.1	0.23
	19.1	19.6	20.8	21	18.8	19.4	19.7	20.2	19.8	0.78
	20.6	18.6	19.2	20.4	19.2	18.7	19.4	20.7	19.6	0.85
# 8	15.1	14.8	15.1	14.6	15.2	14.8	15.4	14.7	15.0	0.28
	15.6	15.8	15.9	15.6	15.5	15.8	16.4	15.8	15.8	0.28
	15.9	16.9	17.1	16.5	16.1	16.9	17.1	16.5	16.6	0.45
# 9	16.5	17.7	16.9	15.6	16.4	18.5	17.2	15.2	16.8	1.08
	17.3	17.3	15.7	15.7	17.2	15.7	15.7	17.3	16.5	0.84
	16.7	16.9	18.0	17.3	17.2	16.8	18.1	17.6	17.3	0.53
# 10	16.3	16.9	17.9	17.0	17.0	17.4	17.9	17.0	17.2	0.54
	14.5	14.6	16.5	14.8	14.8	14.1	16.6	14.6	15.1	0.94
	16.7	17.1	16.8	17.1	16.4	17.9	17.0	17.1	17.0	0.44
# 11	15.6	16.9	14.8	17.9	16.4	16.4	15	18.2	16.4	1.25
	15	15.8	16.3	15.6	15	15.6	16.2	15.5	15.6	0.48
	15.6	15.2	16	16.2	16.3	14.9	16	16	15.8	0.50
# 12	17.1	16	16.7	16	17.3	16.3	17.3	16.3	16.6	0.55
	14.6	14.7	15.8	16.1	14.8	15.2	16.1	16.6	15.5	0.76
	15.2	15.2	14.2	15.2	15.2	15.1	14.7	15.4	15.0	0.39
# 13	18.3	16.2	16.1	17.6	18.2	16.4	15.8	18.2	17.1	1.08
	19.6	18.4	18.2	18.7	20.0	19.1	18.0	19.3	18.9	0.71
	19.1	18.3	18.2	19.0	18.8	18.0	18.1	19.2	18.6	0.49
# 14	17.0	16.8	14.9	16.2	17.2	16.5	15.0	16.3	16.2	0.86
	17.0	16.9	17.5	18.0	16.9	16.5	16.9	17.8	17.2	0.52
	17.4	17.6	17.6	18.8	17.2	18.1	17.3	18.8	17.9	0.65

**Figure B-10. Surface Resistivity Data Reported For Mix #10 @ 28 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	22.7	22.8	22.0	23.3	22.6	22.6	21.8	22.1	22.5	0.49
	23.5	20.8	22.5	22.5	22.6	20.9	23.0	22.3	22.3	0.95
	22.7	20.7	21.6	24.2	24.2	21.7	21.6	22.7	22.4	1.27
# 2	24.5	24.5	24.5	25.2	24.5	24.7	24.1	24.6	24.6	0.31
	24.9	25.0	25.5	25.2	25.3	24.7	24.2	25.1	25.0	0.40
	26.7	26.9	26.9	26.9	26.9	27.0	27.0	26.7	26.9	0.12
# 3	32.5	31.1	30.5	32.5	30.9	28.6	27.8	28.6	30.3	1.80
	35.1	37.2	33.7	33.7	27.3	32.7	30.8	31.3	32.7	2.99
	36.2	32.0	31.4	33.7	33.4	35.3	31.2	30.8	33.0	1.99
# 4	25.1	24.4	28.0	27.3	24.8	25.7	27.3	25.0	26.0	1.38
	25.4	24.9	23.5	26.1	25.2	26.1	24.1	26.9	25.3	1.11
	25.9	26.0	24.8	28.3	24.5	24.2	30.0	26.3	26.3	1.99
# 5	33.9	28.0	30.7	30.8	34.4	29.2	30.6	29.1	30.8	2.26
	33.2	29.4	31.6	30.6	31.6	30.8	32.2	30.7	31.3	1.15
	30.8	31.3	29.1	30.5	31.4	32.2	30.5	29.9	30.7	0.96
# 6	26.8	27.9	26.4	27.7	27.3	28.0	26.0	29.3	27.4	1.04
	23.1	28.1	28.3	27.1	26.2	29.9	27.9	26.9	27.2	1.99
	27.5	28.6	29.7	28.3	27.2	28.4	29.5	28.0	28.4	0.88
# 7	26.7	30	29.7	28.2	27.6	29.8	29.5	28.8	28.8	1.19
	26.8	27.7	27.9	27.2	27.7	26.5	27.8	26.5	27.3	0.59
	28.5	27.8	28.3	28	29.3	28.5	29.2	27.7	28.4	0.60
# 8	21.1	22.5	22.6	21.9	21.3	22.7	22.6	22.3	22.1	0.63
	22.9	23.3	22.9	25	22.9	24.3	23.2	25.5	23.8	1.04
	22.6	23.8	22.2	23.5	22.8	24.2	22.3	23.7	23.1	0.76
# 9	24.9	26.0	25.9	23.2	25.0	24.6	28.1	24.0	25.2	1.49
	24.9	22.9	22.6	21.4	22.0	22.7	22.9	21.2	22.6	1.15
	24.6	25.5	23.9	23.5	24.1	26.1	24.8	23.4	24.5	0.96
# 10	25.4	26.5	25.2	25.7	25.9	27.1	25.1	25.4	25.8	0.69
	24.0	26.3	26.5	24.3	24.8	25.8	26.2	24.2	25.3	1.04
	26.4	23.8	24.0	23.7	26.6	24.2	23.1	23.7	24.4	1.31
# 11	N/A									
# 12	21.4	23	21.1	19.7	21.7	22.8	21.9	21.7	21.7	1.03
	21.9	22.5	20.8	21.5	21.8	22.8	23.2	22.8	22.2	0.80
	22	22.2	22.1	22.1	23.1	23.1	22.5	23.3	22.6	0.53
# 13	18.6	18.9	18.3	18.5	18.5	18.4	18.0	18.3	18.4	0.26
	18.9	19.9	19.7	19.3	19.0	19.6	19.3	19.8	19.4	0.37
	19.6	19.5	19.0	19.7	19.6	19.7	19.4	19.1	19.4	0.26
# 14	24.5	24.4	24.0	25.4	26.5	24.3	23.6	25.1	24.7	0.92
	22.6	25.7	22.7	24.4	22.9	26.2	22.9	24.3	24.0	1.42
	24.2	24.9	25.2	25.3	24.5	24.6	24.8	25.4	24.9	0.42

**Figure B-11. Surface Resistivity Data Reported For Mix #11 @ 28 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	11.8	11.4	12.0	11.5	11.7	11.4	11.8	11.6	11.7	0.21
	12.4	12.5	11.8	12.2	12.1	12.2	11.2	11.9	12.0	0.41
	11.9	11.4	12.5	12.1	12.2	11.4	12.8	12.2	12.1	0.49
# 2	12.4	12.4	12.4	12.2	12.7	12.6	12.4	12.2	12.4	0.17
	11.8	11.8	11.6	11.6	11.8	11.8	11.9	11.9	11.8	0.12
	11.7	11.9	12.0	11.8	11.6	11.8	11.9	11.9	11.8	0.13
# 3	12.0	11.7	11.9	12.6	12.3	11.9	11.9	12.2	12.1	0.28
	12.1	12.2	12.0	11.4	12.0	12.2	11.9	11.1	11.9	0.40
	12.3	12.6	13.6	12.4	13.1	12.5	13.0	12.4	12.7	0.47
# 4	13.3	13.2	12.9	11.5	12.2	12.0	13.2	12.3	12.6	0.67
	11.9	13.2	13.3	12.5	11.9	13.0	13.3	12.8	12.7	0.58
	12.8	12.9	13.4	12.7	13.0	13.3	13.5	13.0	13.1	0.29
# 5	11.9	12.0	12.7	12.1	12.2	12.4	12.4	12.8	12.3	0.32
	12.0	12.2	12.2	12.0	12.3	12.3	12.3	12.4	12.2	0.15
	11.9	12.8	11.6	12.8	11.6	12.6	12.6	11.5	12.2	0.58
# 6	13.3	12.4	12.5	12.1	13.3	12.0	12.5	12.1	12.5	0.50
	13.4	12.7	12.7	11.9	13.2	12.9	13.1	11.8	12.7	0.58
	12.8	11.9	13.6	12.6	12.5	12.7	13.5	12.7	12.8	0.55
# 7	15.1	14.9	14.3	15.1	15.1	15.1	14.8	14.5	14.9	0.31
	13.8	14.1	13.8	14.2	14.1	14.7	13.7	14	14.1	0.32
	13.9	13.8	14.7	14.8	14	13.7	14.3	14.6	14.2	0.43
# 8	11.4	11.2	11.5	10.7	11.6	11.3	11.7	10.9	11.3	0.34
	12	11.6	12.3	13.6	12.2	12	12.4	13.3	12.4	0.68
	12.3	12.6	13.3	12.9	12.5	12.7	13.4	13	12.8	0.39
# 9	12.3	13.7	12.5	12.1	12.7	13.8	12.7	12.3	12.8	0.64
	12.4	11.7	12.1	12.8	12.9	11.9	12.2	12.8	12.4	0.45
	11.9	12.3	13.3	13.7	11.8	11.9	12.3	13.5	12.6	0.78
# 10	11.4	11.3	11.7	11.5	11.6	11.4	12.0	11.2	11.5	0.25
	13.6	13.4	13.1	12.6	13.8	13.4	13.2	12.5	13.2	0.46
	12.1	12.8	13.3	13.3	12.1	13.2	13.3	13.3	12.9	0.54
# 11	10.6	10.5	11.3	11.3	11.3	10.3	10.7	11.3	10.9	0.43
	11	10.9	11.6	11.1	11.8	11.5	11.6	11	11.3	0.35
	11.2	11.7	11.1	11.5	11.2	11.3	11	11.2	11.3	0.23
# 12	12.3	12.5	11.5	12	11.9	11.8	11.9	11.8	12.0	0.31
	11.1	11	10.8	10.8	11.2	11.5	10.9	11.2	11.1	0.24
	12.5	12.6	12.7	11.8	12.7	12.6	13	11.7	12.5	0.46
# 13	12.3	11.7	11.9	11.4	12.4	12.2	12.0	11.6	11.9	0.35
	11.1	10.9	11.2	11.1	11.2	10.8	11.3	11.1	11.1	0.16
	11.0	10.8	11.7	11.0	11.1	10.9	11.8	10.8	11.1	0.39
# 14	1.2	14.5	13.6	12.7	13.3	14.9	13.0	12.8	12.0	4.43
	13.2	13.1	14.1	12.9	13.1	13.2	14.3	13.0	13.4	0.53
	13.3	12.5	14.8	13.2	13.4	12.9	14.5	13.3	13.5	0.78

**Figure B-12. Surface Resistivity Data Reported For Mix #12 @ 28 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	29.7	24.3	28.8	31.4	25.4	24.3	27.9	31.8	<b>28.0</b>	3.02
	34.9	39.8	37.1	34.8	34.7	38.1	36.0	34.7	<b>36.3</b>	1.91
	31.9	31.6	27.1	33.0	29.6	31.4	26.2	32.5	<b>30.4</b>	2.54
# 2	34.8	33.4	35.4	33.1	35.3	33.5	35.0	33.8	<b>34.3</b>	0.93
	36.1	34.6	35.2	38.4	36.1	34.4	35.4	38.4	<b>36.1</b>	1.56
	31.0	35.1	34.0	35.0	31.4	34.9	33.9	34.8	<b>33.8</b>	1.65
# 3	33.4	30.9	28.5	33.8	33.8	27.6	30.7	34.9	<b>31.7</b>	2.69
	39.0	35.0	37.6	34.7	35.5	36.0	38.5	35.6	<b>36.5</b>	1.65
	28.9	34.4	29.2	30.5	28.5	34.2	31.6	30.5	<b>31.0</b>	2.29
# 4	34.8	39.8	35.9	36.9	35.1	36.4	41.7	34.8	<b>36.9</b>	2.53
	30.9	38.5	33.6	32.4	31.6	41.3	33.0	30.9	<b>34.0</b>	3.82
	38.0	36.6	30.2	32.4	33.2	33.8	34.7	38.7	<b>34.7</b>	2.91
# 5	N/A									
# 6	26.9	34.7	35.3	34.7	31.2	34.2	35.7	34.1	<b>33.4</b>	2.94
	34.0	39.7	36.4	37.7	32.8	42.0	34.4	40.0	<b>37.1</b>	3.28
	37.0	31.3	26.9	33.4	36.1	28.1	32.0	33.7	<b>32.3</b>	3.54
# 7	40.4	41.2	40.9	42.9	39.4	39.6	39.5	42	<b>40.7</b>	1.27
	33.8	36.1	36.5	36.5	35	36.6	36.6	35.8	<b>35.9</b>	1.00
	36.5	36.2	36	35.1	37	35.3	34.5	34.7	<b>35.7</b>	0.90
# 8	33.2	33.9	29.4	34.3	31.3	33.8	31.5	34.3	<b>32.7</b>	1.79
	30.6	32.1	31.4	30.2	30.8	32.2	31.5	29.9	<b>31.1</b>	0.85
	33.1	29.3	30.9	30.4	33	29.2	30.2	31.8	<b>31.0</b>	1.52
# 9	33.2	28.9	32.8	30.3	34.2	31.9	35.3	30.7	<b>32.2</b>	2.13
	31.0	34.5	30.5	29.3	31.4	34.4	31.1	30.3	<b>31.6</b>	1.89
	29.0	27.5	30.2	28.4	30.4	27.8	30.7	28.2	<b>29.0</b>	1.25
# 10	36.6	36.5	35.3	37.4	36.6	36.3	35.5	37.4	<b>36.5</b>	0.77
	35.1	32.4	34.7	36.9	35.0	32.6	34.9	37.0	<b>34.8</b>	1.69
	36.5	36.0	36.6	38.5	36.2	36.4	36.9	38.5	<b>37.0</b>	0.99
# 11	29.4	29	28.5	33.3	29.1	29	32.6	29.8	<b>30.1</b>	1.81
	28.9	28.3	26.9	25.4	28.5	26	26.5	24.8	<b>26.9</b>	1.52
	27.5	26.8	29.2	30.3	22.6	26.6	29.6	30.2	<b>27.9</b>	2.58
# 12	27.7	24.6	24.5	19.2	26.9	25	23.7	20.9	<b>24.1</b>	2.84
	25.4	23.3	19.5	19.9	23.6	23.8	22	22.3	<b>22.5</b>	2.00
	25	22.8	22.6	21.9	21.7	21.7	21.7	22.8	<b>22.5</b>	1.12
# 13	32.5	32.6	32.5	32.8	32.8	32.8	32.7	32.8	<b>32.7</b>	0.14
	31.5	31.9	36.1	36.7	31.8	32.0	36.5	36.6	<b>34.1</b>	2.51
	30.8	33.7	35.3	34.4	31.7	34.4	34.7	35.0	<b>33.8</b>	1.63
# 14	33.0	33.0	38.0	36.0	32.0	32.0	36.0	36.0	<b>34.5</b>	2.27
	36.0	36.0	39.0	36.0	37.0	34.0	38.0	35.0	<b>36.4</b>	1.60
	40.0	42.0	40.0	41.0	39.0	41.0	36.0	41.0	<b>40.0</b>	1.85

**Figure B-13. Surface Resistivity Data Reported For Mix #1 @ 56 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	15.5	16.0	14.6	15.4	15.3	15.9	14.7	15.5	15.4	0.50
	15.3	16.0	14.7	15.2	15.3	15.6	14.6	15.1	15.2	0.45
	16.9	16.5	14.9	16.4	16.9	16.5	15.3	16.5	16.2	0.73
# 2	14.8	16.5	15.8	16.6	14.7	16.4	15.8	16.5	15.9	0.77
	15.4	15.1	15.1	15.1	15.5	15.1	14.8	15.3	15.2	0.22
	14.5	15.4	14.5	15.0	14.5	15.7	14.5	15.2	14.9	0.48
# 3	15.2	14.7	13.9	14.9	15.4	14.7	14.1	15.0	14.7	0.52
	17.0	15.7	16.0	15.9	17.1	15.1	14.7	15.7	15.9	0.83
	14.5	14.1	15.5	15.9	14.9	14.1	15.2	16.3	15.1	0.81
# 4	17.0	16.8	17.0	16.4	16.3	17.2	17.1	16.6	16.8	0.33
	17.2	16.0	18.2	16.2	16.8	16.9	16.6	16.3	16.8	0.70
	16.4	16.8	17.2	17.0	16.8	16.4	16.6	16.3	16.7	0.32
# 5	11.5	11.9	11.8	12.3	11.4	12.0	12.4	12.3	12.0	0.37
	12.2	12.5	12.6	12.0	12.2	12.5	12.5	12.0	12.3	0.24
	12.8	12.2	13.2	13.2	12.9	12.3	13.1	13.0	12.8	0.39
# 6	11.2	11.4	11.4	10.7	11.6	11.5	11.4	10.8	11.3	0.30
	15.3	15.8	15.3	16.0	15.3	15.8	15.1	16.1	15.6	0.39
	14.9	15.3	16.5	15.5	15.0	15.4	16.5	15.5	15.6	0.63
# 7	20	19	22	20	20	19	21	19	20.0	1.07
	21	20	20	21	20	20	20	21	20.4	0.52
	21	20	21	22	21	20	20	22	20.9	0.83
# 8	17	15	17	15	17	15	17	15	16.0	1.07
	17	16	16	16	17	16	16	16	16.3	0.46
	17	15	17	16	17	15	17	16	16.3	0.89
# 9	15.2	16.6	16.5	15.4	15.0	16.1	16.7	15.1	15.8	0.72
	14.9	15.0	15.2	15.7	15.1	15.0	15.5	15.6	15.3	0.31
	15.3	14.9	15.9	15.5	15.3	15.0	15.8	15.6	15.4	0.36
# 10	15.8	15.7	15.8	16.0	15.7	15.7	15.7	15.8	15.8	0.10
	15.8	15.8	16.1	15.8	15.7	15.7	16.0	15.8	15.8	0.14
	16.0	15.9	16.5	15.2	15.9	15.9	16.2	15.9	15.9	0.37
# 11	16.1	16.2	16.1	16.2	16.4	16.3	16.4	16.4	16.3	0.13
	17.1	16.6	16.9	17.8	16.8	16.3	16.8	17.8	17.0	0.54
	16.8	17.2	16.8	17.3	16.7	16.6	16.3	17.2	16.9	0.35
# 12	11.8	13.6	12.8	12.3	12	14	13.1	12.5	12.8	0.77
	12.1	11.7	12	12	12.3	11.8	12	12.1	12.0	0.19
	13.9	13.3	13.3	12.5	13.9	12.8	13.1	12.8	13.2	0.51
# 13	N/A									
# 14	N/A									



**Figure B-14. Surface Resistivity Data Reported For Mix #2 @ 56 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	15.7	13.2	13.4	14.2	16.2	13.3	13.5	14.3	14.2	1.15
	14.1	12.2	12.5	13.4	14.2	12.7	12.3	13.4	13.1	0.79
	15.2	13.4	12.5	13.5	15.4	13.3	12.8	13.1	13.7	1.07
# 2	12.3	11.6	11.0	11.9	12.2	11.6	11.0	11.9	11.7	0.49
	12.9	11.9	11.9	11.9	12.5	11.0	11.9	11.9	12.0	0.55
	13.3	13.2	13.7	13.8	13.2	13.4	13.8	13.2	13.5	0.27
# 3	16.5	16.3	16.6	16.2	16.5	16.3	16.6	16.2	16.4	0.17
	15.6	15.6	15.4	15.7	15.7	15.3	15.4	15.7	15.6	0.16
	15.8	15.2	15.8	15.6	15.8	15.2	15.6	15.6	15.6	0.25
# 4	16.4	15.1	17.7	16.2	16.3	16.4	17.0	15.1	16.3	0.87
	15.0	14.7	15.4	17.4	15.3	15.6	15.8	16.8	15.8	0.91
	15.8	15.1	15.0	14.9	15.2	14.1	14.7	15.3	15.0	0.49
# 5	13.4	14.0	14.9	13.8	13.6	14.2	14.3	14.0	14.0	0.46
	13.5	12.9	14.1	15.7	14.0	12.9	13.8	15.9	14.1	1.14
	14.8	14.4	16.9	13.4	14.5	14.8	16.4	13.4	14.8	1.26
# 6	12.1	11.5	12.0	15.6	12.1	11.7	11.9	15.5	12.8	1.70
	15.9	15.6	12.7	13.9	16.1	15.4	12.6	14.1	14.5	1.41
	15.5	15.2	17.4	15.9	15.5	15.2	17.5	15.8	16.0	0.94
# 7	18	19	19	18	19	19	18	18	18.5	0.53
	19	18	17	16	18	18	17	16	17.4	1.06
	18	18	19	18	18	18	19	18	18.3	0.46
# 8	14	12	13	13	14	12	13	13	13.0	0.76
	12	11	10	11	12	11	10	11	11.0	0.76
	11	11	12	13	12	11	12	13	11.9	0.83
# 9	10.0	9.7	9.6	10.3	10.0	9.7	9.5	10.3	9.9	0.31
	9.6	9.8	9.6	9.9	9.7	10.0	9.9	9.8	9.8	0.15
	9.2	10.0	10.2	9.3	9.2	10.0	9.7	9.3	9.6	0.41
# 10	14.5	14.8	15.8	16.5	14.8	14.6	15.5	15.5	15.3	0.69
	13.9	14.7	12.7	14.7	13.6	14.7	13.0	14.2	13.9	0.79
	13.3	14.1	11.9	11.9	13.2	13.5	11.5	11.7	12.6	0.99
# 11	12.7	14	13.5	12.9	13.2	14.2	13.6	13.4	13.4	0.51
	13.4	13.8	12.6	14.5	13.8	13.6	13.4	13.8	13.6	0.54
	12.3	13.7	13.4	12.8	12	12.8	13	12.5	12.8	0.56
# 12	10.6	12.1	11.3	11.7	10.7	12.2	11.4	11.9	11.5	0.60
	10.9	11.9	12.3	11.7	10.8	11.7	12.4	11.8	11.7	0.58
	11.7	12.5	11.6	13	11.5	12.3	12.3	13.1	12.3	0.61
# 13	15.7	16.8	15.1	15.9	15.8	16.7	15.1	15.7	15.8	0.64
	15.0	14.4	15.9	16.0	15.5	14.5	15.8	16.0	15.4	0.66
	16.4	15.7	17.0	15.8	16.8	15.7	16.9	16.3	16.3	0.55
# 14	14.0	13.8	14.0	14.8	14.0	13.7	13.9	15.0	14.2	0.48
	12.4	12.9	13.6	13.8	12.6	12.8	12.9	13.8	13.1	0.55
	14.9	14.4	12.9	12.6	15.1	14.5	13.0	12.8	13.8	1.04

**Figure B-15. Surface Resistivity Data Reported For Mix #3 @ 56 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	16.0	16.4	16.4	16.8	16.1	16.5	16.5	16.8	16.4	0.29
	16.6	17.7	17.9	17.6	16.6	17.6	18.1	17.2	17.4	0.56
	17.1	16.8	17.2	18.3	17.1	17.0	17.3	18.4	17.4	0.60
# 2	16.5	16.3	16.6	16.2	16.5	16.3	16.6	16.2	16.4	0.17
	15.6	15.6	15.4	15.7	15.7	15.3	15.4	15.7	15.6	0.16
	15.8	15.2	15.8	15.6	15.8	15.2	15.6	15.6	15.6	0.25
# 3	16.4	16.1	15.5	16.5	16.9	16.1	15.6	16.6	16.2	0.48
	15.4	15.8	15.5	14.6	15.1	15.7	15.2	15.6	15.4	0.38
	16.0	16.6	15.8	16.3	16.2	15.9	15.6	16.7	16.1	0.37
# 4	17.7	19.0	18.7	19.9	18.4	20.2	18.8	18.5	18.9	0.81
	17.7	18.3	18.2	18.3	18.2	18.9	17.8	17.8	18.2	0.39
	19.9	17.1	18.2	17.4	20.0	17.3	17.2	17.3	18.1	1.22
# 5	17.3	17.5	17.1	16.9	17.4	17.0	18.0	16.7	17.2	0.41
	19.3	19.3	19.9	19.3	19.4	19.7	20.6	19.2	19.6	0.47
	18.6	18.7	17.7	19.5	18.5	18.0	18.7	19.3	18.6	0.60
# 6	17.1	17.1	17.2	16.4	17.2	17.7	17.2	16.4	17.0	0.44
	18.8	20.4	20.1	19.9	19.2	20.9	19.5	20.1	19.9	0.68
	17.8	17.9	17.6	17.6	17.8	18.0	18.0	18.1	17.8	0.20
# 7	21	21	21	22	21	21	22	22	21.4	0.52
	21	22	21	22	21	21	21	22	21.4	0.52
	23	24	23	24	24	23	24	24	23.6	0.52
# 8	16	17	17	16	16	16	17	16	16.4	0.52
	17	17	18	18	17	17	18	17	17.4	0.52
	18	17	18	17	18	17	18	17	17.5	0.53
# 9	16.8	17.8	17.2	18.1	16.8	17.6	17.5	17.8	17.5	0.48
	17.1	17.3	18.7	19.4	17.6	17.6	18.8	18.9	18.2	0.87
	17.6	17.3	18.8	17.1	17.6	17.6	18.6	16.9	17.7	0.68
# 10	18.2	18.6	18.9	17.8	18.5	18.6	19.0	17.9	18.4	0.44
	16.8	17.1	16.8	17.2	16.6	17.2	16.7	17.2	17.0	0.25
	16.6	17.5	17.7	16.6	16.2	17.4	17.7	16.6	17.0	0.60
# 11	16	16.3	16.3	16.7	16.5	16.5	16.5	16.3	16.4	0.21
	17.8	18.2	18.5	18.5	17.9	17.6	18.5	18.8	18.2	0.42
	16.5	17	17	17.4	16.7	17	17.1	17	17.0	0.27
# 12	15.6	15.8	15	16.4	15.6	15.5	15	16.6	15.7	0.58
	16.5	16.1	14.9	14.8	15.4	16.2	15.1	15.3	15.5	0.64
	15.4	16.1	16.4	15.3	15.6	15.4	16.9	15.6	15.8	0.57
# 13	22.2	21.6	22.2	21.0	22.5	21.7	22.3	21.3	21.9	0.53
	21.3	21.1	22.4	21.5	21.0	21.4	22.7	21.7	21.6	0.61
	21.6	21.7	21.5	21.3	21.9	21.7	21.9	21.4	21.6	0.22
# 14	17.1	17.0	17.1	16.8	17.1	16.9	17.1	17.1	17.0	0.12
	15.5	16.0	16.2	17.5	15.9	16.0	16.2	17.7	16.4	0.79
	17.2	16.9	16.9	16.7	17.5	17.0	17.9	17.2	17.2	0.39

**Figure B-16. Surface Resistivity Data Reported For Mix #4 @ 56 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	24.1	24.6	24.9	24.5	23.6	24.5	25.5	24.1	24.5	0.57
	21.7	21.9	23.5	22.0	22.1	22.3	23.2	21.9	22.3	0.66
	24.0	22.1	23.1	21.5	23.0	21.9	22.9	21.6	22.5	0.87
# 2	23.1	23.7	21.5	23.6	23.3	23.6	21.4	23.7	23.0	0.97
	22.1	22.3	23.2	22.0	22.4	23.0	23.5	22.0	22.6	0.59
	23.2	21.4	20.9	22.5	22.8	21.0	20.5	22.6	21.9	1.03
# 3	24.0	21.9	23.8	23.4	23.6	22.7	24.3	23.1	23.4	0.77
	22.7	23.1	22.4	22.3	23.0	22.6	23.3	22.6	22.8	0.35
	23.8	24.0	24.6	25.0	23.4	25.7	25.4	25.3	24.7	0.84
# 4	25.0	23.2	25.4	24.3	25.5	23.5	22.7	25.0	24.3	1.07
	24.5	24.6	23.7	25.2	25.4	25.2	22.9	28.1	25.0	1.53
	23.3	26.0	24.3	25.6	24.7	26.8	24.0	25.4	25.0	1.15
# 5	23.3	22.8	22.4	23.5	23.2	22.1	22.5	23.0	22.9	0.49
	22.6	23.2	22.8	21.3	22.3	23.5	22.4	21.3	22.4	0.80
	21.8	23.1	22.3	23.5	22.0	23.0	22.2	24.2	22.8	0.83
# 6	25.0	23.9	24.2	22.1	25.2	23.9	24.1	22.2	23.8	1.14
	25.0	23.0	25.0	24.3	25.0	23.7	24.7	24.5	24.4	0.72
	25.0	22.8	23.8	24.4	25.9	22.9	23.8	24.5	24.1	1.04
# 7	29	28	30	29	29	28	30	29	29.0	0.76
	27	28	30	27	28	28	30	28	28.3	1.16
	29	27	28	29	28	27	27	29	28.0	0.93
# 8	24	22	23	22	24	22	23	22	22.8	0.89
	24	22	24	23	24	22	24	23	23.3	0.89
	25	26	24	26	25	25	24	25	25.0	0.76
# 9	26.2	24.7	25.1	24.3	26.3	24.8	25.6	25.7	25.3	0.73
	26.7	25.0	26.2	27.7	26.1	25.5	26.3	27.0	26.3	0.84
	23.6	23.6	23.3	22.5	24.4	23.4	23.9	22.8	23.4	0.60
# 10	26.0	25.7	24.6	25.9	25.9	26.2	24.8	25.5	25.6	0.58
	25.4	24.8	26.6	25.6	25.1	25.4	25.6	25.2	25.5	0.53
	25.6	25.9	28.4	25.9	25.2	26.9	27.7	25.8	26.4	1.13
# 11	24.4	23	22.2	23.1	24	24	22.4	23.3	23.3	0.79
	25.3	25.3	24.3	27	25.4	25.1	24.7	26.8	25.5	0.95
	24.1	25	24.2	26.5	25.5	26.2	23.3	26.1	25.1	1.16
# 12	19.3	19	18.3	19.2	19.5	19.1	18.2	20.5	19.1	0.72
	20.8	20.9	20.7	20.5	21.1	20.6	21.2	20.5	20.8	0.26
	19.8	19.5	20.4	19.4	19.9	19.6	20.5	20.6	20.0	0.47
# 13	24.1	25.2	24.0	23.6	24.7	25.3	24.9	23.6	24.4	0.69
	26.6	26.0	25.6	25.6	26.9	26.3	25.7	26.0	26.1	0.48
	23.0	24.2	24.5	23.8	23.7	24.8	24.9	23.9	24.1	0.63
# 14	22.5	24.0	23.8	23.4	22.4	24.1	23.9	22.8	23.4	0.70
	23.4	23.8	24.1	22.9	23.4	23.5	23.0	23.6	23.5	0.39
	23.8	22.3	26.4	23.1	24.0	23.6	26.5	22.6	24.0	1.60

**Figure B-17. Surface Resistivity Data Reported For Mix #5 @ 56 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	14.4	13.9	13.8	14.7	13.8	14.9	14.9	15.0	14.4	0.52
	14.8	13.5	14.3	14.8	14.4	15.2	14.4	15.3	14.6	0.57
	15.0	14.3	13.4	13.7	14.7	14.4	13.4	13.6	14.1	0.62
# 2	14.9	15.2	14.8	15.3	14.9	15.3	14.8	15.2	15.1	0.22
	14.4	14.5	14.0	15.2	14.4	14.4	13.9	15.1	14.5	0.46
	14.0	14.1	14.7	13.4	13.9	14.0	14.7	13.7	14.1	0.45
# 3	13.9	14.6	14.3	14.4	14.9	14.3	14.5	14.2	14.4	0.28
	13.8	12.7	13.7	14.1	13.6	12.6	13.6	14.1	13.5	0.55
	13.4	14.5	13.7	14.3	13.7	14.5	13.9	14.5	14.1	0.45
# 4	17.6	20.8	20.7	22.8	24.1	18.6	23.4	20.2	21.0	2.29
	18.9	19.5	21.9	20.2	20.7	17.5	20.2	20.1	19.9	1.30
	20.0	18.5	20.2	19.0	18.5	20.3	17.7	18.2	19.1	1.00
# 5	12.6	13.3	13.8	14.6	12.4	14.1	13.7	13.5	13.5	0.73
	13.1	13.5	13.6	13.8	13.4	13.6	13.6	13.7	13.5	0.21
	15.4	14.6	14.1	14.4	15.0	14.5	13.8	14.5	14.5	0.50
# 6	15.0	12.8	15.8	14.6	14.4	12.7	15.9	14.4	14.5	1.20
	14.4	13.3	14.0	15.4	15.0	13.3	14.1	14.6	14.3	0.75
	13.1	13.8	13.4	13.9	12.8	13.9	13.6	13.9	13.5	0.45
# 7	20	20	21	20	21	20	21	19	20.3	0.71
	19	19	20	20	18	19	20	20	19.4	0.74
	19	20	21	21	19	20	20	21	20.1	0.83
# 8	16	17	16	16	16	17	16	17	16.4	0.52
	15	16	17	17	15	16	16	17	16.1	0.83
	16	15	15	15	15	15	16	15	15.3	0.46
# 9	16.3	15.1	14.2	15.8	16.0	15.3	14.6	14.9	15.3	0.72
	16.9	15.1	15.2	16.8	16.8	15.3	15.3	16.1	15.9	0.80
	14.2	15.0	13.9	15.9	15.6	14.0	16.1	14.5	14.9	0.88
# 10	13.7	13.5	14.9	14.6	13.5	13.5	14.8	14.6	14.1	0.64
	13.5	14.0	14.8	13.5	13.6	13.9	14.9	13.4	14.0	0.59
	14.5	14.1	14.2	14.9	14.6	14.1	14.5	14.7	14.5	0.29
# 11	15.1	15.2	14.9	15.3	16.3	16.1	15.1	15.4	15.4	0.50
	14.5	14.2	15.2	14.4	16.3	14.9	14.7	14.4	14.8	0.68
	16	15.4	15.3	14.7	14.8	15.3	15.2	14.7	15.2	0.44
# 12	14	13.5	12.7	12.5	13.7	13.6	13.5	12.9	13.3	0.53
	13.4	13.4	13.1	13.7	14	13.7	13.3	13.8	13.6	0.30
	14	14.2	14.7	14.4	14.1	14.6	15.1	14.6	14.5	0.36
# 13	16.8	16.7	17.5	16.3	17.1	16.6	17.5	16.3	16.8	0.49
	17.4	17.5	17.4	16.8	18.0	16.7	17.7	16.7	17.3	0.49
	14.9	16.1	16.0	16.3	15.3	16.1	16.1	16.4	15.9	0.51
# 14	14.0	14.1	14.1	14.2	14.3	14.5	14.2	14.1	14.2	0.16
	14.3	14.7	14.3	14.6	13.7	14.9	14.5	14.6	14.5	0.36
	13.9	11.9	13.2	13.3	13.9	12.0	13.3	13.1	13.1	0.76

**Figure B-18. Surface Resistivity Data Reported For Mix #6 @ 56 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	11.9	12.4	11.5	11.5	11.9	12.4	11.5	11.4	11.8	0.41
	10.9	11.0	11.8	11.9	11.2	11.1	11.9	11.6	11.4	0.42
	11.0	10.9	12.0	12.2	11.0	10.9	12.0	12.0	11.5	0.59
# 2	12.5	12.6	12.8	12.8	12.4	12.7	12.7	12.9	12.7	0.17
	12.7	12.3	11.6	12.7	12.7	12.3	11.6	12.7	12.3	0.48
	12.3	12.2	12.4	12.4	12.1	12.2	12.4	12.4	12.3	0.12
# 3	10.6	10.0	10.9	10.9	10.7	10.0	11.0	11.1	10.7	0.43
	11.3	11.3	11.4	12.0	11.3	11.4	11.6	11.8	11.5	0.25
	9.9	11.3	11.0	11.4	9.9	11.2	10.9	10.9	10.8	0.57
# 4	13.2	12.6	13.2	12.3	13.1	12.4	12.8	12.5	12.8	0.37
	13.2	13.6	13.2	12.3	13.5	13.8	13.2	12.3	13.1	0.56
	12.7	12.5	12.7	13.0	12.0	11.9	12.5	13.2	12.6	0.45
# 5	13.9	13.8	13.5	13.4	14.2	13.3	13.5	13.9	13.7	0.31
	12.7	12.1	13.0	12.6	12.8	11.7	12.7	12.6	12.5	0.42
	13.0	13.1	13.7	13.1	12.7	13.4	13.9	13.6	13.3	0.41
# 6	12.6	12.1	11.2	12.9	12.6	12.3	11.2	12.9	12.2	0.70
	13.9	12.6	14.2	12.6	13.9	12.6	14.0	12.1	13.2	0.83
	11.2	11.2	10.8	11.1	11.2	11.3	10.8	11.0	11.1	0.21
# 7	15	16	15	15	15	16	15	16	15.4	0.52
	16	17	16	16	17	17	16	16	16.4	0.52
	16	16	15	15	16	16	16	15	15.6	0.52
# 8	11	12	10	11	11	12	11	11	11.1	0.64
	12	12	12	13	12	12	12	12	12.1	0.35
	11	11	11	12	12	11	11	12	11.4	0.52
# 9	12.0	11.4	12.8	11.9	11.7	11.4	12.8	12.1	12.0	0.55
	12.2	12.0	11.5	12.0	12.1	11.8	11.5	12.3	11.9	0.30
	11.8	11.3	12.7	11.9	11.8	11.2	12.6	11.9	11.9	0.53
# 10	11.8	11.7	12.0	10.5	11.4	11.7	11.9	10.5	11.4	0.60
	11.2	11.4	10.5	12.5	11.2	11.4	10.9	12.8	11.5	0.78
	11.7	12.4	12.0	12.1	11.6	12.3	12.0	11.9	12.0	0.27
# 11	12	11.7	12.1	12.6	11.3	11.6	12.6	13.3	12.2	0.65
	12.4	11.2	11.8	12.8	12.6	11.3	12.1	12.8	12.1	0.64
	10.5	11.5	11.2	11.6	10.3	11.2	11.1	11.4	11.1	0.47
# 12	11.4	11.3	11.4	9.9	11.2	11	11.8	10.3	11.0	0.63
	10.6	11.5	10.6	10.6	10.6	11.3	10.8	10.7	10.8	0.36
	10.7	11.2	10.9	11.8	10.5	11.2	11	11.9	11.2	0.49
# 13	12.7	12.8	13.4	13.6	12.9	13.2	12.5	14.1	13.2	0.53
	14.1	13.1	13.0	12.9	14.2	13.4	12.5	12.0	13.2	0.75
	13.1	12.9	12.6	13.5	12.9	13.0	12.9	13.6	13.1	0.33
# 14	13.1	11.6	12.9	11.1	13.0	11.7	12.7	11.1	12.1	0.84
	13.2	12.0	13.0	13.4	13.1	12.5	13.1	13.1	12.9	0.47
	11.6	12.8	11.1	11.7	11.7	12.8	11.2	11.9	11.8	0.65

**Figure B-19. Surface Resistivity Data Reported For Mix #7 @ 56 days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	50.6	47.3	49.8	54.8	50.7	47.3	49.4	51.0	50.1	2.38
	43.0	43.3	44.7	42.5	42.8	43.8	42.0	42.5	43.1	0.85
	46.0	41.5	44.9	49.8	46.7	42.2	44.5	50.9	45.8	3.31
# 2	49.9	49.5	49.0	53.3	49.2	49.7	48.9	53.3	50.4	1.85
	47.8	52.1	46.6	46.0	47.7	51.9	46.6	46.0	48.1	2.51
	53.9	50.6	50.7	50.6	54.0	50.7	50.6	50.6	51.5	1.54
# 3	47.9	46.3	43.7	44.4	47.1	46.2	43.9	45.6	45.6	1.53
	46.5	49.5	48.4	45.0	47.8	49.7	47.0	46.3	47.5	1.63
	42.4	41.3	45.7	48.2	41.5	43.7	44.9	48.2	44.5	2.76
# 4	44.9	42.4	49.3	46.3	46.0	39.6	50.0	47.0	45.7	3.43
	47.1	44.7	46.5	47.9	49.3	46.3	45.8	44.3	46.5	1.64
	42.0	42.2	45.6	43.5	45.0	44.0	45.3	42.1	43.7	1.50
# 5	52.2	46.5	48.1	46.9	52.5	47.6	47.8	47.9	48.7	2.32
	45.2	51.1	48.9	48.3	44.5	50.1	48.4	48.8	48.2	2.26
	45.7	45.6	43.3	42.7	46.3	46.2	43.9	41.2	44.4	1.87
# 6	47.3	52.1	49.4	49.5	47.1	51.3	50.5	48.8	49.5	1.78
	49.5	52.0	51.6	47.7	49.5	51.8	50.2	47.3	50.0	1.81
	51.0	44.6	45.9	49.7	50.8	44.0	47.2	49.7	47.9	2.81
# 7	61	61	56	57	60	62	57	57	58.9	2.36
	57	54	52	59	57	56	52	58	55.6	2.67
	62	56	55	53	61	58	54	54	56.6	3.38
# 8	42	46	46	42	43	47	47	42	44.4	2.33
	51	49	50	50	52	49	49	51	50.1	1.13
	39	43	46	47	39	43	46	47	43.8	3.33
# 9	47.6	52.1	49.6	43.9	47.1	49.4	49.8	44.7	48.0	2.76
	48.3	50.2	48.8	51.7	46.5	54.2	50.0	53.6	50.4	2.64
	47.6	50.8	49.5	50.5	47.7	53.6	49.6	50.7	50.0	1.92
# 10	47.3	46.7	51.2	52.5	47.4	48.2	50.9	53.3	49.7	2.59
	48.2	49.5	45.6	43.9	45.3	48.8	45.5	44.8	46.5	2.07
	47.7	45.2	50.6	45.5	47.6	45.7	49.7	46.2	47.3	2.01
# 11	45.7	42.1	43.1	45.8	45	43.4	42.6	44.4	44.0	1.42
	40.9	36.4	37.5	35.5	41.6	37.6	40.9	36.3	38.3	2.42
	34.6	43	42.9	41.8	36.4	43.9	43.9	42.2	41.1	3.56
# 12	37	37.8	38.1	41.9	37.6	38.5	39.8	42.5	39.2	2.06
	36.2	40	38.6	40.9	37.8	41	40.7	43.2	39.8	2.19
	42.1	45.3	41.7	44.7	46.6	45.8	42.8	48.8	44.7	2.43
# 13	42.9	42.8	40.6	44.4	43.3	43.7	41.0	45.7	43.1	1.67
	37.2	37.3	41.8	41.3	37.1	34.4	41.9	42.3	39.2	3.00
	42.9	42.8	40.6	44.4	43.3	43.7	41.0	45.7	43.1	1.67
# 14	41.2	46.5	42.8	44.5	41.5	46.3	43.8	43.9	43.8	1.97
	40.5	40.1	38.3	36.3	40.1	40.2	38.7	36.5	38.8	1.69
	41.6	39.5	39.7	40.7	41.8	40.0	40.3	41.0	40.6	0.85

**Figure B-20. Surface Resistivity Data Reported For Mix #8 @ 56 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	57.6	54.2	55.9	54.5	57.0	54.3	55.6	52.9	55.3	1.57
	63.2	62.5	56.9	63.1	64.3	61.4	57.3	62.2	61.4	2.76
	58.0	55.1	55.3	55.6	57.8	54.8	54.0	55.0	55.7	1.44
# 2	50.4	49.6	49.6	50.4	50.3	49.5	49.6	50.4	50.0	0.43
	52.9	51.6	50.5	52.4	52.9	51.9	50.6	52.6	51.9	0.96
	51.7	50.8	51.6	50.8	51.0	50.6	51.5	50.8	51.1	0.43
# 3	48.5	49.0	50.4	53.6	48.4	48.2	51.4	52.8	50.3	2.11
	47.5	48.9	47.0	47.9	47.0	48.2	46.3	48.2	47.6	0.84
	53.9	53.2	52.2	49.9	55.0	53.6	52.7	49.8	52.5	1.85
# 4	40.5	40.4	40.9	44.0	41.4	39.5	40.7	45.0	41.6	1.92
	40.9	40.7	39.9	37.8	42.0	40.4	40.9	37.9	40.1	1.49
	37.5	41.2	38.7	41.5	38.6	40.3	38.3	42.7	39.9	1.84
# 5	54.1	55.1	52.9	50.6	53.5	55.1	52.7	51.0	53.1	1.69
	53.5	46.2	48.5	48.7	53.8	45.6	48.3	49.5	49.3	3.01
	50.3	53.9	51.3	54.6	51.0	55.0	52.0	54.4	52.8	1.86
# 6	48.2	49.4	48.5	50.6	48.3	53.1	47.4	48.4	49.2	1.83
	49.7	48.9	46.7	43.9	48.3	48.7	46.4	47.2	47.5	1.84
	45.5	46.1	46.4	47.2	47.1	46.3	47.3	46.6	46.6	0.62
# 7	59.7	60	61.3	59.2	58.9	58.9	60.7	59.7	59.8	0.85
	58.2	56.9	56.9	56.8	58.4	58.2	57.4	55.7	57.3	0.92
	61.3	62	59.4	59.6	60	62.7	59.9	61	60.7	1.20
# 8	55.1	53.2	55.2	52.9	57.6	54.9	56.6	54	54.9	1.60
	48.6	48.4	51	52.6	50.6	49.7	51.6	52.9	50.7	1.69
	48.2	48.6	47.8	45.8	49.8	52	50.1	47.2	48.7	1.92
# 9	55.5	54.4	54.1	54.7	56.0	55.8	56.1	54.8	55.2	0.77
	55.0	50.1	55.0	55.5	54.3	52.8	55.1	55.4	54.2	1.85
	53.5	53.2	53.1	53.8	48.6	53.5	52.5	54.0	52.8	1.75
# 10	49.6	45.5	43.6	46.2	49.6	45.7	43.6	46.3	46.3	2.31
	47.3	48.3	47.6	46.0	46.8	47.8	48.5	46.6	47.4	0.86
	53.2	47.7	53.2	48.4	53.5	48.4	53.7	48.5	50.8	2.77
# 11	40.8	41.1	42.9	39.8	39	40.6	45.4	45	41.8	2.37
	42.7	42.3	44.5	43.9	41.7	45.6	42	44.7	43.4	1.44
	35.7	38.9	39.3	41.5	38.1	41	40	43	39.7	2.24
# 12	44.5	44.2	39.9	41.2	43.7	46.1	43.9	43.1	43.3	1.95
	39.6	35.1	31.1	32.8	39.7	35.2	31.1	37.5	35.3	3.47
	39.2	37.2	35.8	46.3	41.3	39.7	37.8	44.3	40.2	3.60
# 13	40.2	43.8	43.2	43.8	40.3	44.6	43.6	43.6	42.9	1.67
	40.4	36.7	37.3	39.9	40.0	37.2	38.4	40.8	38.8	1.63
	41.3	41.1	38.8	39.4	40.7	41.7	38.7	40.1	40.3	1.20
# 14	47.0	48.5	46.5	44.4	47.1	48.4	47.2	44.0	46.6	1.66
	41.0	40.6	43.2	42.4	43.5	42.9	43.3	44.9	42.7	1.39
	41.4	41.8	44.2	42.3	41.0	41.0	43.1	41.9	42.1	1.10

**Figure B-21. Surface Resistivity Data Reported For Mix #9 @ 56 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	28.9	31.9	30.5	28.4	29.1	31.7	29.5	26.5	29.6	1.78
	28.3	29.3	28.9	28.4	26.5	29.6	27.9	28.1	28.4	0.96
	28.1	27.9	28.5	25.5	28.5	27.8	28.9	27.2	27.8	1.07
# 2	24.4	24.5	24.2	24.2	24.6	24.3	24.2	24.7	24.4	0.20
	27.1	26.5	26.3	27.1	26.8	26.6	26.5	26.8	26.7	0.29
	25.4	24.6	25.1	25.8	25.7	24.4	25.0	25.0	25.1	0.49
# 3	29.8	29.7	28.8	26.2	25.5	27.0	27.1	25.7	27.5	1.74
	26.8	24.9	24.5	23.7	25.6	25.3	25.2	23.9	25.0	0.99
	23.7	26.3	23.4	24.5	24.4	26.6	23.9	24.4	24.7	1.18
# 4	28.9	29.1	27.1	28.9	28.4	29.2	26.1	27.7	28.2	1.11
	28.6	25.4	27.0	30.1	30.9	29.6	27.4	30.5	28.7	1.94
	24.1	25.3	26.6	24.2	24.1	27.5	25.9	25.0	25.3	1.26
# 5	26.4	24.4	27.2	22.6	25.9	23.5	27.3	23.2	25.1	1.87
	25.6	25.7	26.6	24.8	26.0	25.7	26.0	25.8	25.8	0.50
	24.2	22.8	23.8	24.0	24.4	2.6	24.1	24.0	21.2	7.55
# 6	50.5	51.4	48.8	52.1	49.5	52.6	49.3	51.2	50.7	1.38
	52.2	53.2	50.8	50.3	52.6	53.1	50.4	50.2	51.6	1.30
	50.8	50.7	51.0	52.0	52.7	50.1	51.2	52.3	51.4	0.89
# 7	35.1	33.7	33	33.5	33.9	34	32.2	34	33.7	0.84
	32.5	33.6	34.6	34.4	33.7	33.5	35	33.5	33.9	0.79
	36.1	31.2	33.3	34.8	35.4	32.2	33.2	34.8	33.9	1.68
# 8	25.6	24.1	25.3	23.8	25.5	24.4	25.3	23.7	24.7	0.80
	25.4	26.6	26.1	25.9	25.8	26.3	26.4	26.3	26.1	0.39
	25.9	27.4	27.7	26.9	26.5	27.3	27.5	27	27.0	0.59
# 9	26.7	25.5	26.2	27.4	26.3	25.4	25.7	28.4	26.5	1.03
	28.9	27.6	26.0	26.9	29.7	28.0	26.0	26.6	27.5	1.35
	25.2	29.4	27.6	25.1	25.4	30.3	29.1	24.6	27.1	2.28
# 10	27.6	26.5	26.4	28.9	28.6	26.0	25.5	27.6	27.1	1.23
	26.4	25.0	24.6	23.4	25.8	24.5	25.3	23.2	24.8	1.10
	26.7	27.2	27.4	27.1	26.5	27.6	28.0	27.3	27.2	0.48
# 11	N/A									
# 12	24.9	24.3	23.5	20.9	24	22.8	23.6	22.2	23.3	1.28
	21.3	21.9	20.3	21.3	20	21.2	21.3	21.5	21.1	0.63
	22.1	22.8	19.6	22.4	22.5	22	19.7	21.3	21.6	1.25
# 13	25.8	25.6	24.2	25.1	25.5	25.5	25.1	26.0	25.4	0.56
	25.8	23.0	23.9	25.3	25.5	22.2	23.9	25.4	24.4	1.32
	24.8	23.8	24.6	23.6	24.4	23.5	24.4	24.9	24.3	0.55
# 14	27.0	28.0	26.0	26.0	26.8	28.0	26.2	26.1	26.8	0.85
	24.7	26.0	23.7	24.8	24.5	25.5	23.5	24.1	24.6	0.85
	27.6	27.0	27.6	28.3	27.7	27.5	27.5	28.5	27.7	0.48



**Figure B-22. Surface Resistivity Data Reported For Mix #10 @ 56 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	39.5	39.9	40.6	41.5	40.8	40.7	40.3	43.1	40.8	1.11
	42.8	38.0	42.2	43.0	43.2	38.1	43.3	44.1	41.8	2.40
	43.6	36.5	39.1	42.2	42.5	36.3	37.5	40.7	39.8	2.86
# 2	41.3	39.6	39.9	41.0	41.4	40.0	40.0	41.3	40.6	0.75
	46.4	43.2	43.2	43.6	45.9	43.1	43.0	43.7	44.0	1.35
	45.4	43.9	45.2	45.1	45.9	45.1	45.0	45.1	45.1	0.56
# 3	49.3	48.9	49.2	53.4	51.1	50.2	51.8	54.4	51.0	2.04
	51.1	54.7	48.2	50.6	49.7	53.7	50.8	48.5	50.9	2.30
	54.5	52.5	51.4	49.8	53.1	55.4	51.9	51.2	52.5	1.83
# 4	35.7	38.9	41.3	44.2	40.1	39.0	42.7	40.5	40.3	2.59
	43.0	43.2	37.2	40.9	43.5	43.6	35.6	44.5	41.4	3.30
	44.9	44.3	44.3	46.2	45.8	44.2	40.0	45.6	44.4	1.94
# 5	48.3	42.2	43.7	42.5	44.4	44.8	44.3	42.7	44.1	1.95
	47.2	42.4	46.8	43.7	46.5	43.8	45.2	45.7	45.2	1.71
	49.1	38.4	41.5	46.7	45.5	40.2	47.0	44.9	44.2	3.73
# 6	37.6	38.1	35.7	39.6	38.8	38.4	33.7	37.6	37.4	1.89
	36.9	42.0	39.1	38.5	37.2	40.4	38.8	37.6	38.8	1.72
	38.5	38.6	41.6	37.9	38.6	39.3	40.9	38.9	39.3	1.29
# 7	43.9	47.8	50.8	44.8	44	48.6	51	47.5	47.3	2.84
	45.8	46.1	48	44.2	44.4	45.8	49	45.8	46.1	1.64
	47.3	46.6	44.5	47.1	46	46.6	45.1	47	46.3	1.01
# 8	37.8	40.9	39.9	42.6	38.9	41.3	42.2	42	40.7	1.70
	40.7	43.6	42.1	46.9	42.9	44.8	42.7	46.7	43.8	2.19
	42.6	46.7	38.9	44.7	44.4	47	40.2	45	43.7	2.92
# 9	43.0	40.2	40.7	73.9	42.9	39.3	41.0	43.4	45.6	11.55
	41.1	46.8	42.0	48.2	42.1	46.8	40.5	48.5	44.5	3.38
	49.1	42.9	45.1	47.1	47.4	43.8	40.9	48.6	45.6	2.92
# 10	41.7	41.5	43.7	42.1	41.7	40.0	43.3	40.2	41.8	1.30
	40.8	43.1	43.2	38.2	40.0	44.0	40.8	38.6	41.1	2.17
	41.7	37.1	35.6	38.2	41.8	37.3	35.8	38.1	38.2	2.38
# 11	37.9	38.4	37.2	36.6	36.6	39	40.2	37.9	38.0	1.23
	37.4	42.1	40.1	39.7	38.5	39.5	40.7	38.7	39.6	1.44
	42.1	38.5	40.4	40	42.1	42.2	38.4	40.7	40.6	1.54
# 12	35.4	33.7	28.9	32.5	36	33.6	28.7	33.7	32.8	2.71
	35.9	34.5	33.8	34.3	34.3	36.3	34.7	34.8	34.8	0.85
	34.7	34.3	33.7	36.7	35.9	36.4	34.8	36.8	35.4	1.19
# 13	N/A									
# 14	44.0	39.0	42.0	38.0	42.0	39.0	41.0	37.0	40.3	2.38
	38.0	43.0	35.0	39.0	38.0	40.0	33.0	38.0	38.0	3.02
	40.0	39.0	41.0	38.0	40.0	39.0	40.0	39.0	39.5	0.93

**Figure B-23. Surface Resistivity Data Reported For Mix #11 @ 56 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	20.5	21.3	19.7	20.9	21.2	22.2	20.6	20.2	20.8	0.76
	23.3	20.7	20.5	17.8	18.9	20.3	19.2	18.4	19.9	1.73
	20.6	20.5	20.9	19.8	21.3	19.5	20.4	20.2	20.4	0.58
# 2	23.3	23.8	23.1	23.4	23.5	23.7	23.5	23.3	23.5	0.23
	23.6	22.5	23.1	23.1	23.5	22.5	23.1	23.5	23.1	0.43
	23.2	22.6	23.8	22.5	23.3	22.7	23.8	22.6	23.1	0.54
# 3	N/A									
# 4	19.5	19.7	21.6	20.8	21.4	20.2	20.4	19.7	20.4	0.80
	19.4	22.3	22.1	20.1	19.3	21.6	20.5	20.1	20.7	1.18
	21.2	20.3	20.6	22.1	20.7	20.6	20.9	21.1	20.9	0.55
# 5	19.6	20.9	21.4	19.9	19.9	21.1	21.6	21.1	20.7	0.77
	18.9	20.1	19.8	20.0	19.1	20.3	19.9	20.1	19.8	0.50
	19.8	20.9	18.7	21.1	20.1	21.0	18.9	21.2	20.2	1.00
# 6	19.8	19.9	19.0	17.9	20.0	19.8	19.0	17.7	19.1	0.91
	18.9	18.8	20.9	19.0	19.3	18.8	20.5	19.0	19.4	0.82
	20.0	18.8	20.5	19.0	20.4	17.8	20.0	18.8	19.4	0.95
# 7	25.3	23.8	22.6	24.3	24.7	24.7	23.4	24.4	24.2	0.85
	23.1	23	23.7	23.6	22.7	24.6	24.2	23.2	23.5	0.64
	23.4	23.3	23.9	24.3	23.8	22.7	22.9	25.3	23.7	0.83
# 8	21.3	21.5	21.4	19.7	21.7	21.8	21.9	19.7	21.1	0.90
	22.4	22.1	23	24.6	22.8	22.1	23.1	25.4	23.2	1.20
	21.9	22.5	24.2	22.9	22.4	23.1	24.4	23.7	23.1	0.89
# 9	23.4	21.4	21.3	23.5	23.7	21.6	21.4	24.5	22.6	1.30
	23.5	27.5	25.0	23.9	24.3	26.9	25.2	24.9	25.2	1.40
	23.8	22.4	23.9	23.7	23.6	27.3	24.1	24.6	24.2	1.41
# 10	18.9	18.9	20.7	19.9	18.6	19.1	20.7	20.1	19.6	0.84
	23.1	22.0	22.1	20.4	22.5	22.2	22.2	21.2	22.0	0.82
	20.8	21.2	22.1	22.0	20.8	20.8	23.0	21.8	21.6	0.80
# 11	16.9	15.3	17.7	17.8	18	18.8	17.4	18.3	17.5	1.06
	17.7	18.9	18.8	19	18.4	18.3	19	19.1	18.7	0.48
	19.5	18.7	18.2	17.8	18	19.1	18.4	18.8	18.6	0.57
# 12	18.4	18	18.5	17.1	18.5	17.9	18.6	17.8	18.1	0.51
	16.9	17.2	16.9	17.3	17.1	18.4	17.5	17.9	17.4	0.52
	19.1	18.8	18.4	17.1	18.6	18.7	19.1	17.3	18.4	0.77
# 13	N/A									
# 14	20.5	20.9	20.3	20.9	20.9	21.2	20.4	21.0	20.8	0.32
	20.0	20.2	20.7	21.6	20.0	20.5	20.6	21.4	20.6	0.60
	20.1	20.8	21.6	20.9	20.3	20.8	21.0	20.7	20.8	0.45

**Figure B-24. Surface Resistivity Data Reported For Mix #12 @ 56 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	40.1	36.0	33.2	34.7	37.4	37.4	33.7	34.7	35.9	2.30
	37.8	40.3	37.9	35.9	36.1	38.9	38.4	35.9	37.7	1.59
	33.6	31.9	31.7	34.1	32.7	33.7	31.7	33.7	32.9	1.01
# 2	36.8	35.2	40.1	35.8	36.8	35.2	38.6	35.5	36.8	1.77
	37.6	34.1	37.2	38.6	37.1	34.0	37.0	39.2	36.9	1.89
	32.0	35.4	33.3	35.2	32.2	35.6	34.0	35.4	34.1	1.49
# 3	36.1	32.2	35.0	37.9	36.5	33.6	34.1	39.2	35.6	2.31
	43.1	38.0	42.6	38.3	43.8	37.5	44.2	38.3	40.7	2.93
	31.5	34.5	34.5	33.8	31.8	38.5	32.7	34.4	34.0	2.19
# 4	39.0	44.2	39.2	42.1	35.3	40.0	38.4	45.5	40.5	3.31
	34.5	33.0	42.1	35.9	33.9	31.6	41.9	35.5	36.1	3.91
	35.9	37.8	34.3	36.6	35.6	37.6	34.6	34.3	35.8	1.41
# 5	N/A									
# 6	33.4	35.7	37.3	35.7	33.8	32	37.2	37.2	35.3	2.01
	35.2	42	37.4	38	35.2	43.1	38.6	40	38.7	2.89
	37	32.7	31.3	37.9	36.6	32	32.8	38.1	34.8	2.86
# 7	49.6	43.2	44.6	44.7	46.7	45	43	47.2	45.5	2.22
	38	40.5	42.1	39.1	39.2	41.5	42.7	40.1	40.4	1.62
	41.4	41.6	39.7	40	41.5	40.8	40.5	40.5	40.8	0.71
# 8	34.7	34.8	32.4	38.2	34	37.1	32.6	38.8	35.3	2.45
	33.4	35.8	36.4	33.4	33.8	36	35.8	33.2	34.7	1.39
	36.3	32.5	34.4	33.5	35.9	32.1	34.1	33.3	34.0	1.50
# 9	33.9	34.1	42.8	36.6	33.7	32.8	41.5	36.2	36.5	3.76
	36.1	33.9	37.6	35.3	32.6	34.2	37.2	35.9	35.4	1.70
	40.5	38.6	41.0	37.8	41.8	38.7	41.0	37.8	39.7	1.60
# 10	43.4	41.9	40.2	42.4	43.4	41.9	40.3	42.3	42.0	1.21
	38.4	36.4	37.9	42.3	38.5	36.3	38.0	42.1	38.7	2.29
	40.5	42.8	42.0	44.1	40.2	42.9	42.1	44.2	42.4	1.47
# 11	N/A									
# 12	30	31.2	32.1	31.9	33.1	33.7	32.2	31.8	32.0	1.12
	33.5	34.8	30.4	33.7	36.1	35.5	31.5	32.7	33.5	1.95
	28.6	29.2	29.5	30	28.7	31	30.9	29.5	29.7	0.91
# 13	40.0	39.2	38.2	35.6	39.9	40.2	37.9	35.4	38.3	1.92
	36.4	36.5	39.2	41.8	36.5	37.3	40.9	41.9	38.8	2.44
	37.7	38.8	40.8	39.8	37.7	39.1	41.1	40.2	39.4	1.30
# 14	N/A									

**Figure B-25. Surface Resistivity Data Reported For Mix #1 @ 91 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (K0hm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	20.0	19.6	19.6	19.9	19.8	19.3	19.4	19.6	19.7	0.24
	18.9	19.6	19.3	18.8	18.4	19.4	18.8	18.9	19.0	0.39
	21.0	20.1	19.0	20.2	21.0	20.1	18.7	20.0	20.0	0.82
# 2	16.7	19.0	18.8	17.5	16.5	19.1	19.0	17.1	18.0	1.12
	17.0	17.7	18.4	17.9	17.2	17.0	17.9	18.2	17.7	0.54
	16.8	18.2	16.4	17.2	16.3	18.9	16.7	17.1	17.2	0.91
# 3	18.6	18.6	18.0	18.2	18.8	18.7	17.8	18.3	18.4	0.34
	19.9	19.0	18.0	18.9	19.7	18.5	19.4	19.3	19.1	0.63
	18.1	17.6	18.6	19.5	18.6	17.2	18.7	19.2	18.5	0.80
# 4	23.9	23.8	23.9	23.1	21.3	22.7	21.7	20.6	22.6	1.29
	25.1	22.3	22.4	22.5	21.8	20.1	19.8	21.9	22.0	1.63
	26.5	23.0	24.7	19.3	24.5	21.9	23.3	21.3	23.1	2.24
# 5	21.2	22.4	21.8	21.2	21.1	22.5	21.8	21.3	21.7	0.56
	21.8	21.8	23.2	23.7	21.2	21.7	24.0	23.4	22.6	1.08
	19.1	20.6	21.4	20.7	19.1	21.1	21.2	21.7	20.6	1.00
# 6	20.2	20.8	21.8	20.5	19.9	20.5	21.9	20.6	20.8	0.72
	20.7	20.9	20.2	22.0	20.5	20.6	20.2	22.0	20.9	0.73
	21.1	20.5	20.5	20.3	21.0	20.2	20.0	19.9	20.4	0.43
# 7	25	23	27	27	25	25	26	26	25.5	1.31
	26	25	25	26	26	25	26	24	25.4	0.74
	26	25	26	27	26	25	25	27	25.9	0.83
# 8	19	21	19	19	19	21	19	19	19.5	0.93
	22	20	20	20	22	20	21	20	20.6	0.92
	21	20	22	20	21	20	22	20	20.8	0.89
# 9	20.0	20.7	21.2	19.4	19.6	20.7	21.6	19.9	20.4	0.78
	20.7	21.0	19.3	21.1	20.2	20.4	19.4	20.2	20.3	0.67
	21.2	20.5	19.7	19.1	21.4	20.7	19.8	20.0	20.3	0.79
# 10	19.4	20.6	20.3	20.4	19.5	20.6	20.0	20.6	20.2	0.49
	21.0	21.0	21.6	21.0	20.7	21.4	21.2	21.2	21.1	0.28
	20.6	20.9	20.2	19.7	20.3	20.9	20.1	19.5	20.3	0.51
# 11	21	20.9	20.2	21.1	20.7	21	19.7	20.7	20.7	0.48
	20.4	21.1	20	22.6	20.8	20.3	19.9	22	20.9	0.97
	20.9	21.3	21.9	23.2	20.3	21	20.9	22.8	21.5	1.01
# 12	15.9	17.8	17.6	16.7	16.2	18.1	17.6	16.5	17.1	0.82
	15	16.1	16.4	15.9	15.6	16.5	16.4	16.3	16.0	0.51
	18.4	16.9	16.7	17	18.7	16.8	16.8	17.1	17.3	0.79
# 13	N/A									
# 14	N/A									

**Figure B-26. Surface Resistivity Data Reported For Mix #2 @ 91 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	18.0	15.2	15.9	16.9	16.5	15.1	16.2	16.8	16.3	0.95
	15.8	14.3	14.4	15.0	15.4	14.7	14.5	15.6	15.0	0.58
	16.5	14.8	14.6	13.4	17.3	15.1	14.4	15.2	15.2	1.22
# 2	13.0	13.1	13.3	13.0	13.2	13.2	13.5	13.6	13.2	0.22
	16.6	16.5	16.3	16.9	16.1	16.2	16.0	16.9	16.4	0.35
	17.7	18.2	18.2	18.3	17.7	18.2	18.3	18.3	18.1	0.26
# 3	14.4	14.8	15.0	15.1	14.3	14.7	15.1	15.0	14.8	0.31
	16.0	14.9	13.8	15.3	16.2	16.4	14.2	16.4	15.4	1.02
	15.1	16.4	16.4	15.2	14.9	15.0	16.7	15.4	15.6	0.73
# 4	17.6	20.8	20.7	22.8	24.1	18.6	23.4	20.2	21.0	2.29
	18.9	19.5	21.9	20.2	20.7	17.5	20.2	20.1	19.9	1.30
	20.0	18.5	20.2	19.0	18.5	20.3	19.7	18.2	19.3	0.85
# 5	16.4	17.4	17.7	17.0	16.5	17.3	12.2	16.7	16.4	1.76
	16.9	16.2	17.9	19.0	17.0	15.9	17.5	19.0	17.4	1.16
	18.0	18.4	20.4	16.4	17.8	18.1	20.8	16.3	18.3	1.63
# 6	15.0	14.1	14.5	17.3	15.1	14.2	14.6	17.9	15.3	1.44
	19.6	18.9	15.2	16.3	19.4	19.2	15.3	17.0	17.6	1.87
	19.4	18.3	21.3	19.7	19.2	18.3	21.7	19.7	19.7	1.23
# 7	25	26	25	24	25	26	25	24	25.0	0.76
	24	23	22	20	24	23	22	21	22.4	1.41
	23	23	24	23	23	24	25	23	23.5	0.76
# 8	19	17	17	18	19	17	16	17	17.5	1.07
	16	15	13	15	16	15	13	15	14.8	1.16
	14	15	15	17	14	15	15	17	15.3	1.16
# 9	18.0	18.1	18.5	18.3	18.2	18.2	18.7	19.1	18.4	0.36
	20.5	18.1	17.8	18.1	19.4	18.2	17.9	18.8	18.6	0.93
	18.2	19.9	19.9	19.2	18.0	19.0	20.1	19.0	19.2	0.78
# 10	20.5	19.8	18.8	19.3	20.8	19.1	19.0	19.0	19.5	0.75
	19.0	17.3	18.5	17.8	19.4	17.1	18.4	17.8	18.2	0.81
	17.0	17.1	14.6	15.2	17.5	17.4	14.4	15.0	16.0	1.34
# 11	19.5	17.7	17.3	18.2	18.7	17.2	17.2	18.4	18.0	0.83
	19.6	18	18.4	18.4	19.5	18.3	18.2	18.6	18.6	0.60
	17.5	17.1	18.2	18.4	19.5	18.3	18.2	18.6	18.2	0.72
# 12	13.1	15.1	13.6	14.2	12.9	15.3	14	14.4	14.1	0.86
	13.4	14.4	15	14.3	13.4	14.3	15.9	14.1	14.4	0.82
	13.8	14.4	14.4	14.8	13.9	14	14.2	15	14.3	0.43
# 13	20.8	21.7	20.1	21.0	20.3	22.0	19.9	20.9	20.8	0.74
	20.6	19.2	21.1	20.4	21.3	19.6	20.4	21.2	20.5	0.76
	21.5	19.7	20.8	20.4	21.0	19.5	21.2	20.2	20.5	0.71
# 14	17.4	17.2	16.8	18.7	17.2	16.6	16.7	18.7	17.4	0.85
	15.6	15.6	16.8	17.0	15.5	14.9	16.2	16.8	16.1	0.76
	18.6	18.1	16.0	15.5	18.4	18.1	16.2	15.7	17.1	1.35

**Figure B-27. Surface Resistivity Data Reported For Mix #3 @ 91 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	22.9	21.7	22.9	22.7	21.7	22.4	22.8	23.0	22.5	0.53
	22.9	23.5	23.9	23.0	22.4	23.3	24.4	23.9	23.4	0.65
	23.8	23.0	23.4	23.4	23.6	23.3	23.2	22.8	23.3	0.32
# 2	25.2	25.6	25.2	26.0	25.4	25.4	25.5	25.9	25.5	0.30
	23.8	23.2	23.1	23.5	23.7	23.3	23.2	23.2	23.4	0.26
	24.5	23.5	23.8	23.9	24.6	23.3	23.5	23.9	23.9	0.47
# 3	23.5	22.5	22.0	23.2	23.5	22.4	21.9	23.3	22.8	0.66
	20.8	22.0	21.3	20.4	21.2	22.2	21.7	20.4	21.3	0.69
	21.8	22.7	21.8	23.2	22.6	22.5	22.5	22.7	22.5	0.47
# 4	26.0	26.5	25.9	28.1	25.7	26.5	27.0	27.8	26.7	0.88
	24.9	25.8	25.4	25.3	25.8	26.1	25.7	24.7	25.5	0.48
	26.3	23.3	25.7	25.0	25.5	24.9	23.2	25.1	24.9	1.10
# 5	24.2	23.6	22.9	23.0	23.3	23.7	23.0	23.1	23.4	0.45
	25.8	26.0	26.9	26.4	25.3	25.8	26.6	25.4	26.0	0.57
	25.1	24.4	24.4	25.7	25.1	24.5	23.4	24.9	24.7	0.68
# 6	26.0	25.6	24.8	24.2	26.1	25.4	24.9	34.3	26.4	3.25
	27.3	30.5	29.0	29.1	27.2	30.7	29.2	28.4	28.9	1.29
	26.7	27.4	26.7	26.0	26.9	27.6	26.4	26.9	26.8	0.51
# 7	32	32	31	32	32	32	31	32	31.8	0.46
	31	32	31	31	31	32	32	32	31.5	0.53
	34	35	34	36	35	35	35	36	35.0	0.76
# 8	24	24	24	25	24	24	25	25	24.4	0.52
	24	25	26	26	25	25	26	27	25.5	0.93
	28	26	27	26	27	26	27	26	26.6	0.74
# 9	25.9	26.0	25.7	27.9	26.0	25.9	25.7	26.1	26.2	0.72
	26.4	26.1	26.9	26.2	26.6	26.1	26.5	25.8	26.3	0.35
	27.9	26.3	27.4	28.8	27.4	26.4	28.7	29.3	27.8	1.11
# 10	27.6	27.6	27.7	28.2	27.8	28.2	28.2	28.2	27.9	0.29
	25.8	25.5	25.6	26.9	26.0	25.5	25.6	27.2	26.0	0.67
	25.0	26.6	26.0	25.1	25.1	27.2	26.5	25.5	25.9	0.83
# 11	23.1	22.6	23.4	23.2	23.8	23.5	23.5	23.2	23.3	0.36
	23.7	24.9	26.3	25.5	25.6	24.9	26	25	25.2	0.81
	23	24.1	24.7	24.3	23.4	23.6	24.5	24.9	24.1	0.67
# 12	20.9	20.5	19.7	21.8	21.3	20.9	20.2	22	20.9	0.78
	19.4	21.8	20.5	20.6	19.9	21.5	20.2	20.2	20.5	0.80
	19.8	20.2	21.5	18.9	19.7	20.2	21.4	19	20.1	0.97
# 13	28.0	27.1	27.6	26.3	27.4	26.6	27.4	26.7	27.1	0.57
	25.9	26.2	27.0	26.6	26.3	26.9	27.3	26.4	26.6	0.47
	26.3	26.3	26.3	26.1	26.7	26.1	25.9	26.4	26.3	0.24
# 14	23.6	22.4	22.5	22.7	23.5	21.7	22.0	22.6	22.6	0.66
	20.4	21.3	21.6	22.1	20.3	21.1	20.3	22.3	21.2	0.80
	22.1	23.0	22.1	22.7	22.2	23.1	21.7	22.7	22.5	0.50

**Figure B-28. Surface Resistivity Data Reported For Mix #4 @ 91 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	34.6	34.6	36.0	35.0	34.1	36.1	36.8	34.5	35.2	0.96
	29.9	32.3	34.8	32.9	30.1	32.2	33.3	32.8	32.3	1.62
	33.3	31.6	31.4	30.5	33.3	31.9	31.7	31.1	31.9	0.99
# 2	35.2	34.9	35.0	35.5	34.8	34.9	34.9	34.9	35.0	0.23
	36.9	34.0	31.5	34.6	37.0	33.9	31.4	34.3	34.2	2.09
	41.0	37.4	34.3	37.1	41.1	37.2	34.0	37.4	37.4	2.62
# 3	32.5	31.3	33.7	32.6	31.7	31.4	33.4	32.5	32.4	0.88
	37.8	32.7	32.1	32.3	32.7	33.1	31.8	32.2	33.1	1.95
	32.6	35.2	32.7	34.6	33.2	34.7	33.7	34.5	33.9	0.99
# 4	38.1	35.4	36.2	36.0	30.3	32.9	37.6	32.4	34.9	2.73
	33.2	35.4	36.7	34.6	32.3	32.2	37.9	33.4	34.5	2.08
	35.2	40.2	35.9	32.7	32.5	36.9	33.8	34.5	35.2	2.52
# 5	31.4	29.6	29.8	31.2	31.2	31.4	29.5	31.9	30.8	0.95
	32.6	32.4	31.2	31.4	32.6	31.2	30.8	30.2	31.6	0.89
	30.3	32.1	31.7	31.7	30.2	32.7	31.7	31.3	31.5	0.85
# 6	39.3	40.0	40.6	39.1	36.3	39.8	40.5	38.5	39.3	1.39
	41.2	39.9	44.1	41.7	40.8	39.5	40.7	41.2	41.1	1.39
	42.0	38.2	38.2	39.2	41.3	38.1	38.0	38.6	39.2	1.57
# 7	47	45	45	44	47	44	45	44	45.1	1.25
	41	41	44	41	41	41	44	41	41.8	1.39
	41	46	41	43	40	43	42	44	42.5	1.93
# 8	34	35	34	33	34	35	34	33	34.0	0.76
	35	33	35	34	36	33	34	34	34.3	1.04
	37	37	36	37	38	37	36	37	36.9	0.64
# 9	37.2	38.9	40.6	38.3	36.8	39.8	41.3	38.4	38.9	1.58
	36.1	37.8	39.0	36.4	36.7	37.6	40.0	36.4	37.5	1.39
	33.6	34.8	34.2	33.3	33.3	36.0	33.5	34.1	34.1	0.93
# 10	36.9	37.0	36.8	37.0	36.7	37.7	37.5	36.7	37.0	0.37
	37.5	36.2	37.1	37.6	37.5	36.4	36.0	36.9	36.9	0.63
	37.1	37.1	39.5	38.9	37.2	37.1	39.5	38.3	38.1	1.10
# 11	33.4	34.9	32.1	32.9	33.2	33.6	32.4	32.9	33.2	0.85
	34.8	35.9	34.4	36.9	35	37.2	34.1	37.2	35.7	1.28
	35	35.3	34.4	36.7	34.3	37.5	34	39	35.8	1.78
# 12	27.3	27.3	27.5	29.7	28.8	28	27.8	30.5	28.4	1.20
	27.1	27.1	28.6	27.1	28.3	29.5	30.7	30	28.6	1.41
	27.9	27.3	27.8	27.4	28.6	27.8	29.1	29.2	28.1	0.74
# 13	31.2	31.4	30.4	30.2	30.1	30.3	30.3	30.8	30.6	0.49
	34.9	33.4	32.7	33.0	33.8	33.0	32.1	32.3	33.2	0.90
	30.1	32.2	30.9	30.7	30.1	32.2	30.8	30.9	31.0	0.81
# 14	33.9	32.4	32.8	33.4	34.2	32.5	32.9	33.5	33.2	0.65
	34.0	32.5	32.6	31.6	34.3	32.0	37.4	32.0	33.3	1.92
	34.7	32.9	33.2	33.4	34.6	33.1	33.2	33.4	33.6	0.69

**Figure B-29. Surface Resistivity Data Reported For Mix #5 @ 91 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	20.1	20.1	20.7	21.3	20.1	19.8	20.9	21.4	20.6	0.61
	20.4	18.8	21.2	22.0	20.1	18.8	21.2	22.0	20.6	1.28
	21.2	22.0	20.0	20.2	21.0	21.8	19.9	20.2	20.8	0.83
# 2	27.1	27.1	26.7	26.8	26.9	27.0	26.5	26.6	26.8	0.23
	22.3	22.9	20.2	25.6	22.0	24.7	20.2	25.2	22.9	2.12
	22.0	24.4	25.8	24.5	22.0	24.7	25.3	24.7	24.2	1.42
# 3	19.6	18.9	19.2	19.3	18.4	19.5	19.0	19.1	19.1	0.38
	18.8	18.2	18.3	19.2	18.5	18.2	18.6	18.9	18.6	0.36
	17.9	19.1	18.2	18.1	18.2	19.2	18.9	18.9	18.6	0.51
# 4	23.9	19.2	20.4	25.9	27.6	20.9	21.6	24.9	23.1	2.97
	28.9	18.6	17.4	20.3	28.6	18.2	18.1	24.9	21.9	4.85
	21.3	20.6	20.2	24.7	21.7	22.4	20.1	23.3	21.8	1.61
# 5	19.8	19.4	20.5	20.8	20.4	19.5	21.4	21.6	20.4	0.83
	20.8	19.1	19.8	20.5	21.4	18.9	19.9	20.2	20.1	0.84
	19.4	20.8	20.5	21.1	20.5	21.4	20.5	21.4	20.7	0.65
# 6	21.8	19.3	23.7	21.9	23.2	18.9	23.6	21.3	21.7	1.84
	22.2	20.2	21.3	22.0	22.0	20.2	21.3	22.6	21.5	0.90
	19.3	20.2	19.6	21.0	19.0	20.2	19.6	21.0	20.0	0.75
# 7	29	28	28	27	31	29	28	27	28.4	1.30
	26	28	28	26	26	27	28	27	27.0	0.93
	25	27	27	29	25	27	28	29	27.1	1.55
# 8	22.8	23	22.2	23.8	22.2	23.3	22.6	23.5	22.9	0.59
	21.2	21.9	21.8	22.6	20.2	21.9	21.6	23.5	21.8	0.96
	20.8	23.1	20.3	20.8	21.5	23	21.6	21.9	21.6	1.02
# 9	22.1	22.8	22.2	20.3	20.6	22.1	22.4	21.2	21.7	0.90
	21.5	22.0	18.4	21.4	19.4	22.6	18.2	21.6	20.6	1.71
	19.9	20.5	22.1	21.4	19.9	21.7	22.4	22.1	21.3	1.01
# 10	19.8	19.4	20.5	20.8	20.4	19.5	21.4	21.6	20.4	0.83
	20.8	19.1	19.8	20.5	21.4	18.9	19.9	20.2	20.1	0.84
	19.4	20.8	20.5	21.1	20.5	21.4	20.5	21.4	20.7	0.65
# 11	20.8	21.5	19.3	20.9	20.6	21.3	19.4	20.7	20.6	0.81
	20.4	19	20.4	19.4	20.7	19.7	19.9	19.8	19.9	0.57
	19.8	20.4	20.3	20	20.2	20.4	20.3	20.2	20.2	0.21
# 12	19.3	18.2	18.7	18.5	19.6	18.7	19.1	19	18.9	0.45
	18.3	17.8	18.5	18.3	18.9	18	18.8	18.8	18.4	0.40
	18.6	19	20.1	19.6	18.8	19.7	20.6	19.5	19.5	0.67
# 13	23.0	23.0	23.6	21.5	22.9	23.0	23.6	21.9	22.8	0.75
	23.4	23.7	24.7	22.9	23.9	22.8	24.4	23.3	23.6	0.68
	20.9	23.0	22.4	24.3	20.1	22.6	21.8	24.3	22.4	1.49
# 14	19.0	19.0	18.8	19.6	18.6	19.1	18.7	19.5	19.0	0.36
	19.0	19.1	18.7	20.2	19.0	18.9	18.4	19.8	19.1	0.59
	17.7	16.7	17.5	17.8	17.7	16.6	17.8	18.0	17.5	0.53



**Figure B-30. Surface Resistivity Data Reported For Mix #6 @ 91 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	13.6	14.7	13.3	12.9	13.7	14.8	13.2	13.2	13.7	0.71
	13.1	12.9	13.1	13.6	13.1	12.9	13.3	13.9	13.2	0.35
	12.7	12.5	13.8	13.9	12.6	12.5	13.9	14.1	13.3	0.73
# 2	13.6	14.1	14.3	14.3	13.6	14.0	14.3	14.3	14.1	0.31
	13.6	13.6	12.5	14.0	13.7	13.6	12.5	14.0	13.4	0.60
	13.5	13.4	13.4	14.0	13.6	13.4	13.3	13.9	13.6	0.26
# 3	12.4	11.4	13.1	12.8	12.5	11.7	13.0	12.4	12.4	0.59
	12.9	13.2	13.3	13.9	13.4	12.9	13.4	14.3	13.4	0.47
	11.5	13.6	12.6	13.2	11.5	13.5	12.8	12.9	12.7	0.82
# 4	12.7	13.2	13.4	14.0	13.4	13.2	13.3	13.0	13.3	0.37
	16.0	14.6	13.9	15.1	17.3	15.9	15.0	15.5	15.4	1.03
	13.3	15.8	12.5	13.1	12.8	15.5	13.2	14.0	13.8	1.24
# 5	16.2	15.7	15.0	14.8	16.7	15.7	15.0	15.2	15.5	0.66
	15.6	15.1	16.2	14.6	15.3	15.1	14.8	15.3	15.3	0.49
	15.7	15.2	15.6	15.0	15.2	15.0	16.0	16.4	15.5	0.51
# 6	15.0	14.5	13.3	14.4	15.0	14.6	13.3	14.1	14.3	0.67
	16.8	15.0	15.7	14.5	16.7	14.5	16.0	15.2	15.6	0.91
	13.1	13.3	12.8	13.4	13.2	13.4	12.9	12.8	13.1	0.25
# 7	14.4	14.7	14.9	14.6	14.4	15.3	14.7	14.6	14.7	0.29
	16	17	15	15.7	16.2	16.7	15.8	15.7	16.0	0.63
	15.1	14.9	14.3	14.3	15.5	14.7	14.3	14.1	14.7	0.49
# 8	12.5	12.5	11.8	12.5	12.6	12.6	11.7	12.5	12.3	0.37
	13.4	13.3	13.5	14.1	13.4	13.5	13.7	13.8	13.6	0.26
	12.8	12.3	12.1	13.2	12.3	12.9	12.2	13.3	12.6	0.47
# 9	14.0	13.0	13.7	13.4	13.6	12.9	13.7	13.5	13.5	0.37
	14.3	13.6	13.1	13.1	13.8	14.2	13.1	13.1	13.5	0.52
	12.9	13.8	14.3	13.4	12.9	13.8	14.1	13.7	13.6	0.51
# 10	13.9	13.3	13.2	11.8	12.9	12.9	13.3	11.8	12.9	0.74
	12.6	11.9	13.9	12.4	12.7	12.3	14.2	12.5	12.8	0.80
	12.7	13.7	13.3	13.0	12.8	13.6	13.4	13.5	13.3	0.37
# 11	11.2	10.3	11.5	11.6	11.3	10.6	11.7	11.9	11.3	0.55
	11.8	10.4	10.2	11.9	11.6	10.6	11.1	12.2	11.2	0.76
	10	10.9	10.7	11	10.2	10.3	10.8	11	10.6	0.39
# 12	12.6	13	12.9	11.6	12.8	12.8	13	11.7	12.6	0.57
	12.4	13.2	12.1	11.9	12.3	13.3	12.3	12.1	12.5	0.52
	11.7	12.9	12.7	13.6	11.7	13.2	12.9	13.6	12.8	0.75
# 13	11.8	11.7	12.2	13.2	11.8	11.6	12.6	13.2	12.3	0.66
	12.3	12.3	12.1	12.6	12.7	12.7	12.1	12.3	12.4	0.25
	12.6	11.9	12.8	11.1	12.3	12.2	12.7	11.4	12.1	0.62
# 14	12.0	14.8	12.2	13.5	12.2	14.6	12.4	13.6	13.2	1.12
	14.4	14.3	14.1	13.7	14.8	14.3	14.5	13.5	14.2	0.42
	12.7	14.2	13.0	11.9	13.0	13.8	14.0	11.8	13.1	0.91

**Figure B-31. Surface Resistivity Data Reported For Mix #7 @ 91 days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	73.5	76.0	72.3	76.2	73.4	76.9	70.9	75.9	74.4	2.16
	60.9	65.4	60.1	65.9	63.7	65.8	62.0	64.7	63.6	2.29
	66.3	64.3	66.3	65.3	66.9	63.5	66.5	65.5	65.6	1.18
# 2	63.4	67.1	66.1	71.1	64.4	64.5	66.9	70.9	66.8	2.89
	64.1	65.3	61.1	59.9	66.5	65.4	62.3	60.5	63.1	2.52
	76.0	65.7	72.8	67.5	76.7	72.3	71.9	67.2	71.3	4.10
# 3	69.1	67.4	66.0	64.5	72.4	66.6	65.4	65.5	67.1	2.56
	68.1	67.8	64.9	67.6	67.7	68.7	67.3	67.4	67.4	1.12
	61.7	62.2	66.5	68.7	60.4	62.7	66.4	71.9	65.1	3.98
# 4	70.5	59.2	61.7	75.9	85.4	66.7	63.0	71.6	69.3	8.58
	77.8	68.6	56.9	70.8	64.0	66.4	57.8	71.3	66.7	7.04
	63.0	44.9	43.6	58.4	63.0	59.8	47.3	57.4	54.7	8.10
# 5	69.2	59.7	68.7	62.7	68.4	63.1	71.4	66.2	66.2	3.99
	61.7	71.7	66.5	67.2	61.6	69.6	66.7	68.1	66.6	3.52
	59.4	63.9	60.7	55.1	60.8	61.9	60.2	54.2	59.5	3.30
# 6	56.6	57.7	62.2	58.9	55.6	57.7	62.2	59.1	58.8	2.41
	57.9	61.4	59.9	54.8	59.4	60.3	57.7	56.1	58.4	2.23
	59.1	53.9	53.7	60.6	58.2	54.1	59.8	59.5	57.4	2.95
# 7	94.2	83.4	81.6	80.6	94.2	85.5	80.2	79.9	85.0	6.00
	79.5	76.5	74.6	83	81.7	76.1	74.6	82.3	78.5	3.51
	84.1	77.7	76.8	74.7	83.6	76.5	74.6	76.2	78.0	3.74
# 8	66.7	66.9	66.8	61.3	65.9	67.7	67.2	63.2	65.7	2.25
	75.5	71	73.6	73.2	74.7	70.8	76.3	72	73.4	2.04
	57.3	64.3	65.4	65.4	56.1	63.8	65.5	65.8	63.0	3.93
# 9	68.0	71.8	67.0	76.0	67.9	75.9	68.5	72.9	71.0	3.67
	72.0	70.2	61.8	66.6	72.5	69.0	61.0	66.0	67.4	4.35
	74.9	71.4	70.2	75.3	76.2	71.1	71.7	75.8	73.3	2.44
# 10	70.1	76.1	73.9	64.7	69.1	76.3	74.4	65.5	71.3	4.60
	64.2	72.0	67.5	64.1	65.4	70.0	67.7	62.5	66.7	3.23
	71.6	67.9	72.3	65.7	68.2	69.3	72.4	65.6	69.1	2.76
# 11	76.4	73.2	79.1	80.5	76.8	74.6	74.4	81.6	77.1	3.05
	71.8	62.8	69.2	62.6	72.7	66	69.7	64.9	67.5	3.93
	63	78.2	72.4	72	63.6	78.8	72.2	72.5	71.6	5.80
# 12	52.1	52.2	52.8	59	54.8	52.8	55	59.6	54.8	2.99
	49.8	53.7	54.9	57.8	52	57.6	55.7	58.9	55.1	3.12
	61.4	62.5	60.1	65.9	64.2	64.6	60.4	69	63.5	3.03
# 13	N/A									
# 14	55.9	61.6	59.1	62.3	55.8	62.4	64.7	62.0	60.5	3.23
	55.2	54.1	55.9	59.5	55.1	52.6	54.7	59.9	55.9	2.55
	56.4	57.7	60.3	59.2	57.5	59.1	60.9	59.9	58.9	1.55

**Figure B-32. Surface Resistivity Data Reported For Mix #8 @ 91 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	80.6	66.0	75.3	79.6	80.8	73.5	74.4	79.6	76.2	5.06
	89.4	81.0	75.2	81.1	89.8	81.1	77.7	81.4	82.1	5.12
	76.0	75.1	74.6	75.2	79.3	76.0	76.3	75.9	76.1	1.43
# 2	75.4	73.2	75.4	73.2	76.0	73.4	75.8	73.5	74.5	1.26
	78.4	77.4	76.5	77.4	78.2	77.4	76.8	77.5	77.5	0.63
	75.3	75.2	74.2	75.5	75.5	75.2	73.7	75.7	75.0	0.70
# 3	79.8	79.5	84.2	84.1	76.6	79.7	83.3	83.1	81.3	2.77
	75.1	77.0	75.2	75.9	76.3	76.7	74.6	76.7	75.9	0.88
	87.2	84.8	83.9	79.3	83.7	85.5	85.6	80.3	83.8	2.70
# 4	71.5	68.4	66.0	72.7	70.3	64.7	66.5	73.6	69.2	3.31
	73.5	65.4	68.4	62.9	70.8	67.4	68.7	66.7	68.0	3.24
	71.9	74.5	69.1	71.7	67.0	74.0	66.2	70.9	70.7	3.03
# 5	83.8	80.3	75.6	72.6	78.8	81.0	76.4	73.0	77.7	3.97
	77.3	67.2	67.2	66.9	76.8	67.8	69.7	71.7	70.6	4.31
	70.6	76.3	76.2	76.2	69.1	74.3	72.3	76.5	73.9	2.92
# 6	59.8	60.4	57.6	56.4	60.0	60.4	57.7	57.3	58.7	1.61
	62.3	60.1	59.0	57.7	60.3	62.9	58.8	59.3	60.1	1.77
	59.3	59.6	60.3	60.7	59.6	59.7	61.4	60.5	60.1	0.71
# 7	76.1	74.4	73.7	75.9	76.9	72.8	75.9	74.6	75.0	1.39
	75.2	71.1	75.7	72.3	74.3	72.5	72.6	73.5	73.4	1.57
	72.7	72	75.2	77.7	76	75.3	78.1	77.8	75.6	2.31
# 8	90.8	88.7	89.8	86.3	91.1	91.5	90.2	86.7	89.4	1.98
	84.4	82.6	83.6	85.8	86.7	83.9	86.9	87.1	85.1	1.72
	78.6	80.9	78.8	74.2	80.5	82.1	79.2	74.2	78.6	2.93
# 9	80.6	81.9	82.5	79.1	81.8	80.6	82.7	78.7	81.0	1.50
	84.7	80.3	83.9	85.6	84.6	79.7	81.8	84.3	83.1	2.21
	79.5	80.0	77.5	81.2	79.4	80.4	79.3	81.6	79.9	1.27
# 10	74.3	68.4	66.1	68.0	71.7	67.8	66.8	68.8	69.0	2.71
	70.0	74.7	71.0	70.1	69.2	74.6	70.4	69.8	71.2	2.17
	75.5	71.9	77.9	74.6	78.3	73.1	78.5	73.1	75.4	2.61
# 11	65.3	74.5	78.1	66.3	63.6	74.4	79	69.3	71.3	5.97
	64.9	77.4	59.4	62	72.5	70.1	70.8	61.4	67.3	6.33
	62.9	69.9	68.8	65.5	65.3	72.8	68.1	66.3	67.5	3.10
# 12	50	51.1	58.1	53.8	50.2	55.8	58.1	58.5	54.5	3.67
	51.2	45.9	51.3	54.4	56.2	50.1	55.7	53.8	52.3	3.41
	45.9	45.7	50.3	56.1	51	51	48.9	59.2	51.0	4.66
# 13	N/A									
# 14	64.0	72.0	68.0	67.0	65.0	73.0	67.0	67.0	67.9	3.14
	62.0	60.0	63.0	63.0	61.0	60.0	61.0	62.0	61.5	1.20
	64.0	61.0	62.0	64.0	63.0	62.0	64.0	65.0	63.1	1.36

**Figure B-33. Surface Resistivity Data Reported For Mix #9 @ 91 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	35.7	37.6	34.9	35.3	36.9	41.4	37.1	33.8	36.6	2.32
	32.8	33.8	37.6	36.3	32.9	33.5	36.2	39.1	35.3	2.36
	36.5	33.3	34.2	31.4	36.0	34.2	34.8	32.6	34.1	1.69
# 2	33.8	33.2	33.6	34.5	33.9	33.1	33.2	34.6	33.7	0.58
	35.1	35.4	34.6	36.6	36.0	34.0	34.7	37.0	35.4	1.04
	36.6	35.0	36.5	36.1	36.9	35.3	36.4	36.0	36.1	0.65
# 3	33.5	34.2	33.2	33.4	33.6	35.8	36.3	33.3	34.2	1.21
	34.6	33.8	33.0	31.2	34.2	34.7	33.1	31.4	33.3	1.35
	30.9	32.8	31.9	32.8	32.6	34.3	32.4	33.4	32.6	1.00
# 4	38.6	35.7	36.5	40.1	34.7	36.9	39.4	35.7	37.2	1.95
	34.1	38.1	40.0	37.6	39.9	38.8	37.4	40.3	38.3	2.02
	33.0	36.5	35.8	32.9	34.8	34.7	31.7	32.8	34.0	1.67
# 5	34.9	32.4	35.2	31.5	35.0	32.1	35.6	30.3	33.4	2.03
	35.4	34.5	34.8	35.5	35.6	34.8	32.8	35.0	34.8	0.90
	33.1	30.3	32.5	32.3	33.3	32.5	33.3	32.4	32.5	0.97
# 6	30.2	32.0	32.3	28.5	29.7	30.5	30.7	25.6	29.9	2.13
	29.3	30.0	30.8	30.6	28.5	28.6	32.3	30.3	30.1	1.26
	30.3	31.8	28.8	30.6	30.6	31.8	28.5	30.0	30.3	1.21
# 7	43.3	42.2	41.6	40.6	43.3	42.3	41.7	41.2	42.0	0.95
	41	39.2	42.4	43.4	40	40.1	40.7	42	41.1	1.40
	43.1	38.2	40.4	42.8	44	40.2	41.8	43.8	41.8	2.04
# 8	33.3	32	32.2	31.3	33.5	32.3	32.4	31.3	32.3	0.81
	32.9	34.9	33.8	34.1	34	34.5	34.2	33.8	34.0	0.58
	34.6	35.8	35.7	34.3	35.7	36.3	35.9	34.9	35.4	0.71
# 9	34.2	37.6	34.2	33.9	35.2	37.3	35.4	33.1	35.1	1.61
	32.2	35.6	37.0	36.0	33.9	35.8	37.4	35.8	35.5	1.68
	39.3	34.7	33.3	36.1	39.8	35.9	33.7	35.9	36.1	2.38
# 10	35.7	32.9	33.0	37.1	36.1	32.5	33.7	36.6	34.7	1.86
	32.8	30.4	31.6	28.4	33.3	30.2	30.6	28.7	30.8	1.76
	33.5	33.9	35.2	35.1	33.5	33.8	35.1	34.9	34.4	0.76
# 11	31	31.4	29.1	30.9	31.2	30.4	29.1	30.9	30.5	0.91
	29.8	31	31.3	30.1	29.9	29.8	31.9	29.4	30.4	0.88
	31.6	29.8	30	30.6	31.6	30.4	30.2	30.8	30.6	0.68
# 12	28.6	28.9	26.7	24.9	25.9	26.7	27.6	25.9	26.9	1.39
	26.3	27.3	24.4	27	23.9	26.8	25.1	26.8	26.0	1.30
	26.6	26.5	23.5	24.5	24.4	25.8	23.9	25.6	25.1	1.18
# 13	30.9	31.0	30.0	30.7	30.1	31.2	30.9	31.6	30.8	0.53
	29.7	25.5	27.2	29.6	27.8	25.3	28.1	29.3	27.8	1.74
	29.7	29.3	30.1	32.0	30.8	30.1	30.8	32.3	30.6	1.06
# 14	24.5	27.4	27.9	28.7	24.9	27.6	28.0	28.0	27.1	1.55
	29.5	28.8	29.3	31.6	29.2	26.9	29.9	31.0	29.5	1.42
	32.0	31.7	31.7	31.9	31.4	30.0	31.3	32.1	31.5	0.67

**Figure B-34. Surface Resistivity Data Reported For Mix #10 @ 91 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	61.9	60.7	66.4	66.6	61.6	60.8	66.8	67.7	64.1	3.05
	65.9	66.5	67.9	68.3	65.5	66.2	66.2	66.2	66.6	0.98
	59.8	63.4	62.4	70.6	59.8	64.1	62.4	70.5	64.1	4.25
# 2	57.7	57.8	54.4	55.4	57.2	57.8	57.2	57.4	56.9	1.26
	61.4	58.2	58.9	57.4	61.4	58.5	59.1	57.3	59.0	1.60
	62.5	57.8	57.2	58.2	62.3	57.5	58.5	58.4	59.1	2.11
# 3	65.2	58.7	61.1	65.4	65.5	63.1	61.9	70.7	64.0	3.63
	72.7	77.2	69.5	70.3	66.0	77.4	69.2	64.1	70.8	4.79
	61.2	65.6	60.5	55.6	65.9	66.8	60.7	57.3	61.7	4.11
# 4	52.6	50.5	52.1	48.8	51.2	50.9	51.9	54.0	51.5	1.55
	54.7	50.3	51.2	53.2	52.3	47.8	52.8	46.4	51.1	2.81
	52.7	54.5	57.9	53.4	53.1	56.9	56.5	53.5	54.8	2.00
# 5	60.2	49.3	53.0	48.5	61.5	51.3	52.5	54.5	53.9	4.75
	56.9	59.3	55.8	50.5	59.3	60.6	58.7	55.3	57.1	3.23
	54.0	60.1	53.3	53.0	55.2	57.8	53.8	50.9	54.8	2.92
# 6	54.6	55.1	52.4	56.2	55.1	56.3	50.3	54.7	54.3	2.03
	53.4	62.9	55.0	59.5	53.4	61.2	56.7	57.1	57.4	3.53
	58.8	58.6	66.6	57.5	59.2	58.6	66.2	56.3	60.2	3.92
# 7	60.5	69.2	67.4	60.1	65	74.1	68.1	59.6	65.5	5.17
	62	61.8	63.1	62.3	59.8	62.8	65.4	64.4	62.7	1.70
	63	62.7	57.5	64.1	64.7	65.5	56.6	65.2	62.4	3.46
# 8	57.3	63.1	55.9	59.8	58.8	64.5	56.9	59.3	59.5	3.00
	60.7	62.3	66.8	69.4	62.3	65.3	60.7	69.7	64.7	3.69
	63.5	68.8	60.6	63.5	61	68.6	62.2	65.9	64.3	3.20
# 9	63.8	69.3	62.4	69.3	60.7	70.4	63.8	67.8	65.9	3.69
	63.5	65.5	61.8	68.2	66.7	64.6	62.4	68.7	65.2	2.57
	58.2	63.8	64.1	63.3	57.1	59.3	66.3	62.2	61.8	3.23
# 10	57.8	58.7	61.0	57.6	58.2	58.4	61.3	57.3	58.8	1.53
	57.1	60.6	58.5	53.7	57.8	60.9	58.8	53.2	57.6	2.85
	56.6	53.3	50.2	53.8	56.2	53.0	49.9	53.9	53.4	2.42
# 11	45.3	45.5	47.1	44.8	45.1	44	47.7	44.1	45.5	1.32
	48.3	48.5	44.9	48.2	47.1	51	43.1	42.1	46.7	3.02
	50.4	52.2	45.7	49.5	51.6	51.3	47.5	50	49.8	2.20
# 12	43.4	42.6	33.6	40.5	49.8	44.9	38.8	45.5	42.4	4.86
	42	39.5	39.5	41.9	45.5	43.2	46	45.1	42.8	2.57
	53.2	48.6	51.4	49.1	54.3	47.2	53.4	48.9	50.8	2.66
# 13	63.1	56.1	65.5	55.0	62.3	58.0	63.0	57.1	60.0	3.91
	60.8	52.9	57.3	55.7	60.1	51.1	60.1	57.5	56.9	3.53
	60.5	59.5	57.3	52.3	60.0	61.4	59.7	54.1	58.1	3.27
# 14	56.0	51.0	50.0	60.0	55.0	50.0	50.0	58.0	53.8	4.03
	55.0	43.0	54.0	52.0	54.0	44.0	56.0	51.0	51.1	4.97
	51.0	54.0	49.0	53.0	52.0	53.0	51.0	52.0	51.9	1.55

**Figure B-35. Surface Resistivity Data Reported For Mix #11 @ 91 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	33.8	32.2	32.2	34.3	33.3	29.7	33.0	33.2	32.7	1.41
	34.5	32.6	29.7	37.2	33.6	34.1	29.1	34.8	33.2	2.69
	34.1	31.8	32.9	30.9	32.8	30.9	33.4	31.8	32.3	1.16
# 2	31.8	31.7	31.2	29.3	30.7	31.3	30.6	29.3	30.7	0.98
	31.6	29.6	30.7	29.7	31.8	29.4	29.9	29.5	30.3	0.97
	31.2	29.8	32.5	31.6	30.6	30.2	33.2	31.2	31.3	1.14
# 3	34.2	33.1	32.4	33.3	37.8	34.0	33.2	34.4	34.1	1.65
	34.3	34.2	33.1	30.8	34.5	35.4	32.4	30.0	33.1	1.90
	35.1	33.9	37.8	36.5	33.8	34.2	37.4	37.3	35.8	1.69
# 4	N/A									
# 5	29.1	29.7	29.8	30.1	30.4	28.2	32.2	29.4	29.9	1.16
	29.0	27.3	29.1	30.1	28.5	27.3	28.5	30.0	28.7	1.06
	29.8	30.9	28.8	30.9	28.0	29.9	28.2	30.6	29.6	1.17
# 6	30.3	30.1	30.8	27.9	29.2	30.4	30.7	29.1	29.8	1.00
	28.0	28.9	30.7	27.9	28.7	29.4	29.8	28.2	29.0	0.97
	29.5	29.4	31.0	31.0	29.2	29.6	30.8	31.1	30.2	0.84
# 7	37.1	37.3	33.9	37.6	39.9	39.3	35.2	38.2	37.3	1.99
	35.4	38.2	36.8	36.8	36	38	36.3	36.7	36.8	0.95
	34.2	34.2	36.6	36.6	36.1	36.4	36.1	37.1	35.9	1.10
# 8	32.6	32.2	32.5	29.1	32.9	33.1	33.2	30.3	32.0	1.48
	35.1	33.5	34	37.2	34.3	33.7	34.4	37.5	35.0	1.55
	32.9	33.6	37.2	34.2	32.9	33.6	37.6	34.9	34.6	1.84
# 9	40.2	39.6	37.8	36.9	39.6	39.6	37.4	38.1	38.7	1.24
	34.7	31.7	31.5	36.1	34.1	32.3	32.4	35.0	33.5	1.72
	35.4	34.6	37.3	34.9	34.1	37.0	37.6	34.7	35.7	1.38
# 10	29.0	28.7	31.6	30.0	29.1	28.6	31.6	30.2	29.9	1.22
	34.2	33.5	31.5	31.6	34.1	33.5	31.7	31.4	32.7	1.24
	30.4	30.4	32.6	32.5	31.2	30.5	32.3	32.8	31.6	1.07
# 11	25.8	27.9	26.2	27.3	26.9	27	25.7	26	26.6	0.79
	27.6	29.2	28.2	28.5	27	29.2	28.9	28.5	28.4	0.77
	28.2	26.8	29.1	29	29.4	27	28.3	26.8	28.1	1.08
# 12	24.8	24.8	24.8	23.8	24.7	25.2	25.3	25.2	24.8	0.47
	22.6	24.6	23.3	22.6	24.1	23.6	23.2	24	23.5	0.72
	25.3	24	25.1	21.6	25.8	25.8	26.4	23.7	24.7	1.56
# 13	28.4	28.1	31.8	28.7	29.6	28.5	30.8	29.2	29.4	1.30
	29.4	30.3	34.4	31.0	30.5	33.4	30.8	31.6	31.4	1.67
	31.8	31.0	30.1	35.2	32.4	31.8	31.2	35.7	32.4	2.00
# 14	29.0	30.0	31.0	31.0	28.0	30.0	32.0	31.0	30.3	1.28
	33.0	31.0	30.0	30.0	32.0	30.0	32.0	30.0	31.0	1.20
	31.0	31.0	33.0	29.0	32.0	31.0	33.0	28.0	31.0	1.77

**Figure B-36. Surface Resistivity Data Reported For Mix #12 @ 91 Days**

LAB No.	Individual SR Test Results at Location/Orientation on Surface of Cylinder (KOhm-cm)									
	0°	90°	180°	270°	0°	90°	180°	270°	MEAN	STDEV
# 1	42.5	35.7	36.2	34.7	42.8	36.3	35.7	34.8	37.3	3.33
	36.9	34.9	33.0	37.9	38.2	34.7	35.8	37.7	36.1	1.85
	29.8	33.9	32.7	33.7	29.6	34.4	32.8	32.5	32.4	1.80
# 2	42.1	38.4	48.1	41.8	44.3	38.4	47.7	43.6	43.1	3.68
	44.7	42.0	41.1	42.5	42.6	41.7	42.0	43.7	42.5	1.16
	40.5	44.1	43.0	40.2	40.1	42.5	42.3	40.1	41.6	1.57
# 3	44.3	40.6	44.1	46.7	46.0	41.2	43.0	45.5	43.9	2.20
	49.4	46.3	50.4	45.9	38.3	43.4	47.6	45.9	45.9	3.77
	33.1	35.0	34.1	32.5	31.0	34.0	33.3	34.2	33.4	1.24
# 4	62.8	51.8	49.8	44.7	65.8	49.2	50.9	46.1	52.6	7.61
	41.1	45.2	49.7	42.2	43.8	48.3	50.4	45.9	45.8	3.42
	41.1	45.8	45.7	38.6	44.8	43.0	44.2	40.8	43.0	2.61
# 5	N/A									
# 6	32.8	35.5	34.9	35.3	32.5	35.5	35.1	35.4	34.6	1.24
	36.6	41.6	34.9	36.8	37	42.3	34.8	38.3	37.8	2.81
	34.8	29.8	29.7	36	34.8	27.6	30.8	36.4	32.5	3.38
# 7	44.1	44.4	37.8	41.8	44	43.1	38	40.6	41.7	2.68
	38.4	39.2	40.2	40.3	37.5	40.2	40.8	39.3	39.5	1.11
	40.2	38.8	38	39.8	41.2	37.7	37.7	39.2	39.1	1.27
# 8	31.6	33.5	29.7	31.7	32.1	32.3	30.2	34.3	31.9	1.53
	34.7	32.7	32.2	34.6	33.9	33.3	32.5	34	33.5	0.96
	33.8	32.1	33.4	32.9	33	32.4	33.3	33.7	33.1	0.60
# 9	36.9	33.7	35.1	34.1	37.2	34.0	35.2	34.0	35.0	1.36
	37.3	34.9	33.4	41.3	36.7	34.4	32.8	42.4	36.7	3.56
	35.7	41.0	38.1	39.0	38.3	41.2	37.9	39.3	38.8	1.77
# 10	41.3	40.0	38.9	41.1	41.4	40.6	39.4	41.5	40.5	0.99
	37.0	34.7	37.9	40.3	37.5	34.9	37.6	40.0	37.5	2.04
	39.8	40.5	38.3	43.1	39.8	40.7	38.1	43.0	40.4	1.87
# 11	N/A									
# 12	33.6	31.7	32.4	32.5	33.7	32.7	32.8	32.2	32.7	0.68
	35.8	35	31.9	36.7	37.7	35.8	32.8	36.5	35.3	1.98
	31.5	30.2	30.7	31.5	29.6	31	30.7	30.5	30.7	0.64
# 13	39.7	38.9	37.3	36.3	39.5	39.5	36.8	36.8	38.1	1.43
	38.9	37.4	40.2	41.9	39.5	36.7	40.2	41.1	39.5	1.77
	36.4	40.4	42.1	41.6	36.8	40.2	40.9	41.0	39.9	2.14
# 14	N/A									

# **Appendix C**

## **Surface Resistivity Test Results Reported for Mix #1 @ 28 Days**



**Figure C-1. Surface Resistivity Test Results Reported for Mix #1, Lab #1, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CTA-34	11.5	11.5	10.5	11.2	11.2	10.7	10.6	11.1	11.0375
CTA-36	10.8	10.7	9.9	11	10.2	11.8	11.6	11.3	10.9125
CTA-38	12	11.2	12.3	11.7	12.2	11.8	11.7	11.6	11.8125
Set Average									11.2542
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1000
Penetrability Based on Test									12.3796
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				67					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure C-2. Surface Resistivity Test Results Reported for Mix #1, Lab #2, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	11.1	12.0	11.7	11.9	11.1	11.9	11.6	11.8	11.6
23	11.2	11.2	11.0	11.5	11.2	11.1	11.0	11.5	11.2
24	10.5	11.9	10.4	10.9	10.5	11.9	10.2	10.9	10.9
Set Average									11.25
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.38
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens					Received the specimens on July 22 at 3:00 p.m. EST. Specimens were put in lime tank immediately and tested them on July 23 at 11:00 EST.				
Any abnormalities, comments, and/or notes.					N/A				

**Figure C-3. Surface Resistivity Test Results Reported for Mix #1, Lab #3, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
4	11.30	10.76	10.94	10.95	11.43	10.65	10.26	10.75	10.88
5	12.23	11.20	10.89	12.62	12.38	11.31	10.91	12.14	11.71
6	11.11	10.75	11.13	11.45	11.21	10.37	11.29	11.69	11.13
Set Average									11.24
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.10
Penetrability Based on Test									12.36
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									73
Lime Water Temperature (°F)									72
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure C-4. Surface Resistivity Test Results Reported for Mix #1, Lab #4, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	11.7	11.2	11.6	12.5	11.3	11	11.9	11.9	11.6375
20	12.3	11.8	11.2	11.3	11.7	12.1	11.2	11.5	11.6375
21	11.6	12.2	12.5	13	11.6	12.1	12.4	13	12.3
Set Average									11.85833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.04416667
Chloride Ion Penetration Type									MODERATE

Air Temperature of testing room (°F)

68.5

Water Temperature of lime bath (°F)

71.9

Curing history specific to your lab once you received the specimens

Samples were received on 7-21-10 (12:00 pm aprox), were taken out of the box and immediately immersed in a water-lime bath.

Any abnormalities, comments, and/or notes.

No Abnormalities on the cylinders were found

**Figure C-5. Surface Resistivity Test Results Reported for Mix #1, Lab #5, @28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
33	11.5	11.9	11.8	12.3	11.4	12	12.4	12.3	11.95
31	12.2	12.5	12.6	12	12.2	12.5	12.5	12	12.3125
32	12.8	12.2	13.2	13.2	12.9	12.3	13.1	13	12.8375
Set Average									12.36666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.60333333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									68.5
Water Temperature of lime bath (°F)									70
Curing history specific to your lab once you received the specimens					Samples were received on 7-21-10 (noon), were taken out of the box and immediately immersed in a water-lime bath. On 7-23-10, samples were taken out of bath, carefully wrapped with the same shipping materials for transportation to PRDOT facilities. Samples were tested by personnel from Grupo Carmelo.				
Any abnormalities, comments, and/or notes.					No specimen abnormalities were found				

**Figure C-6. Surface Resistivity Test Results Reported for Mix #1, Lab #6, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average	
1	10.10	10.34	11.26	10.85	10.23	10.31	11.26	10.72	10.63	
2	10.28	10.52	10.17	11.12	10.39	10.65	9.94	11.12	10.52	
3	10.72	10.01	10.27	10.47	10.63	10.08	10.25	10.52	10.37	
Set Average									10.51	
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1	
Penetrability Based on Test									11.56	
Chloride Ion Penetration Type									HIGH	
									Stdev	0.146
									COV	1.27%
Air Temperature of testing room (°F)				74						
Water Temperature of lime bath (°F)				74						
Curing history specific to your lab once you received the specimens					Received on July 22nd, immediately put in lime water. Run test at 28 days on June 23th at 4.30 pm ET.					
Any abnormalities, comments, and/or notes.					a = 1.5 inches					

**Figure C-7. Surface Resistivity Test Results Reported for Mix #1, Lab #7, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
10	15	14	16	14	14	14	16	14	14.625
11	15	14	14	15	14	14	15	16	14.625
12	15	14	15	16	15	15	15	16	15.125
Set Average									14.79166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									16.27083333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									72
Curing history specific to your lab once you received the specimens					Samples received on 7/22/10 and placed in lime water. Tested samples for 28 day Surface Resistivity on 7/23/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Dan Dennis performed the Surface Resistivity testing				

**Figure C-8. Surface Resistivity Test Results Reported for Mix #1, Lab #8, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	11	12	11	11	11	12	11	11	11.25
17	12	11	12	11	12	11	12	11	11.5
18	12	11	12	12	12	11	12	12	11.75
Set Average									11.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.65
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									76
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Received on July 22 immediately put in lime water. Ran 28 day test July 23 at 11:10 a.m.				
Any abnormalities, comments, and/or notes.					N/A				



**Figure C-9. Surface Resistivity Test Results Reported for Mix #1, Lab #9, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
Caltrans 15	12.2	12	11.1	10.5	11.5	12.1	10.9	10.5	11.35
Caltrans 13	10.8	11	11.2	11.5	10.1	11.1	11.3	11.5	11.0625
Caltrans 14	11.4	10.5	11.6	11.1	11.4	10.5	11.6	11.1	11.15
Set Average									11.1875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.30625
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									70.9
Water Temperature of lime bath (°F)									74.2
Curing history specific to your lab once you received the specimens					Received the cylinders ~1:30 PM on 7-22-10, then straight to lime bath in the cure room.				
Any abnormalities, comments, and/or notes.									

**Figure C-10. Surface Resistivity Test Results Reported for Mix #1, Lab #10, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CTA28	10.5	9.8	10.7	10.6	10.5	11	10.8	10.9	10.6
CTA29	10.7	10.8	10.8	10.8	10.8	10.9	11.5	11	10.9125
CTA30	10.8	10.8	10.7	11.1	11	10.9	10.9	10.9	10.8875
Set Average									10.8
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									11.88
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)									74
Curing history specific to your lab once you received the specimens					Test specimens arrived on 7/22/10 and per instructed put in a lime water. Taken out of lime water on day of test (7/23) and now stored in moist room after 28 day test and will be in moist room thru-out the remainder tests.				
Any abnormalities, comments, and/or notes.									



**Figure C-12. Surface Resistivity Test Results Reported for Mix #1, Lab # 12, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CTA - 7	10.7	11.3	11.7	11.3	11	11.7	10.8	11.1	11.2
CTA - 8	9.2	10.1	10	9.7	10	10.2	10	10	9.9
CTA - 9	11.7	10.7	11	10.3	11.6	10.7	11	10.6	11.0
Set Average									10.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									11.8
Chloride Ion Penetration Type									HIGH
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)				73	73.5	74.5			
Temperature of Ca(OH) <sub>2</sub> Solution (°F)				71.5	71.5	72.5			
Curing history specific to your lab once you received the specimens					The specimens arrived on 7/22/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									





# **Appendix D**

## **Surface Resistivity Test Results Reported for Mix #2 @ 28 Days**

**Figure D-1. Surface Resistivity Test Results Reported for Mix #2, Lab #1, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FHWA-10	10.5	8.9	8.9	9.5	10.5	8.7	9.1	9.5	9.4500
FHWA-11	9.2	8.6	8.4	8.1	9.2	8.6	8.4	8.9	8.6750
FHWA-12	10.3	9	8.5	8.4	10.5	9.1	8.6	8.7	9.1375
Set Average									9.0875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									9.9963
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				67					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure D-2. Surface Resistivity Test Results Reported for Mix #2, Lab #2, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
MCL 40	9.1	8.3	8.6	9.5	9.1	8.3	8.6	9.5	8.9
MCL 41	10	8.6	8.5	8.7	9.8	8.8	8.3	8.8	8.9
MCL 42	8.9	9.5	9.8	9.1	8.9	9.6	10	8.8	9.3
Set Average									9.0
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.0
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after demolding				
Any abnormalities, comments, and/or notes.					N/A				

**Figure D-3. Surface Resistivity Test Results Reported for Mix #2, Lab #3, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Temp H <sub>2</sub> O: 70f		Temp Air: 70f		Ohms:		Scale: 3		Range: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
8/11/2010	7	8.52	8.45	8.75	8.76	8.5	8.94	8.57	9.25	8.72
8/11/2010	8	9.18	9.24	8.38	8.87	9.48	9.13	8.67	9.25	9.03
8/11/2010	9	8.61	9.36	10.55	8.32	8.71	9.6	10.8	8.74	9.34
Set Average										9.03
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										9.93
Penetrability Based on Test										

**Figure D-4. Surface Resistivity Test Results Reported for Mix #2, Lab #4, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
34	10.4	10.1	10.7	10.3	10.5	9.7	11	10.3	10.375
35	9.8	9.5	10.3	10.4	10	9.3	10.2	10.4	9.9875
36	9.9	10.2	10.9	10.2	9.9	10.3	10.5	10.2	10.2625
Set Average									10.20833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									11.22916667
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				67					
Water Temperature of lime bath (°F)				72.1					
Curing history specific to your lab once you received the specimens					Cylinders once received were put on lime water after test				
Any abnormalities, comments, and/or notes.					No Comments				

**Figure D-5. Surface Resistivity Test Results Reported for Mix #2, Lab #5, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
32	16.1	15.4	17	17.1	16.1	15.5	16.9	17.3	16.4
31	16.2	16.5	16.3	15.4	16.2	16.6	16.2	15.3	16.1
33	14.4	15.2	14.8	15.9	14.7	15.4	14.9		15.0
Set Average									15.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.4
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									69.5
Water Temperature of lime bath (°F)									70.0
Curing history specific to your lab once you received the specimens					Samples were received on 8-06-10 , taken out of the box and immediately immersed in a water-lime bath. On 8-11-10, samples were taken out of bath, carefully wrapped with the same shipping materials for transportation to PRDOT facilities. Samples were tested by personnel from Grupo Carmelo.				
Any abnormalities, comments, and/or notes.					No specimen abnormalities were found				

**Figure D-6. Surface Resistivity Test Results Reported for Mix #2, Lab #6, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FHWA4	8.39	8.26	8.16	10.5	8.43	8.25	8.13	10.53	8.83125
FHWA5	10.47	10	8.35	9.17	10.66	10.06	8.3	9.18	9.52375
FHWA6	10.47	10	8.35	9.17	10.66	9.65	11.31	10.27	9.985
Set Average									9.446666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.39133333
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Received on Aug 5th immediately put in lime water. Run test at 28 days on Aug 11th at 4.30 pm ET.				
Any abnormalities, comments, and/or notes.					a = 1.5 inches				

**Figure D-7. Surface Resistivity Test Results Reported for Mix #2, Lab #7, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	13	13	13	13	13	13	13	13	13
17	13	13	12	11	13	13	12	12	12.375
18	12	13	13	13	13	13	14	13	13
Set Average									12.79166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.07083333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 8/05/10 and placed in lime water. Tested samples for 28 day Surface Resistivity on 8/11/10 and then placed back into the lime water.				
					Ed McGaffin performed the Surface Resistivity testing				

**Figure D-8. Surface Resistivity Test Results Reported for Mix #2, Lab #8, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	10	9	9	10	10	9	9	10	9.5
23	9	8	8	8	9	8	8	8	8.25
24	9	9	9	10	9	9	9	10	9.25
Set Average									9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									9.9
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				74.6					
Water Temperature of lime bath (°F)				73.2					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					28 day				

**Figure D-9. Surface Resistivity Test Results Reported for Mix #2, Lab #9, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
20	10	9.7	9.6	10.3	10	9.7	9.5	10.3	9.8875
19	9.6	9.8	9.6	9.9	9.7	10	9.9	9.8	9.7875
21	9.2	10	10.2	9.3	9.2	10	9.7	9.3	9.6125
Set Average									9.7625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.73875
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				72.6					
Water Temperature of lime bath (°F)				74.1					
Curing history specific to your lab once you received the specimens					Lime water bath inside cure room				
Any abnormalities, comments, and/or notes.					Cylinders 20 & 21 had damage from shipping. The shipping box had been patched together by fedex. The damages were corner breaks on the end of the cylinders				



**Figure D-10. Surface Resistivity Test Results Reported for Mix #2, Lab #10, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FWHA31	10.3	8.9	10.3	9.5	10	9.1	10.2	9.6	9.7375
FWHA32	9.2	9.8	8.2	8.4	9.9	9.9	8.3	8.4	9.0125
FWHA33	10.9	10	9.7	10.2	9.9	9.9	9.5	10.4	10.0625
Set Average									9.604166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.56458333
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Received on 8/5/10 and put into lime bath				
Any abnormalities, comments, and/or notes.					Ends of specimens were slightly damaged, possibly dropped during shipment. Do not believe it effected test.				

**Figure D-11. Surface Resistivity Test Results Reported for Mix #2, Lab #11, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	10.4	10.2	9.2	9.1	9.7	10.2	9.5	9.5	9.725
29	10.5	10	9.4	10.6	10.7	9.7	9.5	10.5	10.1125
30	9.2	9.1	9.7	9.1	9.1	9.6	9.7	9.4	9.3625
Set Average									9.733333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.70666667
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									70
Curing history specific to your lab once you received the specimens					After received immediately cured immersed in lime solution.				
Any abnormalities, comments, and/or notes.					Surface imperfections around the height of the cylinders, pictures to be sent.				

**Figure D-12. Surface Resistivity Test Results Reported for Mix #2, Lab #12, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FHWA-13	8.5	10	8.3	8.7	8.4	10	8.4	8.6	8.9
FHWA-14	8	8.3	9.3	9.6	8.2	8.2	9.2	9.3	8.8
FHWA-15	8.4	9.1	9.3	9.4	8.5	9	8.9	9.4	9.0
Set Average									8.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									9.8
Chloride Ion Penetration Type									HIGH
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)				69.5	71	73			
Temperature of Ca(OH) <sub>2</sub> Solution (°F)				66.5	66.5	68.2			
Curing history specific to your lab once you received the specimens					The specimens arrived on 8/6/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure D-13. Surface Resistivity Test Results Reported for Mix #2, Lab #13, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
1	9.9	9.92	9.62	10.58	10.07	10.3	9.81	10.45	10.08125
2	9.42	9.23	10.14	10.17	9.27	9.2	10.33	10.65	9.80125
3	10.52	9.71	10.55	10.11	10.57	9.74	10.54	10.2	10.2425
Set Average									10.04166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									11.04583333
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)									77.9
Water Temperature of lime bath (°F)									74.3
Curing history specific to your lab once you received the specimens					Samples were put in lime water on August 9th, 2010				
Any abnormalities, comments, and/or notes.					Sample 1 has alot of air voids; time of test 14:00				

**Figure D-14. Surface Resistivity Test Results Reported for Mix #2, Lab #14, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	9.8	9.6	10.3	10.7	9.9	9.7	10	10.9	10.1125
38	9.3	9.3	9.8	10.3	9.3	9.4	9.6	10.4	9.675
39	11.1	10.4	9.2	9.6	11	10.3	9.1	9.4	10.0125
Set Average									9.933333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.92666667
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				69					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix E**

## **Surface Resistivity Test Results Reported for Mix #3 @ 28 Days**

**Figure E-1. Surface Resistivity Test Results Reported for Mix #3, Lab #1, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VADOT-1	8.6	8.8	8.9	8.9	8.6	8.7	8.9	8.9	8.7875
VADOT-2	8.7	9.2	9.6	9.2	8.7	9	9.6	9.1	9.1375
VADOT-3	9	9.1	9.1	8.8	9.1	9.1	9.1	9.2	9.0625
Set Average									8.9958
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									9.8954
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure E-2. Surface Resistivity Test Results Reported for Mix #3, Lab #2, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	9.2	9.1	9.1	9.1	9.0	9.3	9.1	9.1	9.1
38	8.7	8.5	8.3	8.5	8.5	8.5	8.3	8.5	8.5
39	8.7	8.3	8.6	8.6	8.7	8.4	8.6	8.8	8.6
Set Average									8.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									9.6
Chloride Ion Penetration Type									HIGH
Date 8/18/10									
Air Temperature of testing room (°F)				68					
Water Temperature of lime bath (°F)				69					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				



**Figure E-3. Surface Resistivity Test Results Reported for Mix #3, Lab #3, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Temp H <sub>2</sub> O: 70f		Temp Air: 75f		Ohms:		Scale: 3		Range: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
8/18/2010	37	8.3	8.3	8.4	8.6	8.3	8.6	8.3	8.5	8.41
8/18/2010	38	8.3	7.9	8.1	7.9	7.7	8.1	8.00	8.00	8.00
8/18/2010	39	8.3	8.5	8.5	8.7	8.5	8.3	8.3	8.2	8.41
Set Average										8.28
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										9.10
Penetrability Based on Test										

**Figure E-4. Surface Resistivity Test Results Reported for Mix #3, Lab #4, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
31	9.6	10.2	10.4	10.1	10.4	10.4	10.8	10.3	10.275
32	11	10.6	10	10.2	10.8	10.3	10.4	10.6	10.5
33	10.5	10.4	10	10.1	10.7	10.6	9.9	10.3	10.3
Set Average									10.35833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									11.39416667
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)									66.6
Water Temperature of lime bath (°F)									72.2
Curing history specific to your lab once you received the specimens									Cylinders once received were put on lime water after test
Any abnormalities, comments, and/or notes.									No Comments

**Figure E-5. Surface Resistivity Test Results Reported for Mix #3, Lab #5, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VA 22	9.9	9.7	9.6	9.5	9.9	9.6	10.1	9.3	9.7
VA 23	10.9	10.9	11.6	10.8	11.5	10.9	11.5	11.0	11.1
VA 24	10.7	9.9	10.7	10.5	10.5	10.2	10.5	10.4	10.4
Set Average									10.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									11.5
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)									67.3
Water Temperature of lime bath (°F)									70.0
Curing history specific to your lab once you received the specimens					Samples were received on 8-16-10 , taken out of the box and immediately immersed in a water-lime bath. On 8-18-10, samples were taken out of bath, carefully wrapped with the same shipping materials for transportation to PRDOT facilities. Samples were tested by personnel from Grupo Carmelo.				
Any abnormalities, comments, and/or notes.					No specimen abnormalities were found				

**Figure E-6. Surface Resistivity Test Results Reported for Mix #3, Lab #6, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	8.99	8.58	8.69	8.35	9.02	8.62	8.72	8.34	8.66
26	9.46	10.07	10.02	10.06	9.48	10.01	9.98	10.02	9.89
27	8.99	9.08	8.85	8.84	9.02	9.1	8.88	8.79	8.94
Set Average									9.17
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.08
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Received on 08/11/10, immediately put in lime water. Run test at 28 days on 08/18/10 at 4.00 pm ET.				
Any abnormalities, comments, and/or notes.					a = 1.5 inches. Purdue was receiving samples #1, 2 and 3 previously. In this case samples #25, 26 and 27 were received.				

**Figure E-7. Surface Resistivity Test Results Reported for Mix #3, Lab #7, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	12	12	12	12	12	12	12	13	12.125
29	12	12	12	12	12	12	12	12	12
30	13	13	14	13	13	13	13	14	13.25
Set Average									12.45833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.70416667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Samples received on 8/12/10 and placed in lime water. Tested samples for 28 day Surface Resistivity on 8/18/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure E-8. Surface Resistivity Test Results Reported for Mix #3, Lab #8, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	9	9	9	9	9	9	9	9	9
14	10	10	10	10	10	10	10	10	10
15	10	10	10	10	10	10	10	10	10
Set Average									9.666666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.63333333
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				76					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					When received placed immediately into lime water bath.				
Any abnormalities, comments, and/or notes.					Received on August 5th. The package was damaged. The cylinders appear to be ok.				

**Figure E-9. Surface Resistivity Test Results Reported for Mix #3, Lab #9, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
8	8.9	9.4	8.5	9.1	8.9	9.5	8.8	9.1	9.025
9	9.2	9.3	9.6	9.6	9	9.2	9.6	9.8	9.4125
7	9.1	8.8	9	9	9.3	9	8.7	8.8	8.9625
Set Average									9.133333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.04666667
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				70.8					
Water Temperature of lime bath (°F)				74.1					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure E-10. Surface Resistivity Test Results Reported for Mix #3, Lab #10, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VADOT4	10.2	10	9.9	9.9	10.2	10	9.9	9.8	9.9875
VADOT5	8.9	9.3	9.1	9.2	8.9	9.4	9.1	9.5	9.175
VADOT6	8.9	9.5	9.7	8.8	8.8	9.5	9.7	9.2	9.2625
Set Average									9.475
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.4225
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Place in Lime Tank				
Any abnormalities, comments, and/or notes.									



**Figure E-11. Surface Resistivity Test Results Reported for Mix #3, Lab #11, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
34	10.7	10.8	10.8	10.7	10.6	10.8	10.9	10.9	10.775
35	11.4	11.6	12.2	11.9	11.6	11.4	12	11.8	11.7375
36	10.3	10.7	11	10.5	10.4	10.9	10.9	10.7	10.675
Set Average									11.0625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.16875
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									70
Curing history specific to your lab once you received the specimens									After received immediately cured immersed in lime solution.
Any abnormalities, comments, and/or notes.									

**Figure E-12. Surface Resistivity Test Results Reported for Mix #3, Lab #12, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VADOT-19	9	9.2	9	9.8	9.1	9.3	9.3	9.8	9.3
VADOT-20	9.3	10.1	9.2	9.3	9.3	10	9.5	9.3	9.5
VADOT-21	9.5	9.6	10.1	9.5	9.5	10.1	10.1	9.5	9.7
Set Average									9.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.5
Chloride Ion Penetration Type									HIGH
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)					68				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					69				
Curing history specific to your lab once you received the specimens					The specimens arrived on 8/13/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure E-13. Surface Resistivity Test Results Reported for Mix #3, Lab #13, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	11.52	10.92	10.93	10.35	11.67	10.92	11.08	10.81	11.025
17	10.41	10.47	11.05	10.87	10.45	10.61	10.96	10.87	10.71125
18	10.91	10.56	10.45	10.69	10.79	10.55	10.47	10.53	10.61875
Set Average									10.785
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									11.8635
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				78.8					
Water Temperature of lime bath (°F)				73.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					none to report				

**Figure E-14. Surface Resistivity Test Results Reported for Mix #3, Lab #14, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
10	10.1	9.7	9.7	9.8	10.1	9.7	9.8	9.8	9.8375
11	8.9	9.4	9.3	9.6	9.1	9.3	9.4	9.7	9.3375
12	10	9.7	9.7	9.6	9.9	9.6	10	10	9.8125
Set Average									9.6625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.62875
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				70.8					
Water Temperature of lime bath (°F)				69					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix F**

## **Surface Resistivity Test Results Reported for Mix #4 @ 28 Days**

**Figure F-1. Surface Resistivity Test Results Reported for Mix #4, Lab #1, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA #4	13.8	13.6	14.5	13.8	13.8	13.7	14.5	13.8	13.9375
PRHTA #5	12.2	12.5	12.7	12.1	12.1	12.6	12.8	12	12.3750
PRHTA #6	13.5	12.3	12.3	11.8	13.4	12.3	12.3	11.8	12.4625
									12.9250
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.2175
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure F-2. Surface Resistivity Test Results Reported for Mix #4, Lab #2, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
23	14.0	14.2	14.1	15.6	14.0	14.2	14.1	15.7	14.5
24	14.9	13.1	14.7	13.2	14.8	13.1	14.7	13.1	14.0
46	14.6	13.3	13.6	14.5	14.5	13.3	13.6	14.5	14.0
Set Average									14.1
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.6
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									72.5
Water Temperature of lime bath (°F)									70
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					Specimen # 46 has 1/4" scraping mark along the length of the specimen. It appears to have occurred during demolding of the specimen.				

**Figure F-3. Surface Resistivity Test Results Reported for Mix #4, Lab #3, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Temp H <sub>2</sub> O: 71f		Temp Air: 72f		Ohms: 23.7k		Scale: 3		Range: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
8/26/2010	16	13.70	13.40	14.50	13.60	14.60	13.50	14.00	14.10	13.93
8/26/2010	17	13.6	13.8	13.7	13	13.2	13.4	13.9	13	13.45
8/26/2010	18	14.3	13.9	14.3	15.2	14.5	14.5	14.4	14.8	14.49
Set Average										13.95
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										15.35
Penetrability Based on Test										



**Figure F-4. Surface Resistivity Test Results Reported for Mix #4, Lab #4, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
40	13.5	12.8	12.9	12.8	13.8	12.6	12.9	12.6	12.9875
41	13.3	13.4	13.4	14.4	14.8	13.8	13.6	13.8	13.8125
42	13.7	13.9	13.8	13.7	13.8	14.1	13.7	13.9	13.83
Set Average									13.54333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.89766667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									68.4
Water Temperature of lime bath (°F)									73.5
Curing history specific to your lab once you received the specimens					Once cylinders were demolded were put on tanks. Cylinders made in our Laboratory				
Any abnormalities, comments, and/or notes.					Cylinder 41 have a noted mark from the demolding procedure. This mark does not count as quadrant to make the test				

**Figure F-5. Surface Resistivity Test Results Reported for Mix #4, Lab #5, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
38	16.8	14.8	15.8	14.8	16.9	14.8	15.7	14.7	15.5
39	15.1	15.9	15.0	15.1	15.8	15.5	14.9	14.9	15.3
37	16.8	14.9	14.9	14.6	16.9	14.7	14.9	14.7	15.3
Set Average									15.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									16.9
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				67.5					
Water Temperature of lime bath (°F)				65.3					
Curing history specific to your lab once you received the specimens					Samples were received on 8-18-10, were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No specimen abnormalities were found				

**Figure F-6. Surface Resistivity Test Results Reported for Mix #4, Lab #6, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA10	15.06	13.93	14.28	13.22	14.97	13.96	14.31	13.30	14.12875
PRHTA11	14.79	13.98	15.08	14.01	14.73	14.02	15.09	13.98	14.46
PRHTA12	14.67	13.84	14.02	13.93	14.69	14.05	13.9	13.93	14.12875
Set Average									14.23916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.66308333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Received on August 19th, immediately put in lime water. Run test at 28 days on August 26th at 4.30 pm ET.				
Any abnormalities, comments, and/or notes.									

**Figure F-7. Surface Resistivity Test Results Reported for Mix #4, Lab #7, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	17	17	18	17	16	17	18	18	17.25
20	16	17	17	16	16	17	18	16	16.625
21	18	16	17	16	18	17	16	17	16.875
Set Average									16.91666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.60833333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples received on 8/19/10 and placed in lime water. Tested samples for 28 day Surface Resistivity on 8/26/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure F-8. Surface Resistivity Test Results Reported for Mix #4, Lab #8, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
7	13	14	14	13	13	14	14	13	13.5
9	14	13	14	13	14	13	14	13	13.5
43	15	15	14	15	15	15	14	15	14.75
Set Average									13.91666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.30833333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					When received placed immediately into lime water bath.				
Any abnormalities, comments, and/or notes.									

**Figure F-9. Surface Resistivity Test Results Reported for Mix #4, Lab #9, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
45	14.3	14	14.6	13.6	14.2	13.9	14.2	13.1	13.9875
15	15.1	13.9	13.6	15.1	15.2	15.3	14.6	15.1	14.7375
44	12.8	12.7	12.6	14.1	12.7	13	12.6	13.7	13.025
Set Average									13.91666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.30833333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				70.7					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure F-10. Surface Resistivity Test Results Reported for Mix #4, Lab #10, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA49	15	15.3	15.5	13.7	15	15.4	15.5	13.6	14.875
PRHTA50	14.6	14.5	15.2	15.4	14.2	14.4	15.3	15.5	14.8875
PRHTA51	14.4	15.1	17.1	15.1	14.4	15.2	17.1	15.3	15.4625
Set Average									15.075
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									16.5825
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Place in Lime Tank				
Any abnormalities, comments, and/or notes.									

**Figure F-11. Surface Resistivity Test Results Reported for Mix #4, Lab #11, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
34	13.9	14.1	13.3	13.1	13.8	13.9	13.8	13.2	13.6375
52	14.2	15.1	14.0	15.9	14.7	15.1	14.1	15.9	14.875
53	15.5	15.8	14.2	17.0	15.3	16.1	14.2	17.1	15.65
Set Average									14.72083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									16.19291667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure F-12. Surface Resistivity Test Results Reported for Mix #4, Lab #12, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA-1	11.9	12	11.9	13.2	11.9	11.7	11.4	13.5	12.2
PRHTA-2	13.1	13.2	13.2	13.4	13.4	13.5	13.8	13.5	13.4
PRHTA-3	12.6	12.8	12.8	13.4	12.9	12.9	13.4	13.8	13.1
Set Average									12.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.2
Chloride Ion Penetration Type									MODERATE
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)					72				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					70				
Curing history specific to your lab once you received the specimens					The specimens arrived on 8/19/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure F-13. Surface Resistivity Test Results Reported for Mix #4, Lab #13, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA-26	13.62	14.81	13.82	13.28	13.64	14.81	13.8	13.37	13.89375
PRHTA-47	15.18	15.01	14.9	14.81	15.05	15.07	14.76	14.87	14.95625
PRHTA-48	13.08	14.2	14.1	13.32	13.03	14	14.15	13.31	13.64875
Set Average									14.16625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.582875
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									75.2
Water Temperature of lime bath (°F)									72.5
Curing history specific to your lab once you received the specimens					Received and placed in curing on 2010 08 20				
Any abnormalities, comments, and/or notes.					Specimens were not packed properly - they were placed in plastic bags and sealed but were not wrapped in paper towels first. As a result, the surfaces were partially dry. Test time was 14:30 on 2010 08 26.				

**Figure F-14. Surface Resistivity Test Results Reported for Mix #4, Lab #14, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA 28	14.5	15	14.1	13.5	14.6	14.6	14.1	13.7	14.2625
PRHTA 29	14.9	15	15.2	13.5	15.2	15.4	14.7	15	14.8625
PRHTA 30	14.8	14.3	16.7	14.5	14.9	14.1	17	14.4	15.0875
Set Average									14.7375
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									16.21125
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									71.4 F
Water Temperature of lime bath (°F)									70 F
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix G**

## **Surface Resistivity Test Results Reported for Mix #5 @ 28 Days**

**Figure G-1. Surface Resistivity Test Results Reported for Mix #5, Lab #1, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC #10	9.4	9.2	9.8	10	9.4	9.2	9.3	9.8	9.5125
GC #11	9.3	9	10	10	9.3	9	10.1	10.1	9.6000
GC #12	9.4	9.5	9.1	9.1	9.4	9.6	9.1	9	9.2750
Set Average									9.4625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.4088
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure G-2. Surface Resistivity Test Results Reported for Mix #5, Lab #2, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC 13	9.6	10.5	9.8	10.2	9.6	10.6	9.8	10.3	10.1
GC 14	9.2	9.8	9.3	9.7	9.4	9.8	9.2	9.9	9.5
GC 15	9.3	9.6	9.8	9.2	9.2	9.5	9.9	9.2	9.5
Set Average									9.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.7
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure G-3. Surface Resistivity Test Results Reported for Mix #5, Lab #3, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Temp H <sub>2</sub> O:		Temp Air:		Ohms:		Range: 3		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
9/1/2010	19	9.0	9.4	9.0	9.0	9.1	9.3	9.1	9.1	9.13
9/1/2010	20	8.9	8.4	8.8	8.9	8.9	7.8	8.8	8.9	8.68
9/1/2010	21	8.5	9.3	8.6	9.1	8.3	9.3	8.6	9.2	8.86
Set Average										8.89
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										9.78
Penetrability Based on Test										

**Figure G-4. Surface Resistivity Test Results Reported for Mix #5, Lab #4, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
55	9.9	9	8.9	8.9	10	9.3	8.9	8.6	9.1875
56	9.9	9	8.5	9.7	9.5	9.3	9.5	9.7	9.3875
57	9.7	9.8	9.6	9.7	9.6	9.5	9.8	9.5	9.65
Set Average									9.408333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.34916667
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				68.2					
Water Temperature of lime bath (°F)				75.2					
Curing history specific to your lab once you received the specimens					Cylinders once received were put on the tanks				
Any abnormalities, comments, and/or notes.					Due to Hurricane Earl, our facilities have problems with the electricity and the air conditioner in the tanks room failed. The system were fixed today and in one point (yesterday for two hours) the tank arrise 25.2 °F (0.2°F over specified ASTM C511)				



**Figure G-5. Surface Resistivity Test Results Reported for Mix #5, Lab #5, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	9	10	9.5	9.2	9.2	10.0	9.5	9.2	9.5
38	8.8	8.9	9.1	9.2	8.5	9	9	9.1	9.0
39	10.1	9.7	9.1	10.1	10.1	9.7	9.3	9.9	9.8
Set Average									9.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.3
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				69.3					
Water Temperature of lime bath (°F)				74.3					
Curing history specific to your lab once you received the specimens					Samples were casted on 8-4-10, taken out of the molds on 8-5-10 and placed in water-lime bath. On 9-1-10, 3 samples were measured in PRHTA facilities for SR.				
Any abnormalities, comments, and/or notes.					No specimen abnormalities were found				

**Figure G-6. Surface Resistivity Test Results Reported for Mix #5, Lab #6, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC 16	9.72	9.63	10.98	10.72	9.67	9.8	10.85	10.68	10.25625
GC 17	10.11	9.19	10.03	10.2	10	9.31	10.2	10.35	9.92375
GC 18	10.8	9.9	11.07	9.75	10.9	10	11.1	9.78	10.4125
Set Average									10.1975
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									11.21725
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens					Received 8/26, immediately put into lime water. Maintained in lime water until testing. Replaced into lime water				
Any abnormalities, comments, and/or notes.					a = 1.5"				

**Figure G-7. Surface Resistivity Test Results Reported for Mix #5, Lab #7, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	14	14	13	13	14	14	14	13	13.625
29	12	13	13	12	12	12	13	13	12.5
30	12	13	13	14	12	13	13	14	13
Set Average									13.04166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.34583333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 8/26/10 and placed in lime water. Tested samples for 28 day Surface Resistivity on 9/01/10 and then placed back into the lime water.				
Ed McGaffin performed the Surface Resistivity testing									

**Figure G-8. Surface Resistivity Test Results Reported for Mix #5, Lab #8, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	10	11	10	11	10	10	10	11	10.375
26	11	12	11	11	11	12	11	11	11.25
27	10	10	10	10	10	10	10	10	10
Set Average									10.54166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									11.59583333
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Put in lime water as soon as we received them				
Any abnormalities, comments, and/or notes.					28 day				

**Figure G-9. Surface Resistivity Test Results Reported for Mix #5, Lab #9, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
24	9	9.2	8.3	10.1	9	9.3	8.1	10.2	9.15
22	9.6	9.3	8.8	9.1	9.5	8.7	8.8	9.3	9.1375
23	10.2	9.6	9.3	10.2	10.2	10.5	10	10.1	10.0125
Set Average									9.433333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.37666667
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				71.4					
Water Temperature of lime bath (°F)				74.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure G-10. Surface Resistivity Test Results Reported for Mix #5, Lab #10, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC-1	8.7	8.9	9.3	9.2	8.7	8.8	9.6	9.3	9.0625
GC-2	8.3	8.5	8.7	9.8	8.4	8.5	9.4	9.8	8.925
GC-3	9.3	9.1	9	9.2	8.8	9.4	9	9.3	9.1375
Set Average									9.041666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									9.945833333
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Place in Lime Tank				
Any abnormalities, comments, and/or notes.									

**Figure G-11. Surface Resistivity Test Results Reported for Mix #5, Lab #11, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
4	10.4	10.2	9.2	9.1	9.7	10.2	9.5	9.5	9.725
5	10.5	10	9.4	10.6	10.7	9.7	9.5	10.5	10.1125
6	9.2	9.1	9.7	9.1	9.1	9.6	9.7	9.4	9.3625
Set Average									9.733333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.70666667
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									70
Curing history specific to your lab once you received the specimens					After received immediately cured immersed in lime solution. Werner probe modification results. 4: 35, 5: 33 & 6: 33.4				
Any abnormalities, comments, and/or notes.					Surface imperfections around the height of the cylinders, pictures to be sent.				

**Figure G-12. Surface Resistivity Test Results Reported for Mix #5, Lab #12, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GRUPO-31	9.2	8.8	8.7	8.7	9.3	8.8	9	8.6	8.9
GRUPO-32	9.4	9.3	8.6	8.7	9.5	9.2	8.9	8.9	9.1
GRUPO-33	9.6	10	10.1	9.6	9.3	9.9	10.2	9.8	9.8
Set Average									9.3
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.2
Chloride Ion Penetration Type									HIGH
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)					73.5				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					73				
Curing history specific to your lab once you received the specimens					The specimens arrived on 8/26/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									



**Figure G-13. Surface Resistivity Test Results Reported for Mix #5, Lab #13, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GS-34	9.99	10.03	9.9	9.54	10.01	10.16	9.95	9.63	9.90125
GS-35	10.05	9.36	10.9	9.67	10.01	9.14	10.84	9.63	9.95
GS-36	9.17	9.59	9.83	9.8	9.32	9.88	9.8	9.87	9.6575
Set Average									9.83625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.819875
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				81.5					
Water Temperature of lime bath (°F)				77					
Curing history specific to your lab once you received the specimens					Samples were put in lime water on Aug 26th, 2010				
Any abnormalities, comments, and/or notes.									

**Figure G-14. Surface Resistivity Test Results Reported for Mix #5, Lab #14, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC-7	9.5	9.7	10	9.6	9.5	9.6	9.7	9.7	9.6625
GC-8	9.3	10	9.9	9.8	9.3	9.6	9.4	10	9.6625
GC-9	8.6	7.9	8.8	8.9	8.6	8.1	8.7	9	8.575
Set Average									9.3
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.23
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				70.8 F					
Water Temperature of lime bath (°F)				69 F					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix H**

## **Surface Resistivity Test Results Reported for Mix #6 @ 28 Days**

**Figure H-1. Surface Resistivity Test Results Reported for Mix #6, Lab #1, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
IN #1	9.8	10.4	9.9	9.5	10	10.6	9.8	9.6	9.9500
IN #2	9.5	9.3	9.6	9.8	9.2	9.3	9.6	9.9	9.5250
IN #3	9	9	9.6	10.1	9	9	9.9	10.1	9.4625
Set Average									9.6458
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.6104
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure H-2. Surface Resistivity Test Results Reported for Mix #6, Lab #2, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	9.2	9.4	9.6	9.5	9.2	9.3	9.5	9.5	9.4
14	8.9	8.9	8.5	9.2	8.9	9	8.4	9.2	8.9
15	9.1	8.8	8.8	9.2	9.2	8.8	8.9	9.3	9.0
Set Average									9.1
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.0
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)									76
Water Temperature of lime bath (°F)									80
Curing history specific to your lab once you received the specimens									Specimens were put in lime tank immediately after receiving them
Any abnormalities, comments, and/or notes.									Lab room temperature was hot for a day due to some airconditioning issues. This issue is resolved.

**Figure H-3. Surface Resistivity Test Results Reported for Mix #6, Lab #3, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Temp H <sub>2</sub> O: 71f		Temp Air: 74f		Ohms: 23.6k		Range: 3		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
9/28/2010	34	9.5	8.8	9.7	9.3	9.4	8.5	9.8	9.3	9.26
9/28/2010	35	10.2	9.86	9.79	10.31	9.8	9.9	9.85	10.77	10.06
9/28/2010	36	8.96	9.99	9.31	9.34	8.88	9.88	9.57	9.83	9.47
Set Average										9.60
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										10.56
Penetrability Based on Test										

**Figure H-4. Surface Resistivity Test Results Reported for Mix #6, Lab #4, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
31	12	11.1	11.7	11.3	11.9	10.6	12	10.9	11.4375
32	11.8	11	11.5	10.6	11.6	11.6	11.4	10.5	11.25
33	11.5	11	10.7	11.4	11.3	11	10.9	11.4	11.2
Set Average									11.29583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.42541667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									70.2
Water Temperature of lime bath (°F)									74.2
Curing history specific to your lab once you received the specimens					Once cylinders were received were put on tanks.				
Any abnormalities, comments, and/or notes.					NO comments				

**Figure H-5. Surface Resistivity Test Results Reported for Mix #6, Lab #5, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
IN 19	11.8	11.1	10.5	10.6	11.2	11.4	10.5	10.6	11.0
IN 20	10.3	10.1	10.7	10.0	10	10.5	10.9	10.0	10.3
IN 21	10.8	10.3	10.8	10.3	10.7	10.4	10.8	10.2	10.5
Set Average									10.6
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									11.7
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)									73.4
Water Temperature of lime bath (°F)									68.0
Curing history specific to your lab once you received the specimens					Samples were received on 9-27-10, taken out of the box and immediately immersed in a water-lime bath. On 9-29-10, samples were taken out of bath, carefully wrapped with the same shipping materials for transportation to PRDOT facilities. Samples were tested by personnel from Grupo Carmelo.				
Any abnormalities, comments, and/or notes.					No personnel from Grupo Carmelo was available for test at 28 days.				



**Figure H-6. Surface Resistivity Test Results Reported for Mix #6, Lab #6, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
IN-46	9.76	9.58	8.78	9.82	9.77	9.69	8.77	9.95	9.515
IN-47	11.1	9.75	10.73	9.86	11.15	9.84	10.8	9.87	10.3875
IN-48	8.87	8.94	8.48	8.59	8.8	8.93	8.54	8.6	8.71875
Set Average									9.540416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.49445833
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					<p>Samples casted on 31 AUG. Demolded at 2 days, put into lime water. Samples were kept in lime until 28day age, 3 cylinders were tested in compression. 3 others were tested for SR on 28 SEPT at 5:30PM, and immediately placed back into lime water</p> <p>a=1.5"</p>				
Any abnormalities, comments, and/or notes.									
RESULTS FROM COMPRESSION									
Perfromed on 9/28, 2:50PM, mwh									
	Cyl	P(lb)	fc (psi)						
	IN-40	67,765	5,390						
	IN-41	68,250	5,430						
	IN-42	72,885	5,800						

**Figure H-7. Surface Resistivity Test Results Reported for Mix #6, Lab #7, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	12	13	12	13	12	13	12	13	12.5
29	14	15	14	14	14	15	14	14	14.25
30	14	13	13	13	14	13	13	13	13.25
Set Average									13.33333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.66666667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 9/23/10 and placed in lime water. Tested samples for 28 day Surface Resistivity on 9/28/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure H-8. Surface Resistivity Test Results Reported for Mix #6, Lab #8, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	10	10	9	10	10	10	9	10	9.75
26	10	10	10	11	10	11	10	11	10.375
27	10	9	9	10	10	9	9	10	9.5
Set Average									9.875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.8625
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Put in lime water as soon as we received them				
Any abnormalities, comments, and/or notes.					28 day				

**Figure H-9. Surface Resistivity Test Results Reported for Mix #6, Lab #9, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
7	10.4	8.9	9.5	9.9	10.1	9.1	9.6	9.8	9.6625
8	9.9	9.7	9.5	10.2	10.4	9.6	9.4	9.8	9.8125
9	9.7	10.2	9.3	9.7	9.6	10.2	9.5	9.8	9.75
Set Average									9.741666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.71583333
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				73.9					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure H-10. Surface Resistivity Test Results Reported for Mix #6, Lab #10, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
INDOT 4	9.7	8.9	9.7	10	10	8.9	9.8	10.1	9.6375
INDOT 5	9.2	9.4	8.7	10.3	9.2	9.4	8.9	10.5	9.45
INDOT 6	10.1	9.7	9.6	10.3	10.1	9.8	9.5	10.3	9.925
Set Average									9.670833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.63791667
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Place in Lime Tank				
Any abnormalities, comments, and/or notes.									

**Figure H-11. Surface Resistivity Test Results Reported for Mix #6, Lab #11, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	10.1	9.7	10.7	10.7	10.2	9.8	10.6	10.9	10.3375
38	10.1	10.2	11.1	9.7	10.7	11.2	10	10.3	10.4125
39	8.8	9.7	9.4	9.7	8.8	9.2	9.6	9.6	9.35
Set Average									10.03333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									11.03666667
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure H-12. Surface Resistivity Test Results Reported for Mix #6, Lab #12, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
INDOT - 16	10	9.6	10.6	8.9	10.1	10	10.7	9	9.9
INDOT - 17	9.3	10.2	9.6	9.5	9.4	10.1	9.7	9.6	9.7
INDOT - 18	9.6	10.3	9.8	10.7	9.6	10.3	9.8	11	10.1
Set Average									9.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									10.9
Chloride Ion Penetration Type									HIGH
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)				70.5					
Temperature of Ca(OH) <sub>2</sub> Solution (°F)				68.5					
Curing history specific to your lab once you received the specimens					The specimens arrived on 9/22/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure H-13. Surface Resistivity Test Results Reported for Mix #6, Lab #13, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	11.01	10.87	11.51	12.23	10.98	10.91	11.5	12.49	11.4375
23	12.1	11.85	11.75	12.06	12.25	11.94	11.83	12.06	11.98
24	11.92	11.41	11.35	10.85	12.04	11.4	11.4	10.95	11.415
Set Average									11.61083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.77191667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									66.2
Water Temperature of lime bath (°F)									62.6
Curing history specific to your lab once you received the specimens					Samples were recieved and put in lime water on Setpember 24th, 2919				
Any abnormalities, comments, and/or notes.					No visible abnormalities				



**Figure H-14. Surface Resistivity Test Results Reported for Mix #6, Lab #14, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
IN-10	11.1	9.2	10.7	9.5	11	9.4	10.3	9.8	10.125
IN-11	11.2	11	10.9	10.4	11	11.2	10.9	10.3	10.8625
IN-12	9.7	10.6	9	9.9	9.6	10.2	9.1	9.6	9.7125
Set Average									10.23333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									11.25666667
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				70.5					
Water Temperature of lime bath (°F)				69.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix I**

## **Surface Resistivity Test Results Reported for Mix #7 @ 28 Days**

**Figure I-1. Surface Resistivity Test Results Reported for Mix #7, Lab #1, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NY HK165	26.6	26.5	27.1	27.5	26.8	26.5	27.1	27.3	26.9
NY HK166	23.3	23.7	25.2	23	23.1	24	24.8	23.3	23.8
NY HK167	25.7	23.2	24	26.6	25.5	22.8	24.8	27.5	25.0
Set Average									25.2458
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									27.7704
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure I-2. Surface Resistivity Test Results Reported for Mix #7, Lab #2, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
HK 177	25.5	26.2	25.9	28.9	25.3	26.5	26	28.9	26.7
HK 178	26.2	25.7	25.7	25.4	26.1	25.6	25.5	25.4	25.7
HK 179	28.6	26.6	28.4	26.3	28.5	26.6	28.4	26.5	27.5
Set Average									26.6
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									29.3
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure I-3. Surface Resistivity Test Results Reported for Mix #7, Lab #3, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Temp H <sub>2</sub> O: 70f		Temp Air:		Ohms: 23.6k		Range: 3		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
10/5/2010	201	28.3	25.9	26.4	26.9	28.7	26.0	27.0	26.5	26.96
10/5/2010	202	29.7	27.6	29.2	27.2	30	26.7	29.5	27	28.36
10/5/2010	203	24.2	25.5	25.8	28.4	23.9	25.2	26	28.2	25.90
Set Average										27.08
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										29.78
Penetrability Based on Test										

**Figure I-4. Surface Resistivity Test Results Reported for Mix #7, Lab #4, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
195	28.6	27.9	26.9	30.5	29.3	30.9	30.1	31.2	29.425
196	27.2	25.9	28.2	28.4	28.7	25.8	28.1	28.1	27.55
197	26	25.4	27.5	26.4	26.1	25	27.2	26.9	26.3125
Set Average									27.7625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									30.53875
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									65.8
Water Temperature of lime bath (°F)									71.7
Curing history specific to your lab once you received the specimens					Samples once were received were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No Abnormalities on the cylinders were found				

**Figure I-5. Surface Resistivity Test Results Reported for Mix #7, Lab #5, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
HK183	32.9	28.8	30.9	30.6	32.8	30.0	29.8	29.7	30.7
HK184	29.1	33.4	31.9	32.0	29.4	33.4	32.0	32.3	31.7
HK185	28.3	29.6	29.1	26.6	29.6	29.7	27.8	27.2	28.5
Set Average									30.3
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									33.3
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				67.1					
Water Temperature of lime bath (°F)				68.6					
Curing history specific to your lab once you received the specimens					Samples were received on 10-1-10, taken out of the box and immediately immersed in a water-lime bath. On 10-5-10, samples were taken out of bath, carefully wrapped with the same shipping materials for transportation to PRDOT facilities. Samples were tested by personnel from Grupo Carmelo.				
Any abnormalities, comments, and/or notes.					No specimen abnormalities were found				

**Figure I-6. Surface Resistivity Test Results Reported for Mix #7, Lab #6, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NY HK186	26.6	30.8	28.8	28.7	27.1	31.1	28.8	28.7	28.83
NY HK187	30.5	29.3	29.4	28.3	30.6	29.1	29.4	28.2	29.35
NY HK188	29.2	27.2	27.7	29.2	29.2	27.3	27.7	29.7	28.40
Set Average									28.86
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									31.74
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Received on 9/30/10, put in lime water. Run test at 28 days on 10/5/10 at 4.00 pm ET.				
Any abnormalities, comments, and/or notes.					a=1.5, range setting No 4				



**Figure I-7. Surface Resistivity Test Results Reported for Mix #7, Lab #7, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
162	38	36	33	33	34	35	32	33	34.25
163	34	31	31	35	33	31	30	33	32.25
164	33	31	32	32	33	32	32	31	32
Set Average									32.83333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									36.11666667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples placed in lime water on 9/9/10. Tested samples for 28 day Surface Resistivity on 10/05/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing Concrete had 28 day compressive strength of 6530, 6840, & 6710 psi				

**Figure I-8. Surface Resistivity Test Results Reported for Mix #7, Lab #8, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
HK 192	26	27	26	24	26	27	27	24	25.875
HK 193	29	29	29	29	30	29	30	29	29.25
HK 194	24	24	25	26	23	24	26	27	24.875
Set Average									26.66666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									29.33333333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Put in lime water as soon as we received them				
Any abnormalities, comments, and/or notes.					28 day				

**Figure I-9. Surface Resistivity Test Results Reported for Mix #7, Lab #9, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
172	28	28.1	25.3	25.2	28.2	28.6	26.9	25.6	26.9875
173	26.7	28	29.7	30.8	27.8	28.2	29.5	31.3	29
171	26.7	30.6	28.5	30.9	26.1	30.7	28.1	31.2	29.1
Set Average									28.3625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									31.19875
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				71.5					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure I-10. Surface Resistivity Test Results Reported for Mix #7, Lab #10, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NYSDOT168	26.2	25.3	29.7	29.9	27.5	25.8	30.3	29.6	28.0375
NYSDOT169	25.6	25.2	28.8	27.5	24.9	25.2	27.5	27.6	26.5375
NYSDOT170	27.9	26.8	27.8	25.6	27.6	26.6	27.9	25.8	27
Set Average									27.19166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									29.91083333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					lime water				
Any abnormalities, comments, and/or notes.									

**Figure I-11. Surface Resistivity Test Results Reported for Mix #7, Lab #11, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
198	28.5	27.1	26.9	28.8	28.1	27.1	27.5	30.1	28.0125
199	26.8	24.1	25.6	26.2	27.1	24.2	25.7	24.9	25.575
200	24.9	28	27.7	27.4	25.2	27.9	28.3	27.5	27.1125
Set Average									26.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									29.59
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure I-12. Surface Resistivity Test Results Reported for Mix #7, Lab #12, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NYSDOT-180	23.8	26	24.9	23.6	23.5	25.1	25.3	24	24.5
NYSDOT-181	23	26.1	24.8	23.4	25.8	25.1	25.3	24	24.7
NYSDOT-182	27.7	29.8	27.1	28.9	28.5	29.4	26.8	29.1	28.4
Set Average									25.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									28.5
Chloride Ion Penetration Type									LOW
					NOON				
Temperature of Room Air (°F)					n/a				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					n/a				
Curing history specific to your lab once you received the specimens					The specimens arrived on 10/30/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure I-13. Surface Resistivity Test Results Reported for Mix #7, Lab #13, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NY HK 189	27.7	29.2	26.7	29.7	27.5	29.5	26.6	30.8	28.4625
NY HK 190	24.7	26.1	26.7	26.3	24.5	26	26.6	26.7	25.95
NY HK 191	27.7	27.4	30.8	28	27.1	27.1	30.9	28.8	28.475
Set Average									27.62916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									30.39208333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									63.5
Water Temperature of lime bath (°F)									59.9
Curing history specific to your lab once you received the specimens					Samples were put in lime water on October 1st, 2010				
Any abnormalities, comments, and/or notes.					No visible abnormalities				

**Figure I-14. Surface Resistivity Test Results Reported for Mix #7, Lab #14, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
HK174	25.6	28.1	26	26.3	25.8	28.6	25.6	26.3	26.5375
HK175	25.9	26.1	24.6	24	25.5	25.8	25.1	23.7	25.0875
HK176	26.9	24.9	25.6	25.3	25.3	26.4	25.4	25.6	25.675
Set Average									25.76666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									28.34333333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				69.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



# **Appendix J**

## **Surface Resistivity Test Results Reported for Mix #8 @ 28 Days**

**Figure J-1. Surface Resistivity Test Results Reported for Mix #8, Lab #1, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NEDOT 31	28.9	25.6	25.9	28.8	29	25.3	26.4	28.9	27.4
NEDOT 32	31.8	30.4	27.8	29.8	32.1	30.2	28	29.9	30.0
NEDOT 33	26.7	26.5	25.5	25.8	26.9	26	25.7	25.7	26.1
Set Average									27.8167
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									30.5983
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure J-2. Surface Resistivity Test Results Reported for Mix #8, Lab #2, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	30.2	28.4	30.1	30.7	30.1	28.6	29.9	30.1	29.8
17	30.1	29.1	29.3	29.8	30.4	30.4	29.4	30.1	29.8
18	30.3	31.6	31.8	30.6	30.2	31.8	32.0	31.0	31.2
Set Average									30.3
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									33.3
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure J-3. Surface Resistivity Test Results Reported for Mix #8, Lab #3, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Temp H <sub>2</sub> O: 72f		Temp Air: 75f		Ohms: 23.7k		Range: 4		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
11/1/2010	34	26.8	25.4	26.7	29.3	27.5	25.3	26.4	29.7	27.14
11/1/2010	35	25.1	25.5	25.4	26.4	25.3	26.1	25.2	25.8	25.60
11/1/2010	36	28.9	29.7	26.7	27.5	30.1	29.3	28.9	27.3	28.55
Set Average										27.10
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										29.81
Penetrability Based on Test										

**Figure J-4. Surface Resistivity Test Results Reported for Mix #8, Lab #4, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	28.9	29.6	29.1	29.4	29.6	28.1	29.3	29.5	29.1875
20	30.9	28.4	29.4	27.1	30.4	27.6	29.4	28.3	28.9
21	28.2	31.1	27.6	31.5	27.7	31.4	28.9	31.4	29.7
Set Average									29.2625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									32.18875
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									68.7
Water Temperature of lime bath (°F)									72
Curing history specific to your lab once you received the specimens					Cylinders once received were put on lime water after test				
Any abnormalities, comments, and/or notes.					No Comments				

**Figure J-5. Surface Resistivity Test Results Reported for Mix #8, Lab #5, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NE 7	31.1	34.4	32.8	31.5	34.1	33.9	32.5	31.2	32.7
NE 8	31.9	28.7	29.8	28.8	31.7	27.7	29.2	29.2	29.6
NE 9	31.7	33	33.2	31.4	30.4	33.3	32.3	31.8	32.1
Set Average									31.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									34.6
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									69.3
Water Temperature of lime bath (°F)									64.9
Curing history specific to your lab once you received the specimens					Samples were received on 10-29-10, taken out of the box and immediately immersed in a water-lime bath. On 11-1-10, samples were taken out of bath, carefully wrapped with the same shipping materials for transportation to PRDOT facilities. Samples were tested by personnel from Grupo Carmelo.				
Any abnormalities, comments, and/or notes.									

**Figure J-6. Surface Resistivity Test Results Reported for Mix #8, Lab #6, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average	
NDOR 37	28.50	30.10	28.40	29.30	29.10	29.70	28.30	27.90	28.91	
NDOR 38	29.50	28.50	27.10	26.60	29.00	28.90	27.20	26.70	27.94	
NDOR 39	28.60	27.70	27.00	28.00	27.90	27.80	27.10	28.10	27.78	
Set Average									28.21	
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1	
Penetrability Based on Test									31.03	
Chloride Ion Penetration Type									LOW	
									Stdev	0.677
									COV	2.18%
Air Temperature of testing room (°F)				74						
Water Temperature of lime bath (°F)				74						
Curing history specific to your lab once you received the specimens					Received on October 29, immediately put in lime the following day. Ran test at 28 days on Nov 1st at 4.30 pm ET.					
Any abnormalities, comments, and/or notes.					a = 1.5 inches					

**Figure J-7. Surface Resistivity Test Results Reported for Mix #8, Lab #7, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	34	34	36	34	33	35	35	34	34.375
26	33	33	33	33	33	33	33	33	33
27	34	34	34	34	34	35	34	35	34.25
Set Average									33.875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									37.2625
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples received on 10/28/10 and placed in lime water. Tested samples for 29 day Surface Resistivity on 11/2/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Due to changes in the Surface Resistivity testing schedule for samples from Nebraska (NEDOT), NY had to perform a 29 day Surface Resistivity test in place of the 28 day. Ed McGaffin performed the Surface Resistivity testing.				



**Figure J-8. Surface Resistivity Test Results Reported for Mix #8, Lab #8, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
40	31	29	31	29	32	29	31	29	30.125
41	27	29	28	28	28	28	28	28	28
42	28	27	27	27	28	28	26	27	27.25
Set Average									28.45833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									31.30416667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Core 43 52060 M.L. 4140 psi 28.5 Mpa Core 44 47150 M.L. 3750 psi 25.9 Mpa Core 45 65620 M.L. 5220 psi 36.0 Mpa Avg. of 28 day breaks 4370 psi 30.1 MPa				
Any abnormalities, comments, and/or notes.					Put in lime water as soon as we received them				

**Figure J-9. Surface Resistivity Test Results Reported for Mix #8, Lab #9, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
23	30	30.3	29.2	28.6	29.6	30.3	29.5	28.5	29.5
24	26.2	27.6	28.2	28.6	26.6	26.9	28.1	28.2	27.55
22	29.4	28.8	29.5	29.5	29.5	29	29.7	29.6	29.375
Set Average									28.80833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									31.68916667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				72.9					
Water Temperature of lime bath (°F)				74.2					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure J-10. Surface Resistivity Test Results Reported for Mix #8, Lab #10, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NEDOT10	29.2	27.1	25.8	28.6	29.2	26.9	25.7	28	27.5625
NEDOT11	25.1	29.4	27.2	27.7	25.4	29.6	27.3	27.7	27.425
NEDOT12	31.2	28.4	30.3	29.1	30.4	27.5	30.6	28.6	29.5125
Set Average									28.16666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									30.98333333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

**Figure J-11. Surface Resistivity Test Results Reported for Mix #8, Lab #11, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	25.4	26.6	26	26.9	26.7	27.6	26.4	27.3	26.6125
14	25.3	28.7	28.7	26.4	27	29.5	29.4	26.9	27.7375
15	24	25.1	27.6	29	25.8	26.5	26.2	26.6	26.35
Set Average									26.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									29.59
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure J-12. Surface Resistivity Test Results Reported for Mix #8, Lab #12, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NEDOT-28	27.6	29.1	26.3	26.2	26.6	29.2	26.4	26.9	27.3
NEDOT-29	27	22.6	23.7	24.6	26.8	22.9	23.6	24.4	24.5
NEDOT-30	27.7	28.7	25.3	29	27.6	28.3	25.1	29.7	27.7
Set Average									26.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									29.1
Chloride Ion Penetration Type									LOW
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)									
Temperature of Ca(OH) <sub>2</sub> Solution (°F)									
Curing history specific to your lab once you received the specimens					The specimens arrived on 10/26/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure J-13. Surface Resistivity Test Results Reported for Mix #8, Lab #13, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
4	35.7	36.4	37.3	38.5	36.8	36	37.3	38.5	37.0625
5	33.3	32.4	33.7	33.2	32.4	31.2	33.9	32.6	32.8375
6	37	34.1	35.3	33.9	36.7	35.1	36.1	34.3	35.3125
Set Average									35.07083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									38.57791667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									62.6
Water Temperature of lime bath (°F)									57.2
Curing history specific to your lab once you received the specimens					Received and placed in curing on 2010/10/29				
Any abnormalities, comments, and/or notes.					Tested on 2010/11/01. All samples have numerous large air voids.				

**Figure J-14. Surface Resistivity Test Results Reported for Mix #8, Lab #14, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
1	27.8	29.8	29.1	27.8	27.5	29.5	29.2	28.1	28.6
2	27.3	26.6	27.4	26.5	27.4	26.1	27.5	26.1	26.8625
3	26	23.1	25	25.8	26	23.1	25	25.8	24.975
Set Average									26.8125
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									29.49375
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				69					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix K**

## **Surface Resistivity Test Results Reported for Mix #9 @ 28 Days**



**Figure K-1. Surface Resistivity Test Results Reported for Mix #9, Lab #1, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CDOT 29	16.6	19.4	17.7	17.3	17.5	19.5	17.7	17	17.8
CDOT 39	16	17.6	18	16.4	17.2	18.2	18.3	16.7	17.3
CDOT 41	16.8	16.7	16.7	15.5	16.9	16.2	16.8	15.7	16.4
Set Average									17.1833
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.9017
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure K-2. Surface Resistivity Test Results Reported for Mix #9, Lab #2, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
30	15.9	16.4	17.1	16.6	15.8	16.4	17.1	16.6	16.5
35	17.2	17	17.6	17.4	17.4	17.1	17.4	17.4	17.3
38	15.9	15.8	15.9	15.9	15.8	15.9	16	15.9	15.9
Set Average									16.6
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.2
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure K-3. Surface Resistivity Test Results Reported for Mix #9, Lab #3, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Temp H <sub>2</sub> O: 75f		Temp Air: 77f		Ohms: 24.0k		Range: 3		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
11/16/2010	4	15.7	16.7	16.6	15.7	15.9	16.8	16.8	15.5	16.21
11/16/2010	12	16.22	15.83	15.79	15.58	15.64	15.62	15.41	15.56	15.71
11/16/2010	25	15.48	15.84	14.52	15.93	15.43	16.17	14.84	16.01	15.53
Set Average										15.81
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										17.40
Penetrability Based on Test										

**Figure K-4. Surface Resistivity Test Results Reported for Mix #9, Lab #4, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
2	18.3	19.3	19.1	17.9	19.1	20	19.3	18.4	18.925
5	18.9	18.7	18.7	20.4	20.5	18.2	18.8	20.4	19.325
46	16.1	17.4	18.3	16.2	16.9	17.8	17.8	17.4	17.2375
Set Average									18.49583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									20.34541667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									62.5
Water Temperature of lime bath (°F)									71.9
Curing history specific to your lab once you received the specimens					Samples once received, were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No Abnormalities on the cylinders were found				

**Figure K-5. Surface Resistivity Test Results Reported for Mix #9, Lab #5, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
cdot 40	17.7	17.1	17.8	15.8	18.0	17.0	18.2	17.0	17.3
cdot 45	18.1	18.2	18.3	17.5	18.5	17.3	17.4	17.5	17.9
cdot 48	16.5	15.6	16.5	17.0	16.8	16.7	16.4	16.9	16.6
Set Average									17.2
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									19.0
Chloride Ion Penetration Type									MODERATE

Air Temperature of testing room (°F):	65.2
Water Temperature of lime bath (°F):	64.3
Curing history specific to your lab once you received the specimens	
Any abnormalities, comments, and/or notes.	

**Figure K-6. Surface Resistivity Test Results Reported for Mix #9, Lab #6, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CO 21	17	18.6	18.9	16.9	16.9	18.2	18.3	16.9	17.7125
CO 22	17.9	17.4	19.7	17.9	17.6	17.6	18.9	18.2	18.15
CO 32	18.6	18.4	17.4	18.8	17.9	19.1	17.3	18.7	18.275
Set Average									18.04583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									19.85041667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Received on NOV 11th, immediately put in lime water. Ran test at 28 d on NOV 16, at 6.30 pm ET.				
Any abnormalities, comments, and/or notes.					a=1.5				

**Figure K-7. Surface Resistivity Test Results Reported for Mix #9, Lab #7, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
3	19.2	19.2	18.9	18.8	19.4	19.3	18.8	19.1	19.0875
7	19.1	19.6	20.8	21	18.8	19.4	19.7	20.2	19.825
10	20.6	18.6	19.2	20.4	19.2	18.7	19.4	20.7	19.6
Set Average									19.50416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									21.45458333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									76
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples received on 11/12/10 and placed in lime water. Tested samples for 28 day Surface Resistivity on 11/16/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure K-8. Surface Resistivity Test Results Reported for Mix #9, Lab #8, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
27	15.1	14.8	15.1	14.6	15.2	14.8	15.4	14.7	14.9625
37	15.6	15.8	15.9	15.6	15.5	15.8	16.4	15.8	15.8
44	15.9	16.9	17.1	16.5	16.1	16.9	17.1	16.5	16.625
Set Average									15.79583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.37541667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				76					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					N/A				



**Figure K-9. Surface Resistivity Test Results Reported for Mix #9, Lab #9, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
31	16.5	17.7	16.9	15.6	16.4	18.5	17.2	15.2	16.75
43	17.3	17.3	15.7	15.7	17.2	15.7	15.7	17.3	16.4875
47	16.7	16.9	18	17.3	17.2	16.8	18.1	17.6	17.325
Set Average									16.85416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.53958333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				73.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure K-10. Surface Resistivity Test Results Reported for Mix #9, Lab #10, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CODOT23	16.3	16.9	17.9	17	17	17.4	17.9	17	17.175
CODOT26	14.5	14.6	16.5	14.8	14.8	14.1	16.6	14.6	15.0625
CODOT34	16.7	17.1	16.8	17.1	16.4	17.9	17	17.1	17.0125
Set Average									16.41666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.05833333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

**Figure K-11. Surface Resistivity Test Results Reported for Mix #9, Lab #11, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	15.6	16.9	14.8	17.9	16.4	16.4	15.0	18.2	16.4
16	15.0	15.8	16.3	15.6	15.0	15.6	16.2	15.5	15.625
19	15.6	15.2	16.0	16.2	16.3	14.9	16.0	16.0	15.775
Set Average									15.93333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.52666667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure K-12. Surface Resistivity Test Results Reported for Mix #9, Lab #12, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CODOT - 17	17.1	16	16.7	16	17.3	16.3	17.3	16.3	16.6
CODOT - 20	14.6	14.7	15.8	16.1	14.8	15.2	16.1	16.6	15.5
CODOT - 28	15.2	15.2	14.2	15.2	15.2	15.1	14.7	15.4	15.0
Set Average									15.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.3
Chloride Ion Penetration Type									MODERATE
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)					72				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					70.5				
Curing history specific to your lab once you received the specimens					The specimens arrived on 11/12/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure K-13. Surface Resistivity Test Results Reported for Mix #9, Lab #13, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
#6	18.3	16.2	16.1	17.6	18.2	16.4	15.8	18.2	17.1
#8	19.6	18.4	18.2	18.7	20	19.1	18	19.3	18.9125
#14	19.1	18.3	18.2	19	18.8	18	18.1	19.2	18.5875
Set Average									18.2
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									20.02
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									71.6
Water Temperature of lime bath (°F)									66.2
Curing history specific to your lab once you received the specimens					Received and placed in lime water on 2010/11/18, tested on 2010/11/19				
Any abnormalities, comments, and/or notes.					Specimens did not arrive on time, and were not fully saturated upon unwrapping.				

**Figure K-14. Surface Resistivity Test Results Reported for Mix #9, Lab #14, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
33	17	16.8	14.9	16.2	17.2	16.5	15	16.3	16.2375
36	17	16.9	17.5	18	16.9	16.5	16.9	17.8	17.1875
42	17.4	17.6	17.6	18.8	17.2	18.1	17.3	18.8	17.85
Set Average									17.09166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.80083333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				69					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix L**

## **Surface Resistivity Test Results Reported for Mix #10 @ 28 Days**

**Figure L-1. Surface Resistivity Test Results Reported for Mix #10, Lab #1, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CEMEX 7	22.7	22.8	22	23.3	22.6	22.6	21.8	22.1	22.5
CEMEX 27	23.5	20.8	22.5	22.5	22.6	20.9	23	22.3	22.3
CEMEX 47	22.7	20.7	21.6	24.2	24.2	21.7	21.6	22.7	22.4
Set Average									22.3917
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									24.6308
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure L-2. Surface Resistivity Test Results Reported for Mix #10, Lab #2, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
6	24.5	24.5	24.5	25.2	24.5	24.7	24.1	24.6	24.6
22	24.9	25	25.5	25.2	25.3	24.7	24.2	25.1	25.0
40	26.7	26.9	26.9	26.9	26.9	27	27	26.7	26.9
Set Average									25.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									28.0
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure L-3. Surface Resistivity Test Results Reported for Mix #10, Lab #3, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Temp H <sub>2</sub> O: 72f		Temp Air: 74f		24.2k		Range: 4		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
12/8/2010	3	32.5	31.1	30.5	32.5	30.9	28.6	27.8	28.6	30.31
12/8/2010	17	35.1	37.2	33.7	33.7	27.3	32.7	30.8	31.3	32.73
12/8/2010	43	36.2	32	31.4	33.7	33.4	35.3	31.2	30.8	33.00
Set Average										32.01
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										35.21
Penetrability Based on Test										

**Figure L-4. Surface Resistivity Test Results Reported for Mix #10, Lab #4, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
1	25.1	24.4	28	27.3	24.8	25.7	27.3	25	25.95
41	25.4	24.9	23.5	26.1	25.2	26.1	24.1	26.9	25.275
46	25.9	26	24.8	28.3	24.5	24.2	30	26.3	26.25
Set Average									25.825
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									28.4075
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									62.5
Water Temperature of lime bath (°F)									71.9
Curing history specific to your lab once you received the specimens					Samples once received, were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No Abnormalities on the cylinders were found				



**Figure L-6. Surface Resistivity Test Results Reported for Mix #10, Lab #6, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
9	26.8	27.9	26.4	27.7	27.3	28	26	29.3	27.425
15	23.1	28.1	28.3	27.1	26.2	29.9	27.9	26.9	27.1875
35	27.5	28.6	29.7	28.3	27.2	28.4	29.5	28	28.4
Set Average									27.67083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									30.43791667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Put in lime water after receipt. Run test at 28 days on 8/DEC at 4.00 pm ET.				
Any abnormalities, comments, and/or notes.					a=1.5"				

**Figure L-7. Surface Resistivity Test Results Reported for Mix #10, Lab #7, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
12	26.7	30	29.7	28.2	27.6	29.8	29.5	28.8	28.7875
23	26.8	27.7	27.9	27.2	27.7	26.5	27.8	26.5	27.2625
48	28.5	27.8	28.3	28	29.3	28.5	29.2	27.7	28.4125
Set Average									28.15416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									30.96958333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples received on 12/03/10 and placed in lime water. Tested samples for 28 day Surface Resistivity on 12/08/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure L-8. Surface Resistivity Test Results Reported for Mix #10, Lab #8, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
21	21.1	22.5	22.6	21.9	21.3	22.7	22.6	22.3	22.125
25	22.9	23.3	22.9	25	22.9	24.3	23.2	25.5	23.75
26	22.6	23.8	22.2	23.5	22.8	24.2	22.3	23.7	23.1375
Set Average									23.00416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									25.30458333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									N/A

**Figure L-9. Surface Resistivity Test Results Reported for Mix #10, Lab #9, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
24	24.9	26	25.9	23.2	25	24.6	28.1	24	25.2125
4	24.9	22.9	22.6	21.4	22	22.7	22.9	21.2	22.575
37	24.6	25.5	23.9	23.5	24.1	26.1	24.8	23.4	24.4875
Set Average									24.09166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									26.50083333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				73.3					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure L-10. Surface Resistivity Test Results Reported for Mix #10, Lab #10, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CEMEX 18	25.4	26.5	25.2	25.7	25.9	27.1	25.1	25.4	25.7875
CEMEX 29	24	26.3	26.5	24.3	24.8	25.8	26.2	24.2	25.2625
CEMEX 42	26.4	23.8	24	23.7	26.6	24.2	23.1	23.7	24.4375
Set Average									25.1625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									27.67875
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

**Figure L-11. Surface Resistivity Test Results Reported for Mix #10, Lab #11, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens					After received immediately cured immersed in lime solution.				
Any abnormalities, comments, and/or notes.									

**Figure L-12. Surface Resistivity Test Results Reported for Mix #10, Lab #12, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CEMEX-11	21.4	23	21.1	19.7	21.7	22.8	21.9	21.7	21.7
CEMEX-34	21.9	22.5	20.8	21.5	21.8	22.8	23.2	22.8	22.2
CEMEX-38	22	22.2	22.1	22.1	23.1	23.1	22.5	23.3	22.6
Set Average									22.1
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									24.3
Chloride Ion Penetration Type									LOW
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)									
Temperature of Ca(OH) <sub>2</sub> Solution (°F)									
Curing history specific to your lab once you received the specimens					The specimens arrived on 12/3/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure L-13. Surface Resistivity Test Results Reported for Mix #10, Lab #13, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	18.62	18.89	18.29	18.45	18.45	18.36	18.01	18.29	18.42
19	18.92	19.94	19.68	19.29	19.01	19.63	19.32	19.78	19.44625
44	19.63	19.45	19.02	19.73	19.56	19.68	19.38	19.12	19.44625
									19.10416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									21.01458333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				64					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure L-14. Surface Resistivity Test Results Reported for Mix #10, Lab #14, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	24.5	24.4	24	25.4	26.5	24.3	23.6	25.1	24.725
33	22.6	25.7	22.7	24.4	22.9	26.2	22.9	24.3	23.9625
36	24.2	24.9	25.2	25.3	24.5	24.6	24.8	25.4	24.8625
Set Average									24.51666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									26.96833333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				69					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix M**

## **Surface Resistivity Test Results Reported for Mix #11 @ 28 Days**

**Figure M-1. Surface Resistivity Test Results Reported for Mix #11, Lab #1, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
Titan 1	11.8	11.4	12	11.5	11.7	11.4	11.8	11.6	11.7
Titan 4	12.4	12.5	11.8	12.2	12.1	12.2	11.2	11.9	12.0
Titan 23	11.9	11.4	12.5	12.1	12.2	11.4	12.8	12.2	12.1
Set Average									11.9167
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.1083
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									
Note:									
1. Temperature reading must be between 68-77 °F									
2. Initial resistivity reading must be between 47.9-48.4 kohm per cm									

**Figure M-2. Surface Resistivity Test Results Reported for Mix #11, Lab #2, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
26	12.4	12.4	12.4	12.2	12.7	12.6	12.4	12.2	12.4
30	11.8	11.8	11.6	11.6	11.8	11.8	11.9	11.9	11.8
47	11.7	11.9	12	11.8	11.6	11.8	11.9	11.9	11.8
Set Average									12.0
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.2
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									72
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				



**Figure M-3. Surface Resistivity Test Results Reported for Mix #11, Lab #3, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Temp H <sub>2</sub> O: 72f		Temp Air: 74f		Ohms; 24.2k		Range: 3		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
12/15/2010	20	12.02	11.73	11.89	12.57	12.32	11.89	11.89	12.16	12.06
12/15/2010	31	12.13	12.17	12.02	11.39	12.02	12.17	11.91	11.11	11.87
12/15/2010	35	12.27	12.57	13.62	12.44	13.14	12.5	13.02	12.41	12.75
Set Average										12.22
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										13.45
Penetrability Based on Test										

**Figure M-4. Surface Resistivity Test Results Reported for Mix #11, Lab #4, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
10	13.3	13.2	12.9	11.5	12.2	12	13.2	12.3	12.575
13	11.9	13.2	13.3	12.5	11.9	13	13.3	12.8	12.7375
17	12.8	12.9	13.4	12.7	13	13.3	13.5	13	13.075
Set Average									12.79583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.07541667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									64.8
Water Temperature of lime bath (°F)									71.9
Curing history specific to your lab once you received the specimens					Samples once received, were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No Abnormalities on the cylinders were found				

**Figure M-5. Surface Resistivity Test Results Reported for Mix #11, Lab #5, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
TIN 5	11.9	12.0	12.7	12.1	12.2	12.4	12.4	12.8	12.3
TIN 9	12.0	12.2	12.2	12.0	12.3	12.3	12.3	12.4	12.2
TIN 11	11.9	12.8	11.6	12.8	11.6	12.6	12.6	11.5	12.2
Set Average									12.2
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.5
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				66.7					
Water Temperature of lime bath (°F)				64.3					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure M-6. Surface Resistivity Test Results Reported for Mix #11, Lab #6, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	13.25	12.36	12.49	12.1	13.28	12.02	12.45	12.1	12.50625
36	13.36	12.72	12.65	11.86	13.21	12.88	13.07	11.81	12.695
38	12.78	11.88	13.58	12.56	12.52	12.73	13.53	12.72	12.7875
Set Average									12.66291667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.92920833
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Put in lime water after receipt. Run test at 28 days on 15/DEC at 4.00 pm ET.				
Any abnormalities, comments, and/or notes.					a=1.5"				

**Figure M-7. Surface Resistivity Test Results Reported for Mix #11, Lab #7, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
3	15.1	14.9	14.3	15.1	15.1	15.1	14.8	14.5	14.8625
32	13.8	14.1	13.8	14.2	14.1	14.7	13.7	14	14.05
33	13.9	13.8	14.7	14.8	14	13.7	14.3	14.6	14.225
Set Average									14.37916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.81708333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 12/09/10 and placed in lime water. Tested samples for 28 day Surface Resistivity on 12/15/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure M-8. Surface Resistivity Test Results Reported for Mix #11, Lab #8, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	11.4	11.2	11.5	10.7	11.6	11.3	11.7	10.9	11.2875
34	12	11.6	12.3	13.6	12.2	12	12.4	13.3	12.425
39	12.3	12.6	13.3	12.9	12.5	12.7	13.4	13	12.8375
Set Average									12.18333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.40166667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									70
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					28 Day				
Any abnormalities, comments, and/or notes.					N/A				

**Figure M-9. Surface Resistivity Test Results Reported for Mix #11, Lab #9, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
41	12.3	13.7	12.5	12.1	12.7	13.8	12.7	12.3	12.7625
14	12.4	11.7	12.1	12.8	12.9	11.9	12.2	12.8	12.35
2	11.9	12.3	13.3	13.7	11.8	11.9	12.3	13.5	12.5875
Set Average									12.56666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.82333333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				72.5					
Water Temperature of lime bath (°F)				73.3					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure M-10. Surface Resistivity Test Results Reported for Mix #11, Lab #10, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
Titan 6	11.4	11.3	11.7	11.5	11.6	11.4	12	11.2	11.5125
Titan 21	13.6	13.4	13.1	12.6	13.8	13.4	13.2	12.5	13.2
Titan 24	12.1	12.8	13.3	13.3	12.1	13.2	13.3	13.3	12.925
Set Average									12.54583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.80041667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									



**Figure M-11. Surface Resistivity Test Results Reported for Mix #11, Lab #11, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	10.6	10.5	11.3	11.3	11.3	10.3	10.7	11.3	10.9125
48	11	10.9	11.6	11.1	11.8	11.5	11.6	11	11.3125
37	11.2	11.7	11.1	11.5	11.2	11.3	11	11.2	11.275
Set Average									11.16666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.28333333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									70
Curing history specific to your lab once you received the specimens					After received immediately cured immersed in lime solution.				
Any abnormalities, comments, and/or notes.									

**Figure M-12. Surface Resistivity Test Results Reported for Mix #11, Lab #12, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
TITAN-12	12.3	12.5	11.5	12	11.9	11.8	11.9	11.8	12.0
TITAN-15	11.1	11	10.8	10.8	11.2	11.5	10.9	11.2	11.1
TITAN-22	12.5	12.6	12.7	11.8	12.7	12.6	13	11.7	12.5
Set Average									11.8
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.0
Chloride Ion Penetration Type									MODERATE
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)									
Temperature of Ca(OH) <sub>2</sub> Solution (°F)									
Curing history specific to your lab once you received the specimens					The specimens arrived on 12/8/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure M-13. Surface Resistivity Test Results Reported for Mix #11, Lab #13, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
27	12.3	11.7	11.9	11.4	12.4	12.2	12	11.6	11.9375
28	11.1	10.9	11.2	11.1	11.2	10.8	11.3	11.1	11.0875
29	11	10.8	11.7	11	11.1	10.9	11.8	10.8	11.1375
Set Average									11.3875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.52625
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									70.2
Water Temperature of lime bath (°F)									68
Curing history specific to your lab once you received the specimens					Received and placed in lime water on 14/12/2010				
Any abnormalities, comments, and/or notes.					Tested on 15/12/2010; sample 28 has many visible voids				

**Figure M-14. Surface Resistivity Test Results Reported for Mix #11, Lab #14, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
7	1.2	14.5	13.6	12.7	13.3	14.9	13	12.8	12
8	13.2	13.1	14.1	12.9	13.1	13.2	14.3	13	13.3625
18	13.3	12.5	14.8	13.2	13.4	12.9	14.5	13.3	13.4875
Set Average									12.95
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.245
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				69					
Water Temperature of lime bath (°F)				66					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix N**

## **Surface Resistivity Test Results Reported for Mix #12 @ 28 Days**

**Figure N-1. Surface Resistivity Test Results Reported for Mix #12, Lab #1, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FL1	29.7	24.3	28.8	31.4	25.4	24.3	27.9	31.8	28.0
FL2	34.9	39.8	37.1	34.8	34.7	38.1	36	34.7	36.3
FL3	31.9	31.6	27.1	33	29.6	31.4	26.2	32.5	30.4
Set Average									31.5417
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									34.6958
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									72
Water Temperature of lime bath (°F)									71
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									
Note:									
1. Temperature reading must be between 68-77 °F									
2. Initial resistivity reading must be between 47.9-48.4 kohm per cm									

**Figure N-2. Surface Resistivity Test Results Reported for Mix #12, Lab #2, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
4	34.8	33.4	35.4	33.1	35.3	33.5	35.0	33.8	34.3
5	36.1	34.6	35.2	38.4	36.1	34.4	35.4	38.4	36.1
6	31.0	35.1	34.0	35.0	31.4	34.9	33.9	34.8	33.8
Set Average									34.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									38.2
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure N-3. Surface Resistivity Test Results Reported for Mix #12, Lab #3, @ 28 Days.**

Florida DOT										
Surface Resistivity (SR) Readings (Kohm-cm)										
Temp H <sub>2</sub> O: 73f		Temp Air: 75f		Ohms; 23.5k		Range: 3		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
4/5/2011	7	33.40	30.90	28.50	33.80	33.80	27.60	30.70	34.90	31.70
4/5/2011	8	39.0	35.0	37.6	34.7	35.5	36.0	38.5	35.6	36.49
4/5/2011	9	28.9	34.4	29.2	30.5	28.5	34.2	31.6	30.5	30.98
Set Average										33.05
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										36.36
Penetrability Based on Test										



**Figure N-4. Surface Resistivity Test Results Reported for Mix #12, Lab #4, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
10	34.8	39.8	35.9	36.9	35.1	36.4	41.7	34.8	36.9
11	30.9	38.5	33.6	32.4	31.6	41.3	33	30.9	34
12	38	36.6	30.2	32.4	33.2	33.8	34.7	38.7	34.7
Set Average									35.2
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									38.72
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				62.5					
Water Temperature of lime bath (°F)				71.9					
Curing history specific to your lab once you received the specimens					Samples once received, were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No Abnormalities on the cylinders were found				

**Figure N-5. Surface Resistivity Test Results Reported for Mix #12, Lab #5, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens					Samples received on 4/1/11 and placed in lime water. Tested samples for 91 day Surface Resistivity on 6/7/11. Cylinders were discarded after this 91 day test.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure N-6. Surface Resistivity Test Results Reported for Mix #12, Lab #6, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	26.9	34.7	35.3	34.7	31.2	34.2	35.7	34.1	33.35
17	34	39.7	36.4	37.7	32.8	42	34.4	40	37.125
18	37	31.3	26.9	33.4	36.1	28.1	32	33.7	32.3125
Set Average									34.2625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									37.68875
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					received and immediately put into lime water				
Any abnormalities, comments, and/or notes.					a=1.5"				

**Figure N-7. Surface Resistivity Test Results Reported for Mix #12, Lab #7, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	40.4	41.2	40.9	42.9	39.4	39.6	39.5	42	40.7375
20	33.8	36.1	36.5	36.5	35	36.6	36.6	35.8	35.8625
21	36.5	36.2	36	35.1	37	35.3	34.5	34.7	35.6625
Set Average									37.42083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									41.16291667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples received on 4/1/11 and placed in lime water. Tested samples for 28 day Surface Resistivity on 4/5/11 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure N-8. Surface Resistivity Test Results Reported for Mix #12, Lab #8, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	33.2	33.9	29.4	34.3	31.3	33.8	31.5	34.3	32.7125
23	30.6	32.1	31.4	30.2	30.8	32.2	31.5	29.9	31.0875
24	33.1	29.3	30.9	30.4	33	29.2	30.2	31.8	30.9875
Set Average									31.59583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									34.75541667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				76					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					N/A				

**Figure N-9. Surface Resistivity Test Results Reported for Mix #12, Lab #9, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	33.2	28.9	32.8	30.3	34.2	31.9	35.3	30.7	32.1625
26	31	34.5	30.5	29.3	31.4	34.4	31.1	30.3	31.5625
27	29	27.5	30.2	28.4	30.4	27.8	30.7	28.2	29.025
Set Average									30.91666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									34.00833333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				73.2					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure N-10. Surface Resistivity Test Results Reported for Mix #12, Lab #10, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FLDOT 28	36.6	36.5	35.3	37.4	36.6	36.3	35.5	37.4	36.45
FLDOT 29	35.1	32.4	34.7	36.9	35	32.6	34.9	37	34.825
FLDOT 30	36.5	36	36.6	38.5	36.2	36.4	36.9	38.5	36.95
Set Average									36.075
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									39.6825
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									72
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

**Figure N-11. Surface Resistivity Test Results Reported for Mix #12, Lab #11, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
33	29.4	29	28.5	33.3	29.1	29	32.6	29.8	30.0875
32	28.9	28.3	26.9	25.4	28.5	26	26.5	24.8	26.9125
31	27.5	26.8	29.2	30.3	22.6	26.6	29.6	30.2	27.85
Set Average									28.28333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									31.11166667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				75					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure N-12. Surface Resistivity Test Results Reported for Mix #12, Lab #12, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FLDOT-34	27.7	24.6	24.5	19.2	26.9	25	23.7	20.9	24.1
FLDOT-35	25.4	23.3	19.5	19.9	23.6	23.8	22	22.3	22.5
FLDOT-36	25	22.8	22.6	21.9	21.7	21.7	21.7	22.8	22.5
Set Average									23.0
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									25.3
Chloride Ion Penetration Type									LOW
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)					72				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					69				
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure N-13. Surface Resistivity Test Results Reported for Mix #12, Lab #13, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	32.5	32.6	32.5	32.8	32.8	32.8	32.7	32.8	32.6875
38	31.5	31.9	36.1	36.7	31.8	32	36.5	36.6	34.1375
39	30.8	33.7	35.3	34.4	31.7	34.4	34.7	35	33.75
Set Average									33.525
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									36.8775
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				69					
Curing history specific to your lab once you received the specimens					Specimens unpacked and placed in lime water on April 4th, 2011; Specimens tested on April 5th, 2011				
Any abnormalities, comments, and/or notes.									

**Figure N-14. Surface Resistivity Test Results Reported for Mix #12, Lab #14, @ 28 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
40	33	33	38	36	32	32	36	36	34.5
41	36	36	39	36	37	34	38	35	36.375
42	40	42	40	41	39	41	36	41	40
Set Average									36.95833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									40.65416667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix AA**

## **Surface Resistivity Test Results Reported for Mix #1 @ 56 Days**

**Figure AA-1. Surface Resistivity Test Results Reported for Mix #1, Lab #1, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CTA-34	15.5	16	14.6	15.4	15.3	15.9	14.7	15.5	15.3625
CTA-36	15.3	16	14.7	15.2	15.3	15.6	14.6	15.1	15.2250
CTA-38	16.9	16.5	14.9	16.4	16.9	16.5	15.3	16.5	16.2375
Set Average									15.6083
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.1692
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				67					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AA-2. Surface Resistivity Test Results Reported for Mix #1, Lab #2, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	14.8	16.5	15.8	16.6	14.7	16.4	15.8	16.5	15.9
23	15.4	15.1	15.1	15.1	15.5	15.1	14.8	15.3	15.2
24	14.5	15.4	14.5	15	14.5	15.7	14.5	15.2	14.9
Set Average									15.3
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									16.9
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									70
Water Temperature of Lime Bath (°F)									68
Curing history specific to your lab once you received the specimens					Received the specimens on July 22 at 3:00 p.m. EST. Specimens were put in lime tank immediately and tested them on July 23 at 11:00 EST and August 20 at 12:00 EST				
Any abnormalities, comments, and/or notes.					N/A				

**Figure AA-3. Surface Resistivity Test Results Reported for Mix #1, Lab #3, @ 56 Days.**

Temp H <sub>2</sub> O:		Temp Air:		Ohms:		Scale:		Range:		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
8/20/2010	4	15.2	14.7	13.9	14.9	15.4	14.7	14.1	15.00	14.74
8/20/2010	5	17.00	15.7	16.00	15.9	17.1	15.1	14.7	15.7	15.90
8/20/2010	6	14.5	14.1	15.5	15.9	14.9	14.1	15.2	16.3	15.06
Set Average										15.23
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										16.76
Penetrability Based on Test										

**Figure AA-4. Surface Resistivity Test Results Reported for Mix #1, Lab #4, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	17	16.8	17	16.4	16.3	17.2	17.1	16.6	16.8
20	17.2	16	18.2	16.2	16.8	16.9	16.6	16.3	16.775
21	16.4	16.8	17.2	17	16.8	16.4	16.6	16.3	16.6875
Set Average									16.75416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.42958333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure AA-5. Surface Resistivity Test Results Reported for Mix #1, Lab #5, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CTA31	15.0	15.5	15.1	15.0	15.3	15.0	15.5	15.5	15.2
CTA32	14.8	14.6	15.6	16.1	14.7	14.7	15.6	15.7	15.2
CTA33	14.0	14.4	15.1	14.7	13.9	14.3	15.2	14.5	14.5
Set Average									15.0
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									16.5
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									68.2
Water Temperature of lime bath (°F)									78.6 *
Curing history specific to your lab once you received the specimens					Samples were received on 7-21-10 (noon), were taken out of the box and immediately immersed in a water-lime bath. On 7-23-10 and 8-20-10 samples were taken out of bath, carefully wrapped with the same shipping materials for transportation to PRDOT facilities. Samples were tested by personnel from Grupo Carmelo.				
Any abnormalities, comments, and/or notes.					* The air cooling unit stopped working on 8-19, is being checked for repairs if needed, thus the reason for the increase in water temperature.				

**Figure AA-6. Surface Resistivity Test Results Reported for Mix #1, Lab #6, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CTA1	11.24	11.42	11.35	10.74	11.55	11.49	11.4	10.84	11.25375
CTA2	15.25	15.78	15.32	15.99	15.28	15.8	15.08	16.11	15.57625
CTA3	14.91	15.3	16.51	15.48	14.96	15.37	16.54	15.49	15.57
Set Average									14.13333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.54666667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				74					
Curing history specific to your lab once you received the specimens					Received on July 22nd, immediately put in lime water. Run test at 56 days on August 20th at 4.30 pm ET.				
Any abnormalities, comments, and/or notes.					a = 1.5 inches				

**Figure AA-7. Surface Resistivity Test Results Reported for Mix #1, Lab #7, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
10	20	19	22	20	20	19	21	19	20
11	21	20	20	21	20	20	20	21	20.375
12	21	20	21	22	21	20	20	22	20.875
Set Average									20.41666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.45833333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples received on 7/22/10 and placed in lime water. Tested samples for 56 day Surface Resistivity on 8/20/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure AA-8. Surface Resistivity Test Results Reported for Mix #1, Lab #8, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	17	15	17	15	17	15	17	15	16
17	17	16	16	16	17	16	16	16	16.25
18	17	15	17	16	17	15	17	16	16.25
Set Average									16.16666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.78333333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Received on July 22 immediately put in lime water. Ran 56 day test August 20 at 11:30 a.m.				
Any abnormalities, comments, and/or notes.					N/A				

**Figure AA-9. Surface Resistivity Test Results Reported for Mix #1, Lab #9, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
15	15.2	16.6	16.5	15.4	15	16.1	16.7	15.1	15.825
13	14.9	15	15.2	15.7	15.1	15	15.5	15.6	15.25
14	15.3	14.9	15.9	15.5	15.3	15	15.8	15.6	15.4125
Set Average									15.49583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.04541667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				73.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AA-10. Surface Resistivity Test Results Reported for Mix #1, Lab #10, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CTA28	15.8	15.7	15.8	16	15.7	15.7	15.7	15.8	15.775
CTA29	15.8	15.8	16.1	15.8	15.7	15.7	16	15.8	15.8375
CTA30	16	15.9	16.5	15.2	15.9	15.9	16.2	15.9	15.9375
Set Average									15.85
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.435
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AA-11. Surface Resistivity Test Results Reported for Mix #1, Lab #11, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	16.1	16.2	16.1	16.2	16.4	16.3	16.4	16.4	16.2625
26	17.1	16.6	16.9	17.8	16.8	16.3	16.8	17.8	17.0125
27	16.8	17.2	16.8	17.3	16.7	16.6	16.3	17.2	16.8625
Set Average									16.7125
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.38375
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				75					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AA-12. Surface Resistivity Test Results Reported for Mix #1, Lab # 12, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CTA - 7	11.8	13.6	12.8	12.3	12	14	13.1	12.5	12.8
CTA - 8	12.1	11.7	12	12	12.3	11.8	12	12.1	12.0
CTA - 9	13.9	13.3	13.3	12.5	13.9	12.8	13.1	12.8	13.2
Set Average									12.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.9
Chloride Ion Penetration Type									MODERATE
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)				71	73.5				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)				69	71.5				
Curing history specific to your lab once you received the specimens					The specimens arrived on 7/22/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									



**Figure AA-13. Surface Resistivity Test Results Reported for Mix #1, Lab #13, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AA-14. Surface Resistivity Test Results Reported for Mix #1, Lab #14, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

## **Appendix AB**

### **Surface Resistivity Test Results Reported for Mix #2 @ 56 Days**

**Figure AB-1. Surface Resistivity Test Results Reported for Mix #2, Lab #1, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FHWA-10	15.7	13.2	13.4	14.2	16.2	13.3	13.5	14.3	14.2250
FHWA-11	14.1	12.2	12.5	13.4	14.2	12.7	12.3	13.4	13.1000
FHWA-12	15.2	13.4	12.5	13.5	15.4	13.3	12.8	13.1	13.6500
Set Average									13.6583
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.0242
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AB-2. Surface Resistivity Test Results Reported for Mix #2, Lab #2, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
MCL 40	12.3	11.6	11	11.9	12.2	11.6	11	11.9	11.7
MCL 41	12.9	11.9	11.9	11.9	12.5	11	11.9	11.9	12.0
MCL 42	13.3	13.2	13.7	13.8	13.2	13.4	13.8	13.2	13.5
Set Average									12.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.6
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									72
Water Temperature of lime bath (°F)									70
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after demolding				
Any abnormalities, comments, and/or notes.					N/A				

**Figure AB-3. Surface Resistivity Test Results Reported for Mix #2, Lab #3, @ 56 Days.**

Temp H <sub>2</sub> O: 72f		Temp Air: 74f		Ohms: 23.8k		Scale: 3		Range: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
9/8/2010	7	11.2	11.83	11.87	11.27	11.36	11.9	11.81	11.82	11.63
9/8/2010	8	13.18	12.86	11.3	11.18	13.65	12.34	11.16	11.86	12.19
9/8/2010	9	11.77	11.82	12.79	11.83	11.97	12.27	12.98	11.75	12.15
Set Average										11.99
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										13.19
Penetrability Based on Test										

**Figure AB-4. Surface Resistivity Test Results Reported for Mix #2, Lab #4, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
34	16.4	15.1	17.7	16.2	16.3	16.4	17	15.1	16.275
35	15	14.7	15.4	17.4	15.3	15.6	15.8	16.8	15.75
36	15.8	15.1	15	14.9	15.2	14.1	14.7	15.3	15
Set Average									15.675
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.2425
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									66.2
Water Temperature of lime bath (°F)									73.6
Curing history specific to your lab once you received the specimens					Once cylinders were recived were put on tanks.				
Any abnormalities, comments, and/or notes.					C				

**Figure AB-5. Surface Resistivity Test Results Reported for Mix #2, Lab #5, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FHWA25	13.4	14.0	14.9	13.8	13.6	14.2	14.3	14.0	14.0
FHWA26	13.5	12.9	14.1	15.7	14.0	12.9	13.8	15.9	14.1
FHWA27	14.8	14.4	16.9	13.4	14.5	14.8	16.4	13.4	14.8
Set Average									14.3
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.7
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									68.9
Water Temperature of lime bath (°F)									76.4
Curing history specific to your lab once you received the specimens					On 9-8-10, samples were taken out of bath, carefully wrapped with the same shipping materials and method for transportation to PRDOT facilities. Samples were tested by personnel from Grupo Carmelo.				
Any abnormalities, comments, and/or notes.					No specimen abnormalities were found				



**Figure AB-6. Surface Resistivity Test Results Reported for Mix #2, Lab #6, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FHWA 4	12.12	11.52	11.97	15.58	12.08	11.74	11.92	15.51	12.805
FHWA5	15.93	15.56	12.7	13.87	16.07	15.43	12.62	14.05	14.52875
FHWA6	15.46	15.18	17.42	15.93	15.52	15.23	17.52	15.79	16.00625
Set Average									14.44666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.89133333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Immediately after arrival on 5 AUG, samples were placed into sat. CH water. They were removed and tested at 28 days, put back into sat. CH water. They were tested for 56-day measurements 8 SEPT, 19:30 and placed back into sat. CH water.				
Any abnormalities, comments, and/or notes.					a=1.5				

**Figure AB-7. Surface Resistivity Test Results Reported for Mix #2, Lab #7, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	18	19	19	18	19	19	18	18	18.5
17	19	18	17	16	18	18	17	16	17.375
18	18	18	19	18	18	18	19	18	18.25
Set Average									18.04166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									19.84583333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 8/05/10 and placed in lime water. Tested samples for 56 day Surface Resistivity on 9/08/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure AB-8. Surface Resistivity Test Results Reported for Mix #2, Lab #8, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	14	12	13	13	14	12	13	13	13
23	12	11	10	11	12	11	10	11	11
24	11	11	12	13	12	11	12	13	11.875
Set Average									11.95833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.15416667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					56 Day				

**Figure AB-9. Surface Resistivity Test Results Reported for Mix #2, Lab #9, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
20	14.2	14.4	14.6	15.1	14.4	13.9	15.3	15.2	14.6375
19	14.1	14.8	13.9	14.4	14.3	14.2	13.5	15.1	14.2875
21	14.3	15	13.6	13	14.3	14.6	14.8	12.3	13.9875
Set Average									14.30416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.73458333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				71.9					
Curing history specific to your lab once you received the specimens					Lime water bath inside cure room				
Any abnormalities, comments, and/or notes.									

**Figure AB-10. Surface Resistivity Test Results Reported for Mix #2, Lab #10, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FWHA31	14.5	14.8	15.8	16.5	14.8	14.6	15.5	15.5	15.25
FWHA32	13.9	14.7	12.7	14.7	13.6	14.7	13	14.2	13.9375
FWHA33	13.3	14.1	11.9	11.9	13.2	13.5	11.5	11.7	12.6375
Set Average									13.94166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.33583333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					in lime water				
Any abnormalities, comments, and/or notes.					Ends of specimens were slightly damaged, possibly dropped during shipment. Do not believe it effected test.				

**Figure AB-11. Surface Resistivity Test Results Reported for Mix #2, Lab #11, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	12.7	14	13.5	12.9	13.2	14.2	13.6	13.4	13.4375
29	13.4	13.8	12.6	14.5	13.8	13.6	13.4	13.8	13.6125
30	12.3	13.7	13.4	12.8	12	12.8	13	12.5	12.8125
Set Average									13.2875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.61625
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AB-12. Surface Resistivity Test Results Reported for Mix #2, Lab #12, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FHWA-13	10.6	12.1	11.3	11.7	10.7	12.2	11.4	11.9	11.5
FHWA-14	10.9	11.9	12.3	11.7	10.8	11.7	12.4	11.8	11.7
FHWA-15	11.7	12.5	11.6	13	11.5	12.3	12.3	13.1	12.3
Set Average									11.8
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.0
Chloride Ion Penetration Type									MODERATE
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)						69.5			
Temperature of Ca(OH) <sub>2</sub> Solution (°F)						69			
Curing history specific to your lab once you received the specimens					The specimens arrived on 8/6/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure AB-13. Surface Resistivity Test Results Reported for Mix #2, Lab #13, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
1	15.71	16.82	15.07	15.92	15.8	16.67	15.08	15.65	15.84
2	15.01	14.4	15.87	16.01	15.49	14.54	15.83	16.02	15.39625
3	16.44	15.65	17.02	15.83	16.78	15.71	16.89	16.3	16.3275
Set Average									15.85458333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.44004167
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									72.5
Water Temperature of lime bath (°F)									69.8
Curing history specific to your lab once you received the specimens					Samples were put in lime water on August 9th, 2010 tested on September 8th, 2010				
Any abnormalities, comments, and/or notes.									



**Figure AB-14. Surface Resistivity Test Results Reported for Mix #2, Lab #14, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	14	13.8	14	14.8	14	13.7	13.9	15	14.15
38	12.4	12.9	13.6	13.8	12.6	12.8	12.9	13.8	13.1
39	14.9	14.4	12.9	12.6	15.1	14.5	13	12.8	13.775
Set Average									13.675
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.0425
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									70.3
Water Temperature of lime bath (°F)									69
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix AC**

## **Surface Resistivity Test Results Reported for Mix #3 @ 56 Days**

**Figure AC-1. Surface Resistivity Test Results Reported for Mix #3, Lab #1, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VADOT-1	16	16.4	16.4	16.8	16.1	16.5	16.5	16.8	16.4375
VADOT-2	16.6	17.7	17.9	17.6	16.6	17.6	18.1	17.2	17.4125
VADOT-3	17.1	16.8	17.2	18.3	17.1	17	17.3	18.4	17.4000
Set Average									17.0833
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.7917
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									72
Water Temperature of lime bath (°F)									71
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AC-2. Surface Resistivity Test Results Reported for Mix #3, Lab #2, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	16.5	16.3	16.6	16.2	16.5	16.3	16.6	16.2	16.4
38	15.6	15.6	15.4	15.7	15.7	15.3	15.4	15.7	15.6
39	15.8	15.2	15.8	15.6	15.8	15.2	15.6	15.6	15.6
Set Average									15.8
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.4
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure AC-3. Surface Resistivity Test Results Reported for Mix #3, Lab #3, @ 56 Days.**

Temp H <sub>2</sub> O: 71f		Temp Air: 74f		Ohms:		Scale: 3		Range: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
9/15/2010	37	16.39	16.05	15.47	16.48	16.85	16.11	15.61	16.63	16.20
9/15/2010	38	15.4	15.76	15.51	14.61	15.14	15.73	15.21	15.64	15.38
9/15/2010	39	15.97	16.56	15.82	16.32	16.17	15.89	15.61	16.66	16.13
Set Average										15.90
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										17.49
Penetrability Based on Test										

**Figure AC-4. Surface Resistivity Test Results Reported for Mix #3, Lab #4, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
31	17.7	19	18.7	19.9	18.4	20.2	18.8	18.5	18.9
32	17.7	18.3	18.2	18.3	18.2	18.9	17.8	17.8	18.15
33	19.9	17.1	18.2	17.4	20	17.3	17.2	17.3	18.05
Set Average									18.36666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									20.20333333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				64.2					
Water Temperature of lime bath (°F)				73.1					
Curing history specific to your lab once you received the specimens					Cylinders once received were put on lime water after test				
Any abnormalities, comments, and/or notes.					No Comments				

**Figure AC-5. Surface Resistivity Test Results Reported for Mix #3, Lab #5, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VA 22	17.3	17.5	17.1	16.9	17.4	17	18	16.7	17.2
VA 23	19.3	19.3	19.9	19.3	19.4	19.7	20.6	19.2	19.6
VA 24	18.6	18.7	17.7	19.5	18.5	18	18.7	19.3	18.6
Set Average									18.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									20.3
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									66.4
Water Temperature of lime bath (°F)									73.4
Curing history specific to your lab once you received the specimens					Samples were received on 8-16-10 , taken out of the box and immediately immersed in a water-lime bath. On 9-15-10, samples were taken out of bath, carefully wrapped with the same shipping materials for transportation to PRDOT facilities. Samples were tested by personnel from Grupo Carmelo.				
Any abnormalities, comments, and/or notes.					No specimen abnormalities were found				

**Figure AC-6. Surface Resistivity Test Results Reported for Mix #3, Lab #6, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VADOT25	17.1	17.1	17.19	16.39	17.19	17.65	17.15	16.35	17.015
VADOT26	18.76	20.4	20.1	19.9	19.2	20.9	19.5	20.1	19.8575
VADOT27	17.79	17.9	17.55	17.56	17.81	17.95	17.95	18.13	17.83
Set Average									18.23416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									20.05758333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens					Immediately after arrival on 11 AUG, samples were placed into sat. lime water. They were removed and tested at 28 days, put back into sat. lime water. They were tested for 56-day measurements 15 SEPT, 16:30 and placed back into sat. CH water.				
Any abnormalities, comments, and/or notes.					The wooden dowels needed replacing, this was done in the morning and they have been soaking in the water in the caps until the test. The numbers still seems rather high, they will be tested again this evening and tomorrow morning. If any significant changes are noticed, they will be reported.				



**Figure AC-7. Surface Resistivity Test Results Reported for Mix #3, Lab #7, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	21	21	21	22	21	21	22	22	21.375
29	21	22	21	22	21	21	21	22	21.375
30	23	24	23	24	24	23	24	24	23.625
Set Average									22.125
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									24.3375
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									71
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 8/12/10 and placed in lime water. Tested samples for 56 day Surface Resistivity on 9/15/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure AC-8. Surface Resistivity Test Results Reported for Mix #3, Lab #8, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	16	17	17	16	16	16	17	16	16.375
14	17	17	18	18	17	17	18	17	17.375
15	18	17	18	17	18	17	18	17	17.5
Set Average									17.08333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.79166667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					When received placed immediately into lime water bath.				
Any abnormalities, comments, and/or notes.									

**Figure AC-9. Surface Resistivity Test Results Reported for Mix #3, Lab #9, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
8	16.8	17.8	17.2	18.1	16.8	17.6	17.5	17.8	17.45
9	17.1	17.3	18.7	19.4	17.6	17.6	18.8	18.9	18.175
7	17.6	17.3	18.8	17.1	17.6	17.6	18.6	16.9	17.6875
Set Average									17.77083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									19.54791667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									73.4
Water Temperature of lime bath (°F)									74.2
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AC-10. Surface Resistivity Test Results Reported for Mix #3, Lab #10, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VADOT4	18.2	18.6	18.9	17.8	18.5	18.6	19	17.9	18.4375
VADOT5	16.8	17.1	16.8	17.2	16.6	17.2	16.7	17.2	16.95
VADOT6	16.6	17.5	17.7	16.6	16.2	17.4	17.7	16.6	17.0375
Set Average									17.475
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									19.2225
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens					Place in Lime Tank				
Any abnormalities, comments, and/or notes.									

**Figure AC-11. Surface Resistivity Test Results Reported for Mix #3, Lab #11, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
34	16	16.3	16.3	16.7	16.5	16.5	16.5	16.3	16.3875
35	17.8	18.2	18.5	18.5	17.9	17.6	18.5	18.8	18.225
36	16.5	17.0	17.0	17.4	16.7	17.0	17.1	17.0	16.9625
Set Average									17.19166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.91083333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AC-12. Surface Resistivity Test Results Reported for Mix #3, Lab #12, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VADOT-19	15.6	15.8	15	16.4	15.6	15.5	15	16.6	15.7
VADOT-20	16.5	16.1	14.9	14.8	15.4	16.2	15.1	15.3	15.5
VADOT-21	15.4	16.1	16.4	15.3	15.6	15.4	16.9	15.6	15.8
Set Average									15.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.3
Chloride Ion Penetration Type									MODERATE
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)					68		19.3		
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					69.5		20		
Curing history specific to your lab once you received the specimens					The specimens arrived on 8/13/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure AC-13. Surface Resistivity Test Results Reported for Mix #3, Lab #13, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	22.2	21.6	22.2	21.0	22.5	21.7	22.3	21.3	21.9
17	21.3	21.1	22.4	21.5	21.0	21.4	22.7	21.7	21.6375
18	21.6	21.7	21.5	21.3	21.9	21.7	21.9	21.4	21.625
Set Average									21.70416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									23.87458333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				65.3					
Water Temperature of lime bath (°F)				64.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AC-14. Surface Resistivity Test Results Reported for Mix #3, Lab #14, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
10	17.1	17	17.1	16.8	17.1	16.9	17.1	17.1	17.025
11	15.5	16	16.2	17.5	15.9	16	16.2	17.7	16.375
12	17.2	16.9	16.9	16.7	17.5	17	17.9	17.2	17.1625
Set Average									16.85416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.53958333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				70.5					
Water Temperature of lime bath (°F)				69.6					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



## **Appendix AD**

### **Surface Resistivity Test Results Reported for Mix #4 @ 56 Days**

**Figure AD-1. Surface Resistivity Test Results Reported for Mix #4, Lab #1, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA #4	24.1	24.6	24.9	24.5	23.6	24.5	25.5	24.1	24.4750
PRHTA #5	21.7	21.9	23.5	22	22.1	22.3	23.2	21.9	22.3250
PRHTA #6	24	22.1	23.1	21.5	23	21.9	22.9	21.6	22.5125
Set Average									23.1042
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									25.4146
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AD-2. Surface Resistivity Test Results Reported for Mix #4, Lab #2, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
23	23.1	23.7	21.5	23.6	23.3	23.6	21.4	23.7	23.0
24	22.1	22.3	23.2	22	22.4	23	23.5	22	22.6
46	23.2	21.4	20.9	22.5	22.8	21	20.5	22.6	21.9
Set Average									22.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									24.7
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				77					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					Specimen # 46 has 1/4" scraping mark along the length of the specimen. It appears to have occurred during demolding of the specimen.				

**Figure AD-3. Surface Resistivity Test Results Reported for Mix #4, Lab #3, @ 56 Days.**

Temp H <sub>2</sub> O: 71f		Temp Air: 75f		Ohms: 23.5k		Scale: 3		Range: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
9/23/2010	16	24.0	21.9	23.8	23.4	23.6	22.7	24.3	23.1	23.35
9/23/2010	17	22.7	23.1	22.4	22.3	23.0	22.6	23.3	22.6	22.75
9/23/2010	18	23.8	24.0	24.6	25.0	23.4	25.7	25.4	25.3	24.65
Set Average										23.58
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										25.94
Penetrability Based on Test										

**Figure AD-4. Surface Resistivity Test Results Reported for Mix #4, Lab #4, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
40	25	23.2	25.4	24.3	25.5	23.5	22.7	25	24.325
41	24.5	24.6	23.7	25.2	25.4	25.2	22.9	28.1	24.95
42	23.3	26	24.3	25.6	24.7	26.8	24	25.4	25.0125
Set Average									24.7625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									27.23875
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									71.4
Water Temperature of lime bath (°F)									73.6
Curing history specific to your lab once you received the specimens					Once cylinders were demolded were put on tanks. Cyliders made in our Laboratory				
Any abnormalities, comments, and/or notes.					Cylinder 41 have a noted mark from the demolding procedure. This mark does not count as quadrant to make the test				

**Figure AD-5. Surface Resistivity Test Results Reported for Mix #4, Lab #5, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
38	23.3	22.8	22.4	23.5	23.2	22.1	22.5	23.0	22.9
37	22.6	23.2	22.8	21.3	22.3	23.5	22.4	21.3	22.4
39	21.8	23.1	22.3	23.5	22.0	23.0	22.2	24.2	22.8
Set Average									22.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									24.9
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				68					
Water Temperature of lime bath (°F)				65.1					
Curing history specific to your lab once you received the specimens					Samples were received on 8-18-10, were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No specimen abnormalities were found				

**Figure AD-6. Surface Resistivity Test Results Reported for Mix #4, Lab #6, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
10	25	23.9	24.2	22.1	25.2	23.9	24.1	22.2	23.825
11	25	23	25	24.3	25	23.7	24.7	24.5	24.4
12	25	22.8	23.8	24.4	25.9	22.9	23.8	24.5	24.1375
Set Average									24.12083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									26.53291667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Received on August 19th, immediately put in lime water. Run test at 28 days, replaced in saturated lime water. Tested for 56-day test on 23 SEPT, at 12.30 pm ET.				
Any abnormalities, comments, and/or notes.					a=3.8cm, range switch = 4				

**Figure AD-7. Surface Resistivity Test Results Reported for Mix #4, Lab #7, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	29	28	30	29	29	28	30	29	29
20	27	28	30	27	28	28	30	28	28.25
21	29	27	28	29	28	27	27	29	28
Set Average									28.41666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									31.25833333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									72
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 8/19/10 and placed in lime water. Tested samples for 56 day Surface Resistivity on 9/23/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				



**Figure AD-8. Surface Resistivity Test Results Reported for Mix #4, Lab #8, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
7	24	22	23	22	24	22	23	22	22.75
9	24	22	24	23	24	22	24	23	23.25
43	25	26	24	26	25	25	24	25	25
Set Average									23.66666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									26.03333333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				76					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AD-9. Surface Resistivity Test Results Reported for Mix #4, Lab #9, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
45	26.2	24.7	25.1	24.3	26.3	24.8	25.6	25.7	25.3375
15	26.7	25	26.2	27.7	26.1	25.5	26.3	27	26.3125
44	23.6	23.6	23.3	22.5	24.4	23.4	23.9	22.8	23.4375
Set Average									25.02916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									27.53208333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				73.4					
Water Temperature of lime bath (°F)				73.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AD-10. Surface Resistivity Test Results Reported for Mix #4, Lab #10, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA49	26	25.7	24.6	25.9	25.9	26.2	24.8	25.5	25.575
PRHTA50	25.4	24.8	26.6	25.6	25.1	25.4	25.6	25.2	25.4625
PRHTA51	25.6	25.9	28.4	25.9	25.2	26.9	27.7	25.8	26.425
Set Average									25.82083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									28.40291667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Place in Lime Tank				
Any abnormalities, comments, and/or notes.									

**Figure AD-11. Surface Resistivity Test Results Reported for Mix #4, Lab #11, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
34	24.4	23	22.2	23.1	24	24	22.4	23.3	23.3
52	25.3	25.3	24.3	27	25.4	25.1	24.7	26.8	25.4875
53	24.1	25	24.2	26.5	25.5	26.2	23.3	26.1	25.1125
Set Average									24.63333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									27.09666667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AD-12. Surface Resistivity Test Results Reported for Mix #4, Lab #12, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA-1	19.3	19	18.3	19.2	19.5	19.1	18.2	20.5	19.1
PRHTA-2	20.8	20.9	20.7	20.5	21.1	20.6	21.2	20.5	20.8
PRHTA-3	19.8	19.5	20.4	19.4	19.9	19.6	20.5	20.6	20.0
Set Average									20.0
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.0
Chloride Ion Penetration Type									LOW
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)					N/A				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					N/A				
Curing history specific to your lab once you received the specimens					The specimens arrived on 8/19/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure AD-13. Surface Resistivity Test Results Reported for Mix #4, Lab #13, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
26	24.1	25.2	24	23.6	24.7	25.3	24.9	23.6	24.425
47	26.6	26	25.6	25.6	26.9	26.3	25.7	26	26.0875
48	23	24.2	24.5	23.8	23.7	24.8	24.9	23.9	24.1
Set Average									24.87083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									27.35791667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				63.5					
Water Temperature of lime bath (°F)				61.3					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					Sample tested on 23/09/2010 at 1:05 PM				

**Figure AD-14. Surface Resistivity Test Results Reported for Mix #4, Lab #14, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA 28	22.5	24	23.8	23.4	22.4	24.1	23.9	22.8	23.3625
PRHTA 29	23.4	23.8	24.1	22.9	23.4	23.5	23	23.6	23.4625
PRHTA 30	23.8	22.3	26.4	23.1	24	23.6	26.5	22.6	24.0375
Set Average									23.62083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									25.98291667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				70.7					
Water Temperature of lime bath (°F)				70 F					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix AE**

## **Surface Resistivity Test Results Reported for Mix #5 @ 56 Days**



**Figure AE-1. Surface Resistivity Test Results Reported for Mix #5, Lab #1, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC #10	14.4	13.9	13.8	14.7	13.8	14.9	14.9	15	14.4250
GC #11	14.8	13.5	14.3	14.8	14.4	15.2	14.4	15.3	14.5875
GC #12	15	14.3	13.4	13.7	14.7	14.4	13.4	13.6	14.0625
Set Average									14.3583
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.7942
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AE-2. Surface Resistivity Test Results Reported for Mix #5, Lab #2, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC 13	14.9	15.2	14.8	15.3	14.9	15.3	14.8	15.2	15.1
GC 14	14.4	14.5	14	15.2	14.4	14.4	13.9	15.1	14.5
GC 15	14	14.1	14.7	13.4	13.9	14	14.7	13.7	14.1
Set Average									14.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									16.0
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure AE-3. Surface Resistivity Test Results Reported for Mix #5, Lab #3, @ 56 Days.**

Temp H <sub>2</sub> O: 71f		Temp Air: 74f		Ohms: 23.6k		Range: 3		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
9/29/2010	19	13.91	14.63	14.26	14.35	14.86	14.32	14.48	14.23	14.38
9/29/2010	20	13.75	12.74	13.67	14.06	13.63	12.61	13.62	14.09	13.52
9/29/2010	21	13.36	14.53	13.72	14.29	13.73	14.48	13.89	14.5	14.06
Set Average										13.99
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										15.39
Penetrability Based on Test										

**Figure AE-4. Surface Resistivity Test Results Reported for Mix #5, Lab #4, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
55	17.6	20.8	20.7	22.8	24.1	18.6	23.4	20.2	21.025
56	18.9	19.5	21.9	20.2	20.7	17.5	20.2	20.1	19.875
57	20	18.5	20.2	19	18.5	20.3	17.7	18.2	19.3
Set Average									20.06667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.07333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				63.3					
Water Temperature of lime bath (°F)				72.2					
Curing history specific to your lab once you received the specimens				Once cylinders were demolded were put on tanks. Cylinders made in our Laboratory by Carmelo Group Crew. Curing in our Tanks, but the rest were moved at his Facilities.					
Any abnormalities, comments, and/or notes.									

**Figure AE-5. Surface Resistivity Test Results Reported for Mix #5, Lab #5, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	12.6	13.3	13.8	14.6	12.4	14.1	13.7	13.5	13.5
38	13.1	13.5	13.6	13.8	13.4	13.6	13.6	13.7	13.5
39	15.4	14.6	14.1	14.4	15	14.5	13.8	14.5	14.5
Set Average									13.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.2
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				73.4					
Water Temperature of lime bath (°F)				68.0					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AE-6. Surface Resistivity Test Results Reported for Mix #5, Lab #6, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC 16	15.02	12.8	15.8	14.6	14.4	12.7	15.9	14.4	14.4525
GC 17	14.4	13.3	14	15.4	15	13.3	14.1	14.6	14.2625
GC 18	13.1	13.8	13.4	13.9	12.8	13.9	13.6	13.9	13.55
Set Average									14.08833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.49716667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Received 8/26, immediately put into lime water. Maintained in lime water until testing at 28-d, replaced into lime water until measurement at 56-d on 29 Sept. at 4:30PM				
Any abnormalities, comments, and/or notes.					a = 1.5"				

**Figure AE-7. Surface Resistivity Test Results Reported for Mix #5, Lab #7, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	20	20	21	20	21	20	21	19	20.25
29	19	19	20	20	18	19	20	20	19.375
30	19	20	21	21	19	20	20	21	20.125
Set Average									19.91666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									21.90833333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples received on 8/26/10 and placed in lime water. Tested samples for 56 day Surface Resistivity on 9/29/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure AE-8. Surface Resistivity Test Results Reported for Mix #5, Lab #8, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	16	17	16	16	16	17	16	17	16.375
26	15	16	17	17	15	16	16	17	16.125
27	16	15	15	15	15	15	16	15	15.25
Set Average									15.91666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.50833333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure AE-9. Surface Resistivity Test Results Reported for Mix #5, Lab #9, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	16.3	15.1	14.2	15.8	16	15.3	14.6	14.9	15.275
23	16.9	15.1	15.2	16.8	16.8	15.3	15.3	16.1	15.9375
24	14.2	15	13.9	15.9	15.6	14	16.1	14.5	14.9
Set Average									15.37083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									16.90791667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				72.3					
Water Temperature of lime bath (°F)				73.9					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AE-10. Surface Resistivity Test Results Reported for Mix #5, Lab #10, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC-1	13.7	13.5	14.9	14.6	13.5	13.5	14.8	14.6	14.1375
GC-2	13.5	14	14.8	13.5	13.6	13.9	14.9	13.4	13.95
GC-3	14.5	14.1	14.2	14.9	14.6	14.1	14.5	14.7	14.45
Set Average									14.17916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.59708333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

**Figure AE-11. Surface Resistivity Test Results Reported for Mix #5, Lab #11, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
4	15.1	15.2	14.9	15.3	16.3	16.1	15.1	15.4	15.425
5	14.5	14.2	15.2	14.4	16.3	14.9	14.7	14.4	14.825
6	16	15.4	15.3	14.7	14.8	15.3	15.2	14.7	15.175
Set Average									15.14166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									16.65583333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AE-12. Surface Resistivity Test Results Reported for Mix #5, Lab #12, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GRUPO-31	14	13.5	12.7	12.5	13.7	13.6	13.5	12.9	13.3
GRUPO-32	13.4	13.4	13.1	13.7	14	13.7	13.3	13.8	13.6
GRUPO-33	14	14.2	14.7	14.4	14.1	14.6	15.1	14.6	14.5
Set Average									13.8
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.1
Chloride Ion Penetration Type									MODERATE
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)					72				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					71				
Curing history specific to your lab once you received the specimens					The specimens arrived on 8/26/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure AE-13. Surface Resistivity Test Results Reported for Mix #5, Lab #13, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
34	16.78	16.73	17.54	16.27	17.05	16.57	17.49	16.31	16.8425
35	17.37	17.49	17.39	16.81	18.01	16.72	17.7	16.65	17.2675
36	14.9	16.11	16.04	16.26	15.34	16.08	16.13	16.37	15.90375
Set Average									16.67125
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.338375
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									68
Water Temperature of lime bath (°F)									65.3
Curing history specific to your lab once you received the specimens					Samples were put in lime water on Aug 26th, 2010				
Any abnormalities, comments, and/or notes.					No visible abnormalities				

**Figure AE-14. Surface Resistivity Test Results Reported for Mix #5, Lab #14, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC-7	14	14.1	14.1	14.2	14.3	14.5	14.2	14.1	14.1875
GC-8	14.3	14.7	14.3	14.6	13.7	14.9	14.5	14.6	14.45
GC-9	13.9	11.9	13.2	13.3	13.9	12	13.3	13.1	13.075
Set Average									13.90416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.29458333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				70.8 F					
Water Temperature of lime bath (°F)				69.4 F					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

## **Appendix AF**

### **Surface Resistivity Test Results Reported for Mix #6 @ 56 Days**

**Figure AF-1. Surface Resistivity Test Results Reported for Mix #6, Lab #1, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
IN #1	11.9	12.4	11.5	11.5	11.9	12.4	11.5	11.4	11.8125
IN #2	10.9	11	11.8	11.9	11.2	11.1	11.9	11.6	11.4250
IN #3	11	10.9	12	12.2	11	10.9	12	12	11.5000
Set Average									11.5792
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.7371
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure AF-2. Surface Resistivity Test Results Reported for Mix #6, Lab #2, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	12.5	12.6	12.8	12.8	12.4	12.7	12.7	12.9	12.7
14	12.7	12.3	11.6	12.7	12.7	12.3	11.6	12.7	12.3
15	12.3	12.2	12.4	12.4	12.1	12.2	12.4	12.4	12.3
Set Average									12.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.7
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									73.5
Water Temperature of lime bath (°F)									72
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					None				

**Figure AF-3. Surface Resistivity Test Results Reported for Mix #6, Lab #3, @ 56 Days.**

Temp H <sub>2</sub> O: 76f		Temp Air: 72f		Ohms: 23.6k		Range: 3		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
10/26/2010	34	10.59	10.03	10.92	10.93	10.67	9.98	11.02	11.07	10.65
10/26/2010	35	11.33	11.29	11.41	11.96	11.28	11.43	11.64	11.77	11.51
10/26/2010	36	9.94	11.34	11.01	11.37	9.94	11.18	10.94	10.89	10.83
Set Average										11.00
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										12.10
Penetrability Based on Test										

**Figure AF-4. Surface Resistivity Test Results Reported for Mix #6, Lab #4, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
31	13.2	12.6	13.2	12.3	13.1	12.4	12.8	12.5	12.7625
32	13.2	13.6	13.2	12.3	13.5	13.8	13.2	12.3	13.1375
33	12.7	12.5	12.7	13	12	11.9	12.5	13.2	12.8
Set Average									12.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.19
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									65.8
Water Temperature of lime bath (°F)									72.2
Curing history specific to your lab once you received the specimens					Once cylinders were received were put on tanks.				
Any abnormalities, comments, and/or notes.					No comments				

**Figure AF-5. Surface Resistivity Test Results Reported for Mix #6, Lab #5, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
IN 19	13.9	13.8	13.5	13.4	14.2	13.3	13.5	13.9	13.7
IN 20	12.7	12.1	13.0	12.6	12.8	11.7	12.7	12.6	12.5
IN 21	13.0	13.1	13.7	13.1	12.7	13.4	13.9	13.6	13.3
Set Average									13.2
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.5
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				67.8					
Water Temperature of lime bath (°F)				65.9					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					No personnel from Grupo Carmelo was available for test at 56 days. Due to involuntary error with schedule, the samples were tested with 3 after required.				

**Figure AF-6. Surface Resistivity Test Results Reported for Mix #6, Lab #6, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
IN-46	12.62	12.12	11.15	12.93	12.61	12.27	11.18	12.87	12.21875
IN-47	13.92	12.61	14.17	12.61	13.93	12.63	13.99	12.12	13.2475
IN-48	11.24	11.21	10.76	11.14	11.21	11.29	10.77	11.02	11.08
Set Average									12.18208333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.40029167
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples casted on 31 AUG. Demolded at 2 days, put into lime water. Samples were kept in lime until 28day age, 3 cylinders were tested for were tested for SR on 28 SEPT at 5:30PM, and immediately placed back into lime water. On 26 OCT, 3 cylinders were tested for compression and 3 were tested for SR and placed back into lime water				
Any abnormalities, comments, and/or notes.					a=1.5"				
Perfromed on 10/26, 3:05 PM, mwh									
	Cyl	P(lb)	fc (psi)						
	IN-43	71,615	5,700						
	IN-44	73,390	5,840						
	IN-45	74,700	5,945						

**Figure AF-7. Surface Resistivity Test Results Reported for Mix #6, Lab #7, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	15	16	15	15	15	16	15	16	15.375
29	16	17	16	16	17	17	16	16	16.375
30	16	16	15	15	16	16	16	15	15.625
Set Average									15.79166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.37083333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 9/23/10 and placed in lime water. Tested samples for 56 day Surface Resistivity on 10/26/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure AF-8. Surface Resistivity Test Results Reported for Mix #6, Lab #8, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	11	12	10	11	11	12	11	11	11.125
26	12	12	12	13	12	12	12	12	12.125
27	11	11	11	12	12	11	11	12	11.375
Set Average									11.54166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.69583333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				76					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AF-9. Surface Resistivity Test Results Reported for Mix #6, Lab #9, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
7	12	11.4	12.8	11.9	11.7	11.4	12.8	12.1	12.0125
8	12.2	12	11.5	12	12.1	11.8	11.5	12.3	11.925
9	11.8	11.3	12.7	11.9	11.8	11.2	12.6	11.9	11.9
Set Average									11.94583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.14041667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure AF-10. Surface Resistivity Test Results Reported for Mix #6, Lab #10, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
INDOT 4	11.8	11.7	12	10.5	11.4	11.7	11.9	10.5	11.4375
INDOT 5	11.2	11.4	10.5	12.5	11.2	11.4	10.9	12.8	11.4875
INDOT 6	11.7	12.4	12	12.1	11.6	12.3	12	11.9	12
Set Average									11.64166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.80583333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Place in Lime Tank				
Any abnormalities, comments, and/or notes.									

**Figure AF-11. Surface Resistivity Test Results Reported for Mix #6, Lab #11, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	12	11.7	12.1	12.6	11.3	11.6	12.6	13.3	12.15
38	12.4	11.2	11.8	12.8	12.6	11.3	12.1	12.8	12.125
39	10.5	11.5	11.2	11.6	10.3	11.2	11.1	11.4	11.1
Set Average									11.79166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.97083333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AF-12. Surface Resistivity Test Results Reported for Mix #6, Lab #12, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
INDOT - 16	11.4	11.3	11.4	9.9	11.2	11	11.8	10.3	11.0
INDOT - 17	10.6	11.5	10.6	10.6	10.6	11.3	10.8	10.7	10.8
INDOT - 18	10.7	11.2	10.9	11.8	10.5	11.2	11	11.9	11.2
Set Average									11.0
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.1
Chloride Ion Penetration Type									MODERATE
					NOON				
Temperature of Room Air (°F)					n/a				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					n/a				
Curing history specific to your lab once you received the specimens					The specimens arrived on 9/22/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure AF-13. Surface Resistivity Test Results Reported for Mix #6, Lab #13, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	12.7	12.8	13.4	13.6	12.9	13.2	12.5	14.1	13.0625
24	14.1	13.1	13.0	12.9	14.2	13.4	12.5	12.0	13.15
23	13.1	12.9	12.6	13.5	12.9	13.0	12.9	13.6	13.0625
Set Average									13.09166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.40083333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74.5
Water Temperature of lime bath (°F)									72
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									tested on October 26, 2010

**Figure AF-14. Surface Resistivity Test Results Reported for Mix #6, Lab #14, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
IN-10	13.05	11.62	12.88	11.12	12.96	11.69	12.73	11.11	12.145
IN-11	13.15	11.96	12.96	13.42	13.13	12.45	13.13	13.09	12.91125
IN-12	11.6	12.79	11.06	11.72	11.68	12.8	11.16	11.85	11.8325
Set Average									12.29625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.525875
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				69.6					
Water Temperature of lime bath (°F)				68.6					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix AG**

## **Surface Resistivity Test Results Reported for Mix #7 @ 56 Days**

**Figure AG-1. Surface Resistivity Test Results Reported for Mix #7, Lab #1, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NY HK165	50.6	47.3	49.8	54.8	50.7	47.3	49.4	51	50.1125
NY HK166	43	43.3	44.7	42.5	42.8	43.8	42	42.5	43.0750
NY HK167	46	41.5	44.9	49.8	46.7	42.2	44.5	50.9	45.8125
Set Average									46.3333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									50.9667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AG-2. Surface Resistivity Test Results Reported for Mix #7, Lab #2, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
HK177	49.9	49.5	49.0	53.3	49.2	49.7	48.9	53.3	50
HK178	47.8	52.1	46.6	46.0	47.7	51.9	46.6	46.0	48
HK179	53.9	50.6	50.7	50.6	54.0	50.7	50.6	50.6	51
Set Average									50
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									54.96
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				



**Figure AG-3. Surface Resistivity Test Results Reported for Mix #7, Lab #3, @ 56 Days.**

Temp H <sub>2</sub> O: 73f		Temp Air: 77f		Ohms: 23.6k		Range: 4:		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
11/2/2010	201	47.9	46.3	43.7	44.4	47.1	46.2	43.9	45.6	45.64
11/2/2010	202	46.5	49.5	48.4	45	47.8	49.7	47	46.3	47.53
11/2/2010	203	42.4	41.3	45.7	48.2	41.5	43.7	44.9	48.2	44.49
Set Average										45.88
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										50.47
Penetrability Based on Test										

**Figure AG-4. Surface Resistivity Test Results Reported for Mix #7, Lab #4, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
195	44.9	42.4	49.3	46.3	46	39.6	50	47	45.7
196	47.1	44.7	46.5	47.9	49.3	46.3	45.8	44.3	46.5
197	42	42.2	45.6	43.5	45	44	45.3	42.1	43.7
Set Average									45.3
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									49.83
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				65.1					
Curing Temp				72.3					
Curing history specific to your lab once you received the specimens					Samples once were received were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No Comments				

**Figure AG-5. Surface Resistivity Test Results Reported for Mix #7, Lab #5, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
HK183	52.2	46.5	48.1	46.9	52.5	47.6	47.8	47.9	48.7
HK184	45.2	51.1	48.9	48.3	44.5	50.1	48.4	48.8	48.2
HK185	45.7	45.6	43.3	42.7	46.3	46.2	43.9	41.2	44.4
Set Average									47.1
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									51.8
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				66.9					
Water Temperature of lime bath (°F)				65.1					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AG-6. Surface Resistivity Test Results Reported for Mix #7, Lab #6, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NY HK186	47.3	52.1	49.4	49.5	47.1	51.3	50.5	48.8	49.5
NY HK187	49.5	52	51.6	47.7	49.5	51.8	50.2	47.3	49.95
NY HK188	51	44.6	45.9	49.7	50.8	44	47.2	49.7	47.8625
Set Average									49.10416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									54.01458333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens					Received on 9/30/10, put in lime water. Run test at 28 days on 10/5/10 at 4.00 pm ET.				
Any abnormalities, comments, and/or notes.					a=1.5, range setting No 4				

**Figure AG-7. Surface Resistivity Test Results Reported for Mix #7, Lab #7, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
162	61	61	56	57	60	62	57	57	58.875
163	57	54	52	59	57	56	52	58	55.625
164	62	56	55	53	61	58	54	54	56.625
Set Average									57.04166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									62.74583333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples placed in lime water on 9/9/10. Tested samples for 56 day Surface Resistivity on 11/02/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing. Concrete had 56 day compressive strength of 6990, 6800, & 7280 psi				

**Figure AG-8. Surface Resistivity Test Results Reported for Mix #7, Lab #8, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
HK 192	42	46	46	42	43	47	47	42	44.375
HK 193	51	49	50	50	52	49	49	51	50.125
HK 194	39	43	46	47	39	43	46	47	43.75
Set Average									46.08333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									50.69166667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AG-9. Surface Resistivity Test Results Reported for Mix #7, Lab #9, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
171	47.6	52.1	49.6	43.9	47.1	49.4	49.8	44.7	48.025
172	48.3	50.2	48.8	51.7	46.5	54.2	50	53.6	50.4125
173	47.6	50.8	49.5	50.5	47.7	53.6	49.6	50.7	50
Set Average									49.47916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									54.42708333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74.3					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AG-10. Surface Resistivity Test Results Reported for Mix #7, Lab #10, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NYSDOT168	47.3	46.7	51.2	52.5	47.4	48.2	50.9	53.3	49.6875
NYSDOT169	48.2	49.5	45.6	43.9	45.3	48.8	45.5	44.8	46.45
NYSDOT170	47.7	45.2	50.6	45.5	47.6	45.7	49.7	46.2	47.275
Set Average									47.80416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									52.58458333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									



**Figure AG-11. Surface Resistivity Test Results Reported for Mix #7, Lab #11, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
198	45.7	42.1	43.1	45.8	45.0	43.4	42.6	44.4	44.0125
199	40.9	36.4	37.5	35.5	41.6	37.6	40.9	36.3	38.3375
200	34.6	43.0	42.9	41.8	36.4	43.9	43.9	42.2	41.0875
Set Average									41.14583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									45.26041667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AG-12. Surface Resistivity Test Results Reported for Mix #7, Lab #12, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NYDOT - 180	37	37.8	38.1	41.9	37.6	38.5	39.8	42.5	39.2
NYDOT - 181	36.2	40	38.6	40.9	37.8	41	40.7	43.2	39.8
NYDOT - 182	42.1	45.3	41.7	44.7	46.6	45.8	42.8	48.8	44.7
Set Average									41.2
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									45.3
Chloride Ion Penetration Type									VERY LOW
					NOON				
Temperature of Room Air (°F)					71				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					70				
Curing history specific to your lab once you received the specimens					The specimens arrived on 10/30/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure AG-13. Surface Resistivity Test Results Reported for Mix #7, Lab #13, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NY HK 189	42.9	42.8	40.6	44.4	43.3	43.7	41	45.7	43.05
NY HK 190	37.2	37.3	41.8	41.3	37.1	34.4	41.9	42.3	39.1625
NY HK 191	42.9	42.8	40.6	44.4	43.3	43.7	41	45.7	43.05
Set Average									41.75416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									45.92958333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									59.9
Water Temperature of lime bath (°F)									57.2
Curing history specific to your lab once you received the specimens					Samples were put in lime water on October 1st, 2010				
Any abnormalities, comments, and/or notes.					tested on November 2nd, 2010				

**Figure AG-14. Surface Resistivity Test Results Reported for Mix #7, Lab #14, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
HK174	41.2	46.5	42.8	44.5	41.5	46.3	43.8	43.9	43.8125
HK175	40.5	40.1	38.3	36.3	40.1	40.2	38.7	36.5	38.8375
HK176	41.6	39.5	39.7	40.7	41.8	40	40.3	41	40.575
Set Average									41.075
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									45.1825
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				69					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix AH**

## **Surface Resistivity Test Results Reported for Mix #8 @ 56 Days**

**Figure AH-1. Surface Resistivity Test Results Reported for Mix #8, Lab #1, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NEDOT 31	57.6	54.2	55.9	54.5	57	54.3	55.6	52.9	55.2500
NEDOT 32	63.2	62.5	56.9	63.1	64.3	61.4	57.3	62.2	61.3625
NEDOT 33	58	55.1	55.3	55.6	57.8	54.8	54	55	55.7000
Set Average									57.4375
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									63.1813
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AH-2. Surface Resistivity Test Results Reported for Mix #8, Lab #2, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	50.4	49.6	49.6	50.4	50.3	49.5	49.6	50.4	50.0
17	52.9	51.6	50.5	52.4	52.9	51.9	50.6	52.6	51.9
18	51.7	50.8	51.6	50.8	51	50.6	51.5	50.8	51.1
Set Average									51.0
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									56.1
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure AH-3. Surface Resistivity Test Results Reported for Mix #8, Lab #3, @ 56 Days.**

Temp H <sub>2</sub> O: 72f		Temp Air: 74f		Ohms: 24k		Range: 4		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
11/29/2010	34	48.5	49	50.4	53.6	48.4	48.2	51.4	52.8	50.29
11/29/2010	35	47.5	48.9	47	47.9	47	48.2	46.3	48.2	47.63
11/29/2010	36	53.9	53.2	52.2	49.9	55	53.6	52.7	49.8	52.54
Set Average										50.15
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										55.17
Penetrability Based on Test										



**Figure AH-4. Surface Resistivity Test Results Reported for Mix #8, Lab #4, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	40.5	40.4	40.9	44	41.4	39.5	40.7	45	41.55
20	40.9	40.7	39.9	37.8	42	40.4	40.9	37.9	40.0625
21	37.5	41.2	38.7	41.5	38.6	40.3	38.3	42.7	39.85
Set Average									40.4875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									44.53625
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									64.4
Water Temperature of lime bath (°F)									73.1
Curing history specific to your lab once you received the specimens					Cylinders once received were put on lime water after test				
Any abnormalities, comments, and/or notes.					No Comments				

**Figure AH-5. Surface Resistivity Test Results Reported for Mix #8, Lab #5, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NE 7	54.1	55.1	52.9	50.6	53.5	55.1	52.7	51.0	53.1
NE 8	53.5	46.2	48.5	48.7	53.8	45.6	48.3	49.5	49.3
NE 9	50.3	53.9	51.3	54.6	51.0	55.0	52.0	54.4	52.8
Set Average									51.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									56.9
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				65.6					
Water Temperature of lime bath (°F)				71.6					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AH-6. Surface Resistivity Test Results Reported for Mix #8, Lab #6, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)										
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average	
NDOR 37	28.50	30.10	28.40	29.30	29.10	29.70	28.30	27.90	28.91	
NDOR 38	29.50	28.50	27.10	26.60	29.00	28.90	27.20	26.70	27.94	
NDOR 39	28.60	27.70	27.00	28.00	27.90	27.80	27.10	28.10	27.78	
Set Average									28.21	
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1	
Penetrability Based on Test									31.03	
Chloride Ion Penetration Type									LOW	
									Stdev	0.677
									COV	2.18%
Air Temperature of testing room (°F)				74						
Water Temperature of lime bath (°F)				74						
Curing history specific to your lab once you received the specimens					Received on October 29, immediately put in lime the following day. Ran test at 28 days on Nov 1st at 4.30 pm ET.					
Any abnormalities, comments, and/or notes.					a = 1.5 inches					

**Figure AH-7. Surface Resistivity Test Results Reported for Mix #8, Lab #7, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	59.7	60	61.3	59.2	58.9	58.9	60.7	59.7	59.8
26	58.2	56.9	56.9	56.8	58.4	58.2	57.4	55.7	57.3125
27	61.3	62	59.4	59.6	60	62.7	59.9	61	60.7375
Set Average									59.28333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									65.21166667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 10/28/10 and placed in lime water. Tested samples for 56 day Surface Resistivity on 11/29/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure AH-8. Surface Resistivity Test Results Reported for Mix #8, Lab #8, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
40	55.1	53.2	55.2	52.9	57.6	54.9	56.6	54	54.9375
41	48.6	48.4	51	52.6	50.6	49.7	51.6	52.9	50.675
42	48.2	48.6	47.8	45.8	49.8	52	50.1	47.2	48.6875
Set Average									51.43333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									56.57666667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									76
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Core 46 78540 M.L. 6250 psi 43.1 Mpa Core 47 82150 M.L. 6540 psi 45.1 Mpa Core 48 94350 M.L. 7510 psi 51.8 Mpa Avg. of 56 day breaks 6770 psi 46.7 MPa				
Any abnormalities, comments, and/or notes.									

**Figure AH-9. Surface Resistivity Test Results Reported for Mix #8, Lab #9, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	55.5	54.4	54.1	54.7	56	55.8	56.1	54.8	55.175
23	55	50.1	55	55.5	54.3	52.8	55.1	55.4	54.15
24	53.5	53.2	53.1	53.8	48.6	53.5	52.5	54	52.775
Set Average									54.03333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									59.43666667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									72.9
Water Temperature of lime bath (°F)									73.4
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AH-10. Surface Resistivity Test Results Reported for Mix #8, Lab #10, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NEDOT10	49.6	45.5	43.6	46.2	49.6	45.7	43.6	46.3	46.2625
NEDOT11	47.3	48.3	47.6	46	46.8	47.8	48.5	46.6	47.3625
NEDOT12	53.2	47.7	53.2	48.4	53.5	48.4	53.7	48.5	50.825
Set Average									48.15
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									52.965
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									72
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

**Figure AH-11. Surface Resistivity Test Results Reported for Mix #8, Lab #11, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	40.8	41.1	42.9	39.8	39	40.6	45.4	45	41.825
14	42.7	42.3	44.5	43.9	41.7	45.6	42	44.7	43.425
15	35.7	38.9	39.3	41.5	38.1	41	40	43	39.6875
Set Average									41.64583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									45.81041667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					Cylinders have a layer of viscous material on exterior.				



**Figure AH-12. Surface Resistivity Test Results Reported for Mix #8, Lab #12, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NEDOT-28	44.5	44.2	39.9	41.2	43.7	46.1	43.9	43.1	43.3
NEDOT-29	39.6	35.1	31.1	32.8	39.7	35.2	31.1	37.5	35.3
NEDOT-30	39.2	37.2	35.8	46.3	41.3	39.7	37.8	44.3	40.2
Set Average									39.6
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									43.6
Chloride Ion Penetration Type									VERY LOW
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)									
Temperature of Ca(OH) <sub>2</sub> Solution (°F)									
Curing history specific to your lab once you received the specimens					The specimens arrived on 10/26/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure AH-13. Surface Resistivity Test Results Reported for Mix #8, Lab #13, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
4	40.2	43.8	43.2	43.8	40.3	44.6	43.6	43.6	42.8875
5	40.4	36.7	37.3	39.9	40	37.2	38.4	40.8	38.8375
6	41.3	41.1	38.8	39.4	40.7	41.7	38.7	40.1	40.34285714
Set Average									40.68928571
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									44.75821429
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									69.8
Water Temperature of lime bath (°F)									71.6
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AH-14. Surface Resistivity Test Results Reported for Mix #8, Lab #14, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
1	47	48.5	46.5	44.4	47.1	48.4	47.2	44	46.6375
2	41	40.6	43.2	42.4	43.5	42.9	43.3	44.9	42.725
3	41.4	41.8	44.2	42.3	41	41	43.1	41.9	42.0875
Set Average									43.81666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									48.19833333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									70
Water Temperature of lime bath (°F)									69
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

## **Appendix AJ**

### **Surface Resistivity Test Results Reported for Mix #9 @ 56 Days**

**Figure AJ-1. Surface Resistivity Test Results Reported for Mix #9, Lab #1, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CDOT 29	28.9	31.9	30.5	28.4	29.1	31.7	29.5	26.5	29.5625
CDOT 39	28.3	29.3	28.9	28.4	26.5	29.6	27.9	28.1	28.3750
CDOT 41	28.1	27.9	28.5	25.5	28.5	27.8	28.9	27.2	27.8000
Set Average									28.5792
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									31.4371
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AJ-2. Surface Resistivity Test Results Reported for Mix #9, Lab #2, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
30	24.4	24.5	24.2	24.2	24.6	24.3	24.2	24.7	24.4
25	27.1	26.5	26.3	27.1	26.8	26.6	26.5	26.8	26.7
38	25.4	24.6	25.1	25.8	25.7	24.4	25	25	25.1
Set Average									25.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									27.9
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure AJ-3. Surface Resistivity Test Results Reported for Mix #9, Lab #3, @ 56 Days.**

Temp H <sub>2</sub> O: 72f		Temp Air: 74f		Ohms: 24.2k		Scale: 4		Range: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
12/14/2010	4	29.8	29.7	28.8	26.2	25.5	27.0	27.1	25.7	27.48
12/14/2010	12	26.8	24.9	24.5	23.7	25.6	25.3	25.2	23.9	24.99
12/14/2010	25	23.7	26.3	23.4	24.5	24.4	26.6	23.9	24.4	24.65
Set Average										25.70
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										28.27
Penetrability Based on Test										

**Figure AJ-4. Surface Resistivity Test Results Reported for Mix #9, Lab #4, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°		0°	90°	180°	270°	Average
2	28.9	29.1	27.1	28.9	28.4	29.2	26.1	27.7	28.175
5	28.6	25.4	27	30.1	30.9	29.6	27.4	30.5	28.6875
46	24.1	25.3	26.6	24.2	24.1	27.5	25.9	25	25.3375
Set Average									27.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									30.14
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									67.2 71.1
Curing history specific to your lab once you received the specimens					Samples once received, were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No Abnormalities on the cylinders were found				



**Figure AJ-5. Surface Resistivity Test Results Reported for Mix #9, Lab #5, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
cdot 40	26.4	24.4	27.2	22.6	25.9	23.5	27.3	23.2	25.1
cdot 45	25.6	25.7	26.6	24.8	26.0	25.7	26.0	25.8	25.8
cdot 48	24.2	22.8	23.8	24.0	24.4	2.6	24.1	24.0	21.2
Set Average									24.0
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									26.4
Chloride Ion Penetration Type									LOW

Air Temperature of testing room (°F):	66.7
Water Temperature of lime bath (°F):	64.3
Curing history specific to your lab once you received the specimens	
Any abnormalities, comments, and/or notes.	

**Figure AJ-6. Surface Resistivity Test Results Reported for Mix #9, Lab #6, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CO 21	50.5	51.4	48.8	52.1	49.5	52.6	49.3	51.2	50.675
CO 22	52.2	53.2	50.8	50.3	52.6	53.1	50.4	50.2	51.6
CO 32	50.8	50.7	51	52	52.7	50.1	51.2	52.3	51.35
Set Average									51.20833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									56.32916667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens					Immediately put into lime water, tested at 56 day on 14/DEC				
Any abnormalities, comments, and/or notes.					a=1.5				
<b>Note: Considered to be Outlier due to Values Higher than 91-day Data.</b>									

**Figure AJ-7. Surface Resistivity Test Results Reported for Mix #9, Lab #7, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
3	35.1	33.7	33	33.5	33.9	34	32.2	34	33.675
7	32.5	33.6	34.6	34.4	33.7	33.5	35	33.5	33.85
10	36.1	31.2	33.3	34.8	35.4	32.2	33.2	34.8	33.875
Set Average									33.8
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									37.18
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 11/12/10 and placed in lime water. Tested samples for 56 day Surface Resistivity on 12/14/10 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure AJ-8. Surface Resistivity Test Results Reported for Mix #9, Lab #8, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
27	25.6	24.1	25.3	23.8	25.5	24.4	25.3	23.7	24.7125
37	25.4	26.6	26.1	25.9	25.8	26.3	26.4	26.3	26.1
44	25.9	27.4	27.7	26.9	26.5	27.3	27.5	27	27.025
Set Average									25.94583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									28.54041667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					N/A				

**Figure AJ-9. Surface Resistivity Test Results Reported for Mix #9, Lab #9, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
45	26.7	25.5	26.2	27.4	26.3	25.4	25.7	28.4	26.45
47	28.9	27.6	26	26.9	29.7	28	26	26.6	27.4625
31	25.2	29.4	27.6	25.1	25.4	30.3	29.1	24.6	27.0875
Set Average									27
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									29.7
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				73.2					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AJ-10. Surface Resistivity Test Results Reported for Mix #9, Lab #10, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CODOT23	27.6	26.5	26.4	28.9	28.6	26	25.5	27.6	27.1375
CODOT26	26.4	25	24.6	23.4	25.8	24.5	25.3	23.2	24.775
CODOT34	26.7	27.2	27.4	27.1	26.5	27.6	28	27.3	27.225
Set Average									26.37916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									29.01708333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									70
Water Temperature of lime bath (°F)									71
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

**Figure AJ-11. Surface Resistivity Test Results Reported for Mix #9, Lab #11, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AJ-12. Surface Resistivity Test Results Reported for Mix #9, Lab #12, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CODOT - 17	24.9	24.3	23.5	20.9	24	22.8	23.6	22.2	23.3
CODOT - 20	21.3	21.9	20.3	21.3	20	21.2	21.3	21.5	21.1
CODOT - 28	22.1	22.8	19.6	22.4	22.5	22	19.7	21.3	21.6
Set Average									22.0
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									24.2
Chloride Ion Penetration Type									LOW
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)					68				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					67				
Curing history specific to your lab once you received the specimens					The specimens arrived on 11/12/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									



**Figure AJ-13. Surface Resistivity Test Results Reported for Mix #9, Lab #13, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
6	25.8	25.6	24.2	25.1	25.5	25.5	25.1	26	25.35
8	25.8	23	23.9	25.3	25.5	22.2	23.9	25.4	24.375
14	24.8	23.8	24.6	23.6	24.4	23.5	24.4	24.9	24.25
Set Average									24.65833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									27.12416667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									68.9
Water Temperature of lime bath (°F)									67.7
Curing history specific to your lab once you received the specimens					Received and placed in lime water on 2010/11/18, tested on 2010/11/19				
Any abnormalities, comments, and/or notes.									

**Figure AJ-14. Surface Resistivity Test Results Reported for Mix #9, Lab #14, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
33	27	28	26	26	26.8	28	26.2	26.1	26.7625
36	24.7	26	23.7	24.8	24.5	25.5	23.5	24.1	24.6
42	27.6	27	27.6	28.3	27.7	27.5	27.5	28.5	27.7125
Set Average									26.35833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									28.99416667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				69					
Water Temperature of lime bath (°F)				68					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix AK**

## **Surface Resistivity Test Results Reported for Mix #10 @ 56 Days**

**Figure AK-1. Surface Resistivity Test Results Reported for Mix #10, Lab #1, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CEMEX 7	39.6	41.1	40.8	39.6	40.6	42.5	41.5	42	40.9625
CEMEX 27	42.9	39	42.5	44.7	41.7	39.6	43.2	44.8	42.3000
CEMEX 47	40.9	36.9	36.4	41.8	42.6	36.2	37.9	42.4	39.3875
Set Average									40.8833
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									44.9717
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AK-2. Surface Resistivity Test Results Reported for Mix #10, Lab #2, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
6	41.3	39.6	39.9	41	41.4	40	40	41.3	40.6
22	46.4	43.2	43.2	43.6	45.9	43.1	43	43.7	44.0
40	45.4	43.9	45.2	45.1	45.9	45.1	45	45.1	45.1
Set Average									43.2
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									47.5
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									72
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure AK-3. Surface Resistivity Test Results Reported for Mix #10, Lab #3, @ 56 Days.**

Temp H <sub>2</sub> O: 75f		Temp Air: 72f		Ohms: 24.6k		Range: 3		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
1/5/2011	3	49.3	48.9	49.2	53.4	51.1	50.2	51.8	54.4	51.04
1/5/2011	17	51.1	54.7	48.2	50.6	49.7	53.7	50.8	48.5	50.91
1/5/2011	43	54.5	52.5	51.4	49.8	53.1	55.4	51.9	51.2	52.48
Set Average										51.48
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										56.62
Penetrability Based on Test										

**Figure AK-4. Surface Resistivity Test Results Reported for Mix #10, Lab #4, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°		0°	90°	180°	270°	Average
1	35.7	38.9	41.3	44.2	40.1	39	42.7	40.5	40.3
41	43	43.2	37.2	40.9	43.5	43.6	35.6	44.5	41.4375
46	44.9	44.3	44.3	46.2	45.8	44.2	40	45.6	44.4125
Set Average									42.05
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									46.255
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				65.5					
				71.7					
Curing history specific to your lab once you received the specimens					Samples once received, were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No Abnormalities on the cylinders were found				

**Figure AK-5. Surface Resistivity Test Results Reported for Mix #10, Lab #5, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
Cex 31	48.3	42.2	43.7	42.5	44.4	44.8	44.3	42.7	44.1
Cex 32	47.2	42.4	46.8	43.7	46.5	43.8	45.2	45.7	45.2
Cex 39	49.1	38.4	41.5	46.7	45.5	40.2	47	44.9	44.2
Set Average									44.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									48.9
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)			66.4						
Water Temperature of lime bath (°F)			64.2						
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure AK-6. Surface Resistivity Test Results Reported for Mix #10, Lab #6, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
9	37.6	38.1	35.7	39.6	38.8	38.4	33.7	37.6	37.4375
15	36.9	42	39.1	38.5	37.2	40.4	38.8	37.6	38.8125
35	38.5	38.6	41.6	37.9	38.6	39.3	40.9	38.9	39.2875
Set Average									38.5125
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									42.36375
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Put in lime water after receipt. Run test at 56 days on 5/JAN at 11.30 am ET.				
Any abnormalities, comments, and/or notes.					a=1.5"				

**Figure AK-7. Surface Resistivity Test Results Reported for Mix #10, Lab #7, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
12	43.9	47.8	50.8	44.8	44	48.6	51	47.5	47.3
23	45.8	46.1	48	44.2	44.4	45.8	49	45.8	46.1375
48	47.3	46.6	44.5	47.1	46	46.6	45.1	47	46.275
Set Average									46.57083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									51.22791667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 12/03/10 and placed in lime water. Tested samples for 56 day Surface Resistivity on 01/05/11 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure AK-8. Surface Resistivity Test Results Reported for Mix #10, Lab #8, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
21	37.8	40.9	39.9	42.6	38.9	41.3	42.2	42	40.7
25	40.7	43.6	42.1	46.9	42.9	44.8	42.7	46.7	43.8
26	42.6	46.7	38.9	44.7	44.4	47	40.2	45	43.6875
Set Average									42.72916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									47.00208333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									N/A

**Figure AK-9. Surface Resistivity Test Results Reported for Mix #10, Lab #9, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
4	43	40.2	40.7	73.9	42.9	39.3	41	43.4	45.55
24	41.1	46.8	42	48.2	42.1	46.8	40.5	48.5	44.5
37	49.1	42.9	45.1	47.1	47.4	43.8	40.9	48.6	45.6125
Set Average									45.22083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									49.74291667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				70.7					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AK-10. Surface Resistivity Test Results Reported for Mix #10, Lab #10, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CEMEX 18	41.7	41.5	43.7	42.1	41.7	40	43.3	40.2	41.775
CEMEX 29	40.8	43.1	43.2	38.2	40	44	40.8	38.6	41.0875
CEMEX 42	41.7	37.1	35.6	38.2	41.8	37.3	35.8	38.1	38.2
Set Average									40.35416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									44.38958333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									71
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

**Figure AK-11. Surface Resistivity Test Results Reported for Mix #10, Lab #11, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
2	37.9	38.4	37.2	36.6	36.6	39	40.2	37.9	37.975
8	37.4	42.1	40.1	39.7	38.5	39.5	40.7	38.7	39.5875
28	42.1	38.5	40.4	40	42.1	42.2	38.4	40.7	40.55
Set Average									39.37083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									43.30791667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				75					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					Note: Actually Tested at 66 Days				

**Figure AK-12. Surface Resistivity Test Results Reported for Mix #10, Lab #12, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CEMEX 11	35.4	33.7	28.9	32.5	36	33.6	28.7	33.7	32.8
CEMEX 34	35.9	34.5	33.8	34.3	34.3	36.3	34.7	34.8	34.8
CEMEX 38	34.7	34.3	33.7	36.7	35.9	36.4	34.8	36.8	35.4
Set Average									34.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									37.8
Chloride Ion Penetration Type									VERY LOW
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)				71	71	71.5			
Temperature of Ca(OH) <sub>2</sub> Solution (°F)				68	68.5	68.5			
Curing history specific to your lab once you received the specimens					The specimens arrived on 12/3/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure AK-13. Surface Resistivity Test Results Reported for Mix #10, Lab #13, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure AK-14. Surface Resistivity Test Results Reported for Mix #10, Lab #14, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	44	39	42	38	42	39	41	37	40.25
33	38	43	35	39	38	40	33	38	38
36	40	39	41	38	40	39	40	39	39.5
Set Average									39.25
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									43.175
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix AL**

## **Surface Resistivity Test Results Reported for Mix #11 @ 56 Days**

**Figure AL-1. Surface Resistivity Test Results Reported for Mix #11, Lab #1, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
Titan 1	20.4	21.7	19	19.3	21	19.9	20.2	19.4	20.1125
Titan 4	22.6	20.9	19.1	20.6	21.6	20.5	19.6	19.9	20.6000
Titan 23	22.2	20.5	22.7	20.1	21.1	19.7	22.1	21.3	21.2125
Set Average									20.6417
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.7058
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AL-2. Surface Resistivity Test Results Reported for Mix #11, Lab #2, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
26	23.3	23.8	23.1	23.4	23.5	23.7	23.5	23.3	23.5
30	23.6	22.5	23.1	23.1	23.5	22.5	23.1	23.5	23.1
47	23.2	22.6	23.8	22.5	23.3	22.7	23.8	22.6	23.1
Set Average									23.2
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									25.5
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									70
Water Temperature of lime bath (°F)									72
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure AL-3. Surface Resistivity Test Results Reported for Mix #11, Lab #3, @ 56 Days.**

Temp H <sub>2</sub> O: 76f		Temp Air: 72f		Ohms: 23.6k		Range: 3		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
1/12/2011										#DIV/0!
1/12/2011										#DIV/0!
1/12/2011										#DIV/0!
Set Average										#DIV/0!
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										#DIV/0!
Penetrability Based on Test										

**Figure AL-4. Surface Resistivity Test Results Reported for Mix #11, Lab #4, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
10	19.5	19.7	21.6	20.8	21.4	20.2	20.4	19.7	20.4125
13	19.4	22.3	22.1	20.1	19.3	21.6	20.5	20.1	20.675
17	21.2	20.3	20.6	22.1	20.7	20.6	20.9	21.1	20.9375
Set Average									20.675
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.7425
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				64.2					
				71.2					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					No Abnormalities on the cylinders were found				

**Figure AL-5. Surface Resistivity Test Results Reported for Mix #11, Lab #5, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
TIN 5	19.6	20.9	21.4	19.9	19.9	21.1	21.6	21.1	20.7
TIN 9	18.9	20.1	19.8	20.0	19.1	20.3	19.9	20.1	19.8
TIN 11	19.8	20.9	18.7	21.1	20.1	21.0	18.9	21.2	20.2
									20.2
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.2
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				65.7					
Water Temperature of lime bath (°F)				64.1					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AL-6. Surface Resistivity Test Results Reported for Mix #11, Lab #6, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	19.8	19.9	19	17.9	20	19.8	19	17.7	19.1375
36	18.9	18.8	20.9	19	19.3	18.8	20.5	19	19.4
38	20	18.8	20.5	19	20.4	17.8	20	18.8	19.4125
Set Average									19.31666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									21.24833333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Put in lime water after receipt. Run test at 56 days on 12/JAN at 4.00 pm ET.				
Any abnormalities, comments, and/or notes.					a=1.5"				



**Figure AL-7. Surface Resistivity Test Results Reported for Mix #11, Lab #7, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
3	25.3	23.8	22.6	24.3	24.7	24.7	23.4	24.4	24.15
32	23.1	23	23.7	23.6	22.7	24.6	24.2	23.2	23.5125
33	23.4	23.3	23.9	24.3	23.8	22.7	22.9	25.3	23.7
Set Average									23.7875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									26.16625
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									72
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples received on 12/09/10 and placed in lime water. Tested samples for 56 day Surface Resistivity on 1/12/11 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure AL-8. Surface Resistivity Test Results Reported for Mix #11, Lab #8, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	21.3	21.5	21.4	19.7	21.7	21.8	21.9	19.7	21.125
34	22.4	22.1	23	24.6	22.8	22.1	23.1	25.4	23.1875
39	21.9	22.5	24.2	22.9	22.4	23.1	24.4	23.7	23.1375
Set Average									22.48333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									24.73166667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					N/A				

**Figure AL-9. Surface Resistivity Test Results Reported for Mix #11, Lab #9, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
14	23.4	21.4	21.3	23.5	23.7	21.6	21.4	24.5	22.6
41	23.5	27.5	25	23.9	24.3	26.9	25.2	24.9	25.15
2	23.8	22.4	23.9	23.7	23.6	27.3	24.1	24.6	24.175
Set Average									23.975
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									26.3725
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				74.2					
Water Temperature of lime bath (°F)				73.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AL-10. Surface Resistivity Test Results Reported for Mix #11, Lab #10, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
Titan 6	18.9	18.9	20.7	19.9	18.6	19.1	20.7	20.1	19.6125
Titan 21	23.1	22	22.1	20.4	22.5	22.2	22.2	21.2	21.9625
Titan 24	20.8	21.2	22.1	22	20.8	20.8	23	21.8	21.5625
Set Average									21.04583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									23.15041667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

**Figure AL-11. Surface Resistivity Test Results Reported for Mix #11, Lab #11, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	16.9	15.3	17.7	17.8	18	18.8	17.4	18.3	17.525
48	17.7	18.9	18.8	19	18.4	18.3	19	19.1	18.65
37	19.5	18.7	18.2	17.8	18	19.1	18.4	18.8	18.5625
Set Average									18.24583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									20.07041667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									75
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AL-12. Surface Resistivity Test Results Reported for Mix #11, Lab #12, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
TITAN - 12	18.4	18	18.5	17.1	18.5	17.9	18.6	17.8	18.1
TITAN - 15	16.9	17.2	16.9	17.3	17.1	18.4	17.5	17.9	17.4
TITAN - 22	19.1	18.8	18.4	17.1	18.6	18.7	19.1	17.3	18.4
Set Average									18.0
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									19.8
Chloride Ion Penetration Type									MODERATE
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)				70					
Temperature of Ca(OH) <sub>2</sub> Solution (°F)				68					
Curing history specific to your lab once you received the specimens					The specimens arrived on 12/8/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure AL-13. Surface Resistivity Test Results Reported for Mix #11, Lab #13, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AL-14. Surface Resistivity Test Results Reported for Mix #11, Lab #14, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
7	20.5	20.9	20.3	20.9	20.9	21.2	20.4	21	20.7625
8	20	20.2	20.7	21.6	20	20.5	20.6	21.4	20.625
18	20.1	20.8	21.6	20.9	20.3	20.8	21	20.7	20.775
Set Average									20.72083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.79291667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									72
Water Temperature of lime bath (°F)									70
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



# **Appendix AM**

## **Surface Resistivity Test Results Reported for Mix #12 @ 56 Days**

**Figure AM-1. Surface Resistivity Test Results Reported for Mix #12, Lab #1, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FL1	40.1	36	33.2	34.7	37.4	37.4	33.7	34.7	35.9000
FL2	37.8	40.3	37.9	35.9	36.1	38.9	38.4	35.9	37.6500
FL3	33.6	31.9	31.7	34.1	32.7	33.7	31.7	33.7	32.8875
Set Average									35.4792
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									39.0271
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AM-2. Surface Resistivity Test Results Reported for Mix #12, Lab #2, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
4	36.8	35.2	40.1	35.8	36.8	35.2	38.6	35.5	36.8
5	37.6	34.1	37.2	38.6	37.1	34.0	37.0	39.2	36.9
6	32.0	35.4	33.3	35.2	32.2	35.6	34.0	35.4	34.1
Set Average									35.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									39.5
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				78					
Water Temperature of lime bath (°F)				76					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure AM-3. Surface Resistivity Test Results Reported for Mix #12, Lab #3, @ 56 Days.**

Temp H <sub>2</sub> O: 74f		Temp Air: 76f		Ohms: 23.6k		Range: 4		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
5/3/2011	7	36.1	32.2	35	37.9	36.5	33.6	34.1	39.2	35.58
5/3/2011	8	43.1	38	42.6	38.3	43.8	37.5	44.2	38.3	40.73
5/3/2011	9	31.5	34.5	34.5	33.8	31.8	38.5	32.7	34.4	33.96
Set Average										36.75
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										40.43
Penetrability Based on Test										

**Figure AM-4. Surface Resistivity Test Results Reported for Mix #12, Lab #4, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°		0°	90°	180°	270°	Average
10	39	44.2	39.2	42.1	35.3	40	38.4	45.5	40.4625
11	34.5	33	42.1	35.9	33.9	31.6	41.9	35.5	36.05
12	35.9	37.8	34.3	36.6	35.6	37.6	34.6	34.3	35.8375
Set Average									37.45
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									41.195
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				68.7					
				72.1					
Curing history specific to your lab once you received the specimens					Samples once received, were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No Abnormalities on the cylinders were found				

**Figure AM-5. Surface Resistivity Test Results Reported for Mix #12, Lab #5, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									Average
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	
									#DIV/0!
									#DIV/0!
									#DIV/0!
<b>Set Average</b>									#DIV/0!
<b>Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)</b>									1.1
<b>Penetrability Based on Test</b>									#DIV/0!
<b>Chloride Ion Penetration Type</b>									#DIV/0!
<b>Air Temperature of testing room (°F)</b>									
<b>Water Temperature of lime bath (°F)</b>									
<b>Curing history specific to your lab once you received the specimens</b>									
<b>Any abnormalities, comments, and/or notes.</b>									

**Figure AM-6. Surface Resistivity Test Results Reported for Mix #12, Lab #6, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	33.4	35.7	37.3	35.7	33.8	32	37.2	37.2	35.2875
17	35.2	42	37.4	38	35.2	43.1	38.6	40	38.6875
18	37	32.7	31.3	37.9	36.6	32	32.8	38.1	34.8
Set Average									36.25833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									39.88416667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens					received and immediately put into lime water				
Any abnormalities, comments, and/or notes.					a=1.5"				

**Figure AM-7. Surface Resistivity Test Results Reported for Mix #12, Lab #7, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	49.6	43.2	44.6	44.7	46.7	45	43	47.2	45.5
20	38	40.5	42.1	39.1	39.2	41.5	42.7	40.1	40.4
21	41.4	41.6	39.7	40	41.5	40.8	40.5	40.5	40.75
Set Average									42.21666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									46.43833333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens					Samples received on 4/1/11 and placed in lime water. Tested samples for 56 day Surface Resistivity on 5/3/11 and then placed back into the lime water.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				



**Figure AM-8. Surface Resistivity Test Results Reported for Mix #12, Lab #8, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	34.7	34.8	32.4	38.2	34	37.1	32.6	38.8	35.325
23	33.4	35.8	36.4	33.4	33.8	36	35.8	33.2	34.725
24	36.3	32.5	34.4	33.5	35.9	32.1	34.1	33.3	34.0125
Set Average									34.6875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									38.15625
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Received on July 22 immediately put in lime water. Ran 56 day test August 20 at 11:30 a.m.				
Any abnormalities, comments, and/or notes.					N/A				

**Figure AM-9. Surface Resistivity Test Results Reported for Mix #12, Lab #9, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
26	33.9	34.1	42.8	36.6	33.7	32.8	41.5	36.2	36.45
27	36.1	33.9	37.6	35.3	32.6	34.2	37.2	35.9	35.35
25	40.5	38.6	41	37.8	41.8	38.7	41	37.8	39.65
Set Average									37.15
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									40.865
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				73.2					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AM-10. Surface Resistivity Test Results Reported for Mix #12, Lab #10, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FLDOT 28	43.4	41.9	40.2	42.4	43.4	41.9	40.3	42.3	41.975
FLDOT 29	38.4	36.4	37.9	42.3	38.5	36.3	38	42.1	38.7375
FLDOT 30	40.5	42.8	42	44.1	40.2	42.9	42.1	44.2	42.35
Set Average									41.02083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									45.12291667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

Figure AM-11. Surface Resistivity Test Results Reported for Mix #12, Lab #11, @ 56 Days.

Surface Resistivity (SR) Readings (Kohm-cm)									Average
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	
									#DIV/0!
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AM-12. Surface Resistivity Test Results Reported for Mix #12, Lab #12, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FLDOT-34	30	31.2	32.1	31.9	33.1	33.7	32.2	31.8	32.0
FLDOT-35	33.5	34.8	30.4	33.7	36.1	35.5	31.5	32.7	33.5
FLDOT-36	28.6	29.2	29.5	30	28.7	31	30.9	29.5	29.7
Set Average									31.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									34.9
Chloride Ion Penetration Type									LOW
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)				72					
Temperature of Ca(OH) <sub>2</sub> Solution (°F)				71					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure AM-13. Surface Resistivity Test Results Reported for Mix #12, Lab #13, @ 56 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	40.0	39.2	38.2	35.6	39.9	40.2	37.9	35.4	38.3
38	36.4	36.5	39.2	41.8	36.5	37.3	40.9	41.9	38.8
39	37.7	38.8	40.8	39.8	37.7	39.1	41.1	40.2	39.4
Set Average									38.8375
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									42.72125
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				75.2					
Water Temperature of lime bath (°F)				70.7					
Curing history specific to your lab once you received the specimens					Specimens unpacked and placed in lime water on April 4th, 2011; Specimens tested on May 3rd, 2011				
Any abnormalities, comments, and/or notes.									

Figure AM-14. Surface Resistivity Test Results Reported for Mix #12, Lab #14, @ 56 Days.

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

## **Appendix BA**

### **Surface Resistivity Test Results Reported for Mix #1 @ 91 Days**



**Figure BA-1. Surface Resistivity Test Results Reported for Mix #1, Lab #1, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CTA-34	20	19.6	19.6	19.9	19.8	19.3	19.4	19.6	19.6500
CTA-36	18.9	19.6	19.3	18.8	18.4	19.4	18.8	18.9	19.0125
CTA-38	21	20.1	19	20.2	21	20.1	18.7	20	20.0125
Set Average									19.5583
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									21.5142
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BA-2. Surface Resistivity Test Results Reported for Mix #1, Lab #2, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	16.7	19	18.8	17.5	16.5	19.1	19	17.1	18.0
23	17	17.7	18.4	17.9	17.2	17	17.9	18.2	17.7
24	16.8	18.2	16.4	17.2	16.3	18.9	16.7	17.1	17.2
Set Average									17.6
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									19.4
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				77					
Water Temperature of Lime Bath (°F)				72					
Curing history specific to your lab once you received the specimens					Specimens were put in lime water bath immediately after receiving them.				
Any abnormalities, comments, and/or notes.					N/A				

**Figure BA-3. Surface Resistivity Test Results Reported for Mix #1, Lab #3, @ 91 Days.**

Temp H <sub>2</sub> O: 71f		Temp Air: 74f		Ohms: 23.6k		Scale: 3		Range: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
9/24/2010	4	18.57	18.6	18.04	18.22	18.79	18.69	17.84	18.27	18.38
9/24/2010	5	19.86	18.96	18	18.85	19.72	18.5	19.41	19.34	19.08
9/24/2010	6	18.12	17.59	18.64	19.54	18.62	17.15	18.7	19.24	18.45
Set Average										18.64
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										20.50
Penetrability Based on Test										

**Figure BA-4. Surface Resistivity Test Results Reported for Mix #1, Lab #4, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	23.9	23.8	23.9	23.1	21.3	22.7	21.7	20.6	22.625
20	25.1	22.3	22.4	22.5	21.8	20.1	19.8	21.9	21.9875
21	26.5	23	24.7	19.3	24.5	21.9	23.3	21.3	23.0625
Set Average									22.55833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									24.81416667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									71.2
Water Temperature of lime bath (°F)									73.1
Curing history specific to your lab once you received the specimens					Samples were received on 7-21-10 (noon), were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No Abnormalities on the cylinders were found				

**Figure BA-5. Surface Resistivity Test Results Reported for Mix #1, Lab #5, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CTA31	21.2	22.4	21.8	21.2	21.1	22.5	21.8	21.3	21.7
CTA32	21.8	21.8	23.2	23.7	21.2	21.7	24	23.4	22.6
CTA33	19.1	20.6	21.4	20.7	19.1	21.1	21.2	21.7	20.6
Set Average									21.6
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									23.8
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BA-6. Surface Resistivity Test Results Reported for Mix #1, Lab #6, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
1	20.2	20.8	21.8	20.5	19.9	20.5	21.9	20.6	20.775
2	20.7	20.9	20.2	22	20.5	20.6	20.2	22	20.8875
3	21.1	20.5	20.5	20.3	21	20.2	20	19.9	20.4375
Set Average									20.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.77
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									74
Curing history specific to your lab once you received the specimens					Received on July 22nd, immediately put in lime water. Ran tests at 28 and 56 days, immediately put back into lime water. Ran test at 91 days on 24 SEPT at 1730 ET.				
Any abnormalities, comments, and/or notes.					a=3.8cm				

**Figure BA-7. Surface Resistivity Test Results Reported for Mix #1, Lab #7, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
10	25	23	27	27	25	25	26	26	25.5
11	26	25	25	26	26	25	26	24	25.375
12	26	25	26	27	26	25	25	27	25.875
Set Average									25.58333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									28.14166667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									72
Curing history specific to your lab once you received the specimens					Samples received on 7/22/10 and placed in lime water. Tested samples for 91 day Surface Resistivity on 9/24/10. Cylinders were discarded after this 91 day test.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure BA-8. Surface Resistivity Test Results Reported for Mix #1, Lab #8, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	19	21	19	19	19	21	19	19	19.5
17	22	20	20	20	22	20	21	20	20.625
18	21	20	22	20	21	20	22	20	20.75
Set Average									20.29166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.32083333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									76
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					Core 16 138290M.L. 11010Psi 75.9MPa Core 18 140470M.L. 11180Psi 77.1MPa				



**Figure BA-9. Surface Resistivity Test Results Reported for Mix #1, Lab #9, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
15	20	20.7	21.2	19.4	19.6	20.7	21.6	19.9	20.3875
14	20.7	21	19.3	21.1	20.2	20.4	19.4	20.2	20.2875
13	21.2	20.5	19.7	19.1	21.4	20.7	19.8	20	20.3
Set Average									20.325
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.3575
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				72.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									
		Diameter	Load	Strength					
	Cylinder	(Inch)	(Pounds)	(psi)					
	13	3.97	131,700	10,639					
	14	4.00	165,512	13,171					
	15	4.01	137,730	10,906					

**Figure BA-10. Surface Resistivity Test Results Reported for Mix #1, Lab #10, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CTA28	19.4	20.6	20.3	20.4	19.5	20.6	20	20.6	20.175
CTA29	21	21	21.6	21	20.7	21.4	21.2	21.2	21.1375
CTA30	20.6	20.9	20.2	19.7	20.3	20.9	20.1	19.5	20.275
Set Average									20.52916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.58208333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BA-11. Surface Resistivity Test Results Reported for Mix #1, Lab #11, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	21	20.9	20.2	21.1	20.7	21	19.7	20.7	20.6625
26	20.4	21.1	20	22.6	20.8	20.3	19.9	22	20.8875
27	20.9	21.3	21.9	23.2	20.3	21	20.9	22.8	21.5375
Set Average									21.02916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									23.13208333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				75					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BA-12. Surface Resistivity Test Results Reported for Mix #1, Lab # 12, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CTA - 7	15.9	17.8	17.6	16.7	16.2	18.1	17.6	16.5	17.1
CTA - 8	15	16.1	16.4	15.9	15.6	16.5	16.4	16.3	16.0
CTA - 9	18.4	16.9	16.7	17	18.7	16.8	16.8	17.1	17.3
Set Average									16.8
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.5
Chloride Ion Penetration Type									MODERATE
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)					n/a				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					n/a				
Curing history specific to your lab once you received the specimens					The specimens arrived on 7/22/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure BA-13. Surface Resistivity Test Results Reported for Mix #1, Lab #13, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BA-14. Surface Resistivity Test Results Reported for Mix #1, Lab #14, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

## **Appendix BB**

### **Surface Resistivity Test Results Reported for Mix #2 @ 91 Days**

**Figure BB-1. Surface Resistivity Test Results Reported for Mix #2, Lab #1, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FHWA-10	18	15.2	15.9	16.9	16.5	15.1	16.2	16.8	16.3250
FHWA-11	15.8	14.3	14.4	15	15.4	14.7	14.5	15.6	14.9625
FHWA-12	16.5	14.8	14.6	13.4	17.3	15.1	14.4	15.2	15.1625
Set Average									15.4833
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.0317
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									70
Water Temperature of lime bath (°F)									70
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					Started to use the Resipod Proceq resistivity meter.				



**Figure BB-2. Surface Resistivity Test Results Reported for Mix #2, Lab #2, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
40	13.0	13.1	13.3	13.0	13.2	13.2	13.5	13.6	13.2
41	16.6	16.5	16.3	16.9	16.1	16.2	16.0	16.9	16.4
42	17.7	18.2	18.2	18.3	17.7	18.2	18.3	18.3	18.1
Set Average									15.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.5
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									76
Water Temperature of lime bath (°F)									75
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after demolding				
Any abnormalities, comments, and/or notes.					N/A				

**Figure BB-3. Surface Resistivity Test Results Reported for Mix #2, Lab #3, @ 91 Days.**

Temp H <sub>2</sub> O: 71f		Temp Air: 74f		Ohms: 23.8k		Scale:		Range:		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
10/12/2010	7	14.4	14.8	15	15.1	14.3	14.7	15.1	15	14.80
10/12/2010	8	16	14.9	13.8	15.3	16.2	16.4	14.2	16.4	15.40
10/12/2010	9	15.1	16.4	16.4	15.2	14.9	15	16.7	15.4	15.64
Set Average										15.28
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										16.81
Penetrability Based on Test										

**Figure BB-4. Surface Resistivity Test Results Reported for Mix #2, Lab #4, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
34	17.6	20.8	20.7	22.8	24.1	18.6	23.4	20.2	21.025
35	18.9	19.5	21.9	20.2	20.7	17.5	20.2	20.1	19.875
36	20	18.5	20.2	19	18.5	20.3	19.7	18.2	19.3
Set Average									20.06666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.07333333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									64.2
Water Temperature of lime bath (°F)									73.6
Curing history specific to your lab once you received the specimens					Once cylinders were recived were put on tanks.				
Any abnormalities, comments, and/or notes.					No Comments				

**Figure BB-5. Surface Resistivity Test Results Reported for Mix #2, Lab #5, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FHWA25	16.4	17.4	17.7	17.0	16.5	17.3	12.2	16.7	16.4
FHWA26	16.9	16.2	17.9	19.0	17.0	15.9	17.5	19.0	17.425
FHWA27	18.0	18.4	20.4	16.4	17.8	18.1	20.8	16.3	18.3
Set Average									17.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									19.1
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									66.7
Water Temperature of lime bath (°F)									67.4
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BB-6. Surface Resistivity Test Results Reported for Mix #2, Lab #6, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FHWA 4	15.02	14.08	14.45	17.29	15.11	14.22	14.62	17.89	15.335
FHWA 5	19.6	18.89	15.21	16.31	19.43	19.16	15.3	17.01	17.61375
FHWA 6	19.43	18.31	21.3	19.7	19.22	18.34	21.7	19.7	19.7125
Set Average									17.55375
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									19.309125
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Immediately after arrival on 5 AUG, samples were placed into sat. CH water. They were removed and tested at 28 days, put back into sat. CH water. They were tested for 56-day measurements 8 SEPT and placed back into sat. CH water. They were tested for 91-day on 13 OCT				
Any abnormalities, comments, and/or notes.					a=1.5				

**Figure BB-7. Surface Resistivity Test Results Reported for Mix #2, Lab #7, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	25	26	25	24	25	26	25	24	25
17	24	23	22	20	24	23	22	21	22.375
18	23	23	24	23	23	24	25	23	23.5
Set Average									23.625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									25.9875
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 8/05/10 and placed in lime water. Tested samples for 91 day Surface Resistivity on 10/13/10. Cylinders were discarded after this 91 day test.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure BB-8. Surface Resistivity Test Results Reported for Mix #2, Lab #8, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	19	17	17	18	19	17	16	17	17.5
23	16	15	13	15	16	15	13	15	14.75
24	14	15	15	17	14	15	15	17	15.25
Set Average									15.83333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.41666667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					Core 22 83140 M.L. 6620 psi 45.6 Mpa Core 24 76230 M.L. 6070 psi 41.9 MPa				

**Figure BB-9. Surface Resistivity Test Results Reported for Mix #2, Lab #9, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	18	18.1	18.5	18.3	18.2	18.2	18.7	19.1	18.3875
21	20.5	18.1	17.8	18.1	19.4	18.2	17.9	18.8	18.6
20	18.2	19.9	19.9	19.2	18	19	20.1	19	19.1625
Set Average									18.71666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									20.58833333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				73.2					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure BB-10. Surface Resistivity Test Results Reported for Mix #2, Lab #10, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FWHA31	14.5	14.8	15.8	16.5	14.8	14.6	15.5	15.5	15.25
FWHA32	13.9	14.7	12.7	14.7	13.6	14.7	13	14.2	13.9375
FWHA33	13.3	14.1	11.9	11.9	13.2	13.5	11.5	11.7	12.6375
Set Average									13.94166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.33583333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					in lime water				
Any abnormalities, comments, and/or notes.					Ends of specimens were slightly damaged, possibly dropped during shipment. Do not believe it effected test.				

**Figure BB-11. Surface Resistivity Test Results Reported for Mix #2, Lab #11, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	19.5	17.7	17.3	18.2	18.7	17.2	17.2	18.4	18.025
29	19.6	18	18.4	18.4	19.5	18.3	18.2	18.6	18.625
30	17.5	17.1	18.2	18.4	19.5	18.3	18.2	18.6	18.225
Set Average									18.29166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									20.12083333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BB-12. Surface Resistivity Test Results Reported for Mix #2, Lab #12, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FHWA-13	13.1	15.1	13.6	14.2	12.9	15.3	14	14.4	14.1
FHWA-14	13.4	14.4	15	14.3	13.4	14.3	15.9	14.1	14.4
FHWA-15	13.8	14.4	14.4	14.8	13.9	14	14.2	15	14.3
Set Average									14.2
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.7
Chloride Ion Penetration Type									MODERATE
				NOON					
Temperature of Room Air (°F)									
Temperature of Ca(OH) <sub>2</sub> Solution (°F)				71					
Curing history specific to your lab once you received the specimens					The specimens arrived on 8/6/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure BB-13. Surface Resistivity Test Results Reported for Mix #2, Lab #13, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
1	20.8	21.7	20.1	21	20.3	22	19.9	20.9	20.8375
2	20.6	19.2	21.1	20.4	21.3	19.6	20.4	21.2	20.475
3	21.5	19.7	20.8	20.4	21	19.5	21.2	20.2	20.5375
Set Average									20.61666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.67833333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									60.35
Water Temperature of lime bath (°F)									58.1
Curing history specific to your lab once you received the specimens					Samples were put in lime water on August 9th, 2010 tested on October 13th, 2010				
Any abnormalities, comments, and/or notes.									

**Figure BB-14. Surface Resistivity Test Results Reported for Mix #2, Lab #14, @ 91 Days.**

37	17.37	17.15	16.78	18.72	17.21	16.57	16.72	18.68	17.4
38	15.55	15.57	16.77	17.03	15.52	14.94	16.21	16.82	16.05125
39	18.62	18.12	15.96	15.5	18.44	18.07	16.22	15.66	17.07375
Set Average									16.84166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									18.52583333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				70.5					
Water Temperature of lime bath (°F)				68.6					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

## **Appendix BC**

### **Surface Resistivity Test Results Reported for Mix #3 @ 91 Days**

**Figure BC-1. Surface Resistivity Test Results Reported for Mix #3, Lab #1, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VADOT-1	8.6	8.8	8.9	8.9	8.6	8.7	8.9	8.9	8.7875
VADOT-2	8.7	9.2	9.6	9.2	8.7	9	9.6	9.1	9.1375
VADOT-3	9	9.1	9.1	8.8	9.1	9.1	9.1	9.2	9.0625
Set Average									8.9958
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									9.8954
Chloride Ion Penetration Type									HIGH
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BC-2. Surface Resistivity Test Results Reported for Mix #3, Lab #2, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	25.2	25.6	25.2	26	25.4	25.4	25.5	25.9	25.5
38	23.8	23.2	23.1	23.5	23.7	23.3	23.2	23.2	23.4
39	24.5	23.5	23.8	23.9	24.6	23.3	23.5	23.9	23.9
Set Average									24.3
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									26.7
Chloride Ion Penetration Type									LOW
							10/20/2010		
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				



**Figure BC-3. Surface Resistivity Test Results Reported for Mix #3, Lab #3, @ 91 Days.**

Temp H <sub>2</sub> O: 73f		Temp Air: 75f		Ohms: 23.6k		Scale: 5		Range: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
10/20/2010	37	23.5	22.5	22	23.2	23.5	22.4	21.9	23.3	22.79
10/20/2010	38	20.8	22	21.3	20.4	21.2	22.2	21.7	20.4	21.25
10/20/2010	39	21.8	22.7	21.8	23.2	22.6	22.5	22.5	22.7	22.48
Set Average										22.17
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										24.39
Penetrability Based on Test										

**Figure BC-4. Surface Resistivity Test Results Reported for Mix #3, Lab #4, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
31	26	26.5	25.9	28.1	25.7	26.5	27	27.8	26.6875
32	24.9	25.8	25.4	25.3	25.8	26.1	25.7	24.7	25.4625
33	26.3	23.3	25.7	25	25.5	24.9	23.2	25.1	24.875
Set Average									25.675
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									28.2425
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									67.3
Water Temperature of lime bath (°F)									72.3
Curing history specific to your lab once you received the specimens					Cylinders once received were put on lime water after test				
Any abnormalities, comments, and/or notes.					No Comments				

**Figure BC-5. Surface Resistivity Test Results Reported for Mix #3, Lab #5, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VA 22	24.2	23.6	22.9	23	23.3	23.7	23	23.1	23.35
VA 23	25.8	26	26.9	26.4	25.3	25.8	26.6	25.4	26.025
VA 24	25.1	24.4	24.4	25.7	25.1	24.5	23.4	24.9	24.6875
Set Average									24.6875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									27.15625
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									70.7
Water Temperature of lime bath (°F)									66.4
Curing history specific to your lab once you received the specimens					Samples were received on 8-16-10 , taken out of the box and immediately immersed in a water-lime bath. On 9-15-10, samples were taken out of bath, carefully wrapped with the same shipping materials for transportation to PRDOT facilities. Samples were tested by personnel from Grupo Carmelo.				
Any abnormalities, comments, and/or notes.					No specimen abnormalities were found				

**Figure BC-6. Surface Resistivity Test Results Reported for Mix #3, Lab #6, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	26	25.6	24.8	24.2	26.1	25.4	24.9	34.3	26.4125
26	27.3	30.5	29	29.1	27.2	30.7	29.2	28.4	28.925
27	26.7	27.4	26.7	26	26.9	27.6	26.4	26.9	26.825
Set Average									27.3875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									30.12625
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Immediately after arrival on 11 AUG, samples were placed into sat. lime water. They were removed and tested at 28 days, put back into sat. lime water, removed and tested for 56-day measurements on 15 SEPT. Finally, they were removed and tested for 91-day on 20 OCT at 16:30				
Any abnormalities, comments, and/or notes.					See accompanying picture. A rather strange discoloration was seen on 3 samples. This was noticed less than 3 minutes after removal from the saturated lime water. Samples have been kept submerged in saturated lime water for the duration of the test, and they have not been removed except for tests at 28 and 56 days. Furthermore, samples were stored in				

**Figure BC-7. Surface Resistivity Test Results Reported for Mix #3, Lab #7, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	32	32	31	32	32	32	31	32	31.75
29	31	32	31	31	31	32	32	32	31.5
30	34	35	34	36	35	35	35	36	35
Set Average									32.75
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									36.025
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 8/12/10 and placed in lime water. Tested samples for 91 day Surface Resistivity on 10/20/10. Cylinders were then discarded after this 91 day test.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure BC-8. Surface Resistivity Test Results Reported for Mix #3, Lab #8, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	24	24	24	25	24	24	25	25	24.375
14	24	25	26	26	25	25	26	27	25.5
15	28	26	27	26	27	26	27	26	26.625
Set Average									25.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									28.05
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									76
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					When received placed immediately into lime water bath.				
Any abnormalities, comments, and/or notes.					Core 13    81140 M.L.    6460 psi    44.5 Mpa Core 15    79900 M.L.    6360 psi    43.9 MPa				

**Figure BC-9. Surface Resistivity Test Results Reported for Mix #3, Lab #9, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
8	25.9	26	25.7	27.9	26	25.9	25.7	26.1	26.15
7	26.4	26.1	26.9	26.2	26.6	26.1	26.5	25.8	26.325
9	27.9	26.3	27.4	28.8	27.4	26.4	28.7	29.3	27.775
Set Average									26.75
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									29.425
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BC-10. Surface Resistivity Test Results Reported for Mix #3, Lab #10, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VADOT4	27.6	27.6	27.7	28.2	27.8	28.2	28.2	28.2	27.9375
VADOT5	25.8	25.5	25.6	26.9	26	25.5	25.6	27.2	26.0125
VADOT6	25	26.6	26	25.1	25.1	27.2	26.5	25.5	25.875
Set Average									26.60833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									29.26916667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens					Place in Lime Tank				
Any abnormalities, comments, and/or notes.									



**Figure BC-11. Surface Resistivity Test Results Reported for Mix #3, Lab #11, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
34	23.1	22.6	23.4	23.2	23.8	23.5	23.5	23.2	23.2875
35	23.7	24.9	26.3	25.5	25.6	24.9	26	25	25.2375
36	23	24.1	24.7	24.3	23.4	23.6	24.5	24.9	24.0625
Set Average									24.19583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									26.61541667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BC-12. Surface Resistivity Test Results Reported for Mix #3, Lab #12, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
VADOT-19	20.9	20.5	19.7	21.8	21.3	20.9	20.2	22	20.9
VADOT-20	19.4	21.8	20.5	20.6	19.9	21.5	20.2	20.2	20.5
VADOT-21	19.8	20.2	21.5	18.9	19.7	20.2	21.4	19	20.1
Set Average									20.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.6
Chloride Ion Penetration Type									LOW
					NOON				
Temperature of Room Air (°F)					71				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					68.5				
Curing history specific to your lab once you received the specimens					The specimens arrived on 8/6/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure BC-13. Surface Resistivity Test Results Reported for Mix #3, Lab #13, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	28	27.1	27.6	26.3	27.4	26.6	27.4	26.7	27.1375
17	25.9	26.2	27	26.6	26.3	26.9	27.3	26.4	26.575
18	26.3	26.3	26.3	26.1	26.7	26.1	25.9	26.4	26.2625
Set Average									26.65833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									29.32416667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									63.14
Water Temperature of lime bath (°F)									60.8
Curing history specific to your lab once you received the specimens					curing in lime water for 91 days				
Any abnormalities, comments, and/or notes.					no visible abnormalities				

**Figure BC-14. Surface Resistivity Test Results Reported for Mix #3, Lab #14, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
10	23.6	22.4	22.5	22.7	23.5	21.7	22	22.6	22.625
11	20.4	21.3	21.6	22.1	20.3	21.1	20.3	22.3	21.175
12	22.1	23	22.1	22.7	22.2	23.1	21.7	22.7	22.45
Set Average									22.08333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									24.29167
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				70.1					
Water Temperature of lime bath (°F)				69.2					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

## **Appendix BD**

### **Surface Resistivity Test Results Reported for Mix #4 @ 91 Days**

**Figure BD-1. Surface Resistivity Test Results Reported for Mix #4, Lab #1, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA #4	34.6	34.6	36.0	35.0	34.1	36.1	36.8	34.5	35.2125
PRHTA #5	29.9	32.3	34.8	32.9	30.1	32.2	33.3	32.8	32.2875
PRHTA #6	33.3	31.6	31.4	30.5	33.3	31.9	31.7	31.1	31.8500
Set Average									33.1167
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									36.4283
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BD-2. Surface Resistivity Test Results Reported for Mix #4, Lab #2, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
23	35.2	34.9	35.0	35.5	34.8	34.9	34.9	34.9	35.0
24	36.9	34.0	31.5	34.6	37.0	33.9	31.4	34.3	34.2
46	41.0	37.4	34.3	37.1	41.1	37.2	34.0	37.4	37.4
Set Average									35.6
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									39.1
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									72
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					Specimen # 46 has 1/4" scraping mark along the length of the specimen. It appears to have occurred during demolding of the specimen.				

**Figure BD-3. Surface Resistivity Test Results Reported for Mix #4, Lab #3, @ 91 Days.**

Temp H <sub>2</sub> O: 71f		Temp Air: 74f		Ohms: 23.6k		Scale: 5		Range: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
10/28/2010	16	32.5	31.3	33.7	32.6	31.7	31.4	33.4	32.5	32.39
10/28/2010	17	37.8	32.7	32.1	32.3	32.7	33.1	31.8	32.2	33.09
10/28/2010	18	32.6	35.2	32.7	34.6	33.2	34.7	33.7	34.5	33.90
Set Average										33.13
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										36.44
Penetrability Based on Test										



**Figure BD-4. Surface Resistivity Test Results Reported for Mix #4, Lab #4, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
40	38.1	35.4	36.2	36	30.3	32.9	37.6	32.4	34.8625
41	33.2	35.4	36.7	34.6	32.3	32.2	37.9	33.4	34.4625
42	35.2	40.2	35.9	32.7	32.5	36.9	33.8	34.5	35.2125
Set Average									34.84583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									38.33041667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									63.3
Water Temperature of lime bath (°F)									72.6
Curing history specific to your lab once you received the specimens					Once cylinders were demolded were put on tanks. Cyliders made in our Laboratory				
Any abnormalities, comments, and/or notes.					Cylinder 41 have a noted mark from the demolding procedure. This mark does not count as quadrant to make the test				

**Figure BD-5. Surface Resistivity Test Results Reported for Mix #4, Lab #5, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	31.4	29.6	29.8	31.2	31.2	31.4	29.5	31.9	30.8
38	32.6	32.4	31.2	31.4	32.6	31.2	30.8	30.2	31.6
39	30.3	32.1	31.7	31.7	30.2	32.7	31.7	31.3	31.5
Set Average									31.3
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									34.4
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									67.6
Water Temperature of lime bath (°F)									66.2
Curing history specific to your lab once you received the specimens					Samples were received on 8-18-10, were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No specimen abnormalities were found				

**Figure BD-6. Surface Resistivity Test Results Reported for Mix #4, Lab #6, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA 10	39.3	40	40.6	39.1	36.3	39.8	40.5	38.5	39.2625
PRHTA 11	41.2	39.9	44.1	41.7	40.8	39.5	40.7	41.2	41.1375
PRHTA 12	42	38.2	38.2	39.2	41.3	38.1	38	38.6	39.2
Set Average									39.86666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									43.85333333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Received on August 19th, immediately put in lime water. Run tests at 28 and 56 days, replaced in saturated lime water. Tested for 91-day test on 28 OCT, at 6.30 pm ET.				
Any abnormalities, comments, and/or notes.					a=1.5				

**Figure BD-7. Surface Resistivity Test Results Reported for Mix #4, Lab #7, @ 91 Days.**

Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	47	45	45	44	47	44	45	44	45.125
20	41	41	44	41	41	41	44	41	41.75
21	41	46	41	43	40	43	42	44	42.5
Set Average									43.125
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									47.4375
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens					Samples received on 8/19/10 and placed in lime water. Tested samples for 91 day Surface Resistivity on 10/28/10. Cylinders were discarded after this 91 day test.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure BD-8. Surface Resistivity Test Results Reported for Mix #4, Lab #8, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
7	34	35	34	33	34	35	34	33	34
9	35	33	35	34	36	33	34	34	34.25
43	37	37	36	37	38	37	36	37	36.875
Set Average									35.04166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									38.54583333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				76					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					Core 7 83210 M.L. 6620 psi 45.6 MPa Core 43 83290 M.L. 6630 psi 45.7 MPa				
Any abnormalities, comments, and/or notes.									

**Figure BD-9. Surface Resistivity Test Results Reported for Mix #4, Lab #9, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
15	37.2	38.9	40.6	38.3	36.8	39.8	41.3	38.4	38.9125
44	36.1	37.8	39	36.4	36.7	37.6	40	36.4	37.5
45	33.6	34.8	34.2	33.3	33.3	36	33.5	34.1	34.1
Set Average									36.8375
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									40.52125
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				73.4					
Water Temperature of lime bath (°F)				73.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BD-10. Surface Resistivity Test Results Reported for Mix #4, Lab #10, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA49	36.9	37	36.8	37	36.7	37.7	37.5	36.7	37.0375
PRHTA50	37.5	36.2	37.1	37.6	37.5	36.4	36	36.9	36.9
PRHTA51	37.1	37.1	39.5	38.9	37.2	37.1	39.5	38.3	38.0875
Set Average									37.34166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									41.07583333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Place in Lime Tank				
Any abnormalities, comments, and/or notes.									

**Figure BD-11. Surface Resistivity Test Results Reported for Mix #4, Lab #11, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
34	33.4	34.9	32.1	32.9	33.2	33.6	32.4	32.9	33.175
52	34.8	35.9	34.4	36.9	35	37.2	34.1	37.2	35.6875
53	35	35.3	34.4	36.7	34.3	37.5	34	39	35.775
Set Average									34.87916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									38.36708333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure BD-12. Surface Resistivity Test Results Reported for Mix #4, Lab #12, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA-1	27.3	27.3	27.5	29.7	28.8	28	27.8	30.5	28.4
PRHTA-2	27.1	27.1	28.6	27.1	28.3	29.5	30.7	30	28.6
PRHTA-3	27.9	27.3	27.8	27.4	28.6	27.8	29.1	29.2	28.1
Set Average									28.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									31.2
Chloride Ion Penetration Type									LOW
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)					N/A				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					N/A				
Curing history specific to your lab once you received the specimens					The specimens arrived on 8/19/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure BD-13. Surface Resistivity Test Results Reported for Mix #4, Lab #13, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
26	31.2	31.4	30.4	30.2	30.1	30.3	30.3	30.8	30.5875
47	34.9	33.4	32.7	33	33.8	33	32.1	32.3	33.15
48	30.1	32.2	30.9	30.7	30.1	32.2	30.8	30.9	30.9875
Set Average									31.575
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									34.7325
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									60.8
Water Temperature of lime bath (°F)									59.9
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									sample tested on Nov. 28, 2010h

**Figure BD-14. Surface Resistivity Test Results Reported for Mix #4, Lab #14, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
PRHTA 28	33.9	32.4	32.8	33.4	34.2	32.5	32.9	33.5	33.2
PRHTA 29	34	32.5	32.6	31.6	34.3	32	37.4	32	33.3
PRHTA 30	34.7	32.9	33.2	33.4	34.6	33.1	33.2	33.4	33.5625
Set Average									33.35417
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									36.68958
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				69					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix BE**

## **Surface Resistivity Test Results Reported for Mix #5 @ 91 Days**

**Figure BE-1. Surface Resistivity Test Results Reported for Mix #5, Lab #1, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC #10	20.1	20.1	20.7	21.3	20.1	19.8	20.9	21.4	20.5500
GC #11	20.4	18.8	21.2	22	20.1	18.8	21.2	22	20.5625
GC #12	21.2	22	20	20.2	21	21.8	19.9	20.2	20.7875
Set Average									20.6333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.6967
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BE-2. Surface Resistivity Test Results Reported for Mix #5, Lab #2, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GS13	27.1	27.1	26.7	26.8	26.9	27	26.5	26.6	26.8
GS14	22.3	22.9	20.2	25.6	22	24.7	20.2	25.2	22.9
GS15	22	24.4	25.8	24.5	22	24.7	25.3	24.7	24.2
Set Average									24.6
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									27.1
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure BE-3. Surface Resistivity Test Results Reported for Mix #5, Lab #3, @ 91 Days.**

Temp H <sub>2</sub> O: 72f		Temp Air: 74f		Ohms: 23.7k		Range: 4		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
11/3/2010	19	19.6	18.9	19.2	19.3	18.4	19.5	19	19.1	19.13
11/3/2010	20	18.8	18.2	18.3	19.2	18.5	18.2	18.6	18.9	18.59
11/3/2010	21	17.9	19.1	18.2	18.1	18.2	19.2	18.9	18.9	18.56
Set Average										18.76
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										20.63
Penetrability Based on Test										

**Figure BE-4. Surface Resistivity Test Results Reported for Mix #5, Lab #4, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
55	23.9	19.2	20.4	25.9	27.6	20.9	21.6	24.9	23.05
56	28.9	18.6	17.4	20.3	28.6	18.2	18.1	24.9	21.875
57	21.3	20.6	20.2	24.7	21.7	22.4	20.1	23.3	21.8
Set Average									22.24166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									24.46583333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				68.2					
Water Temperature of lime bath (°F)				75.2					
Curing history specific to your lab once you received the specimens					Once cylinders were demolded were put on tanks. Cylinders made in our Laboratory by Carmelo Group Crew. Curing in our Tanks, but the rest were moved at his Facilities.				
Any abnormalities, comments, and/or notes.					Due to Hurricane Earl, our facilities have problems with the electricity and the air conditioner in the tanks room fails. The system were fixed today and in one point of the day (yesterday for two hours) the tank arrive 25.2 °F (.2°F over specified)				



**Figure BE-5. Surface Resistivity Test Results Reported for Mix #5, Lab #5, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC-1	19.8	19.4	20.5	20.8	20.4	19.5	21.4	21.6	20.425
GC-2	20.8	19.1	19.8	20.5	21.4	18.9	19.9	20.2	20.075
GC-3	19.4	20.8	20.5	21.1	20.5	21.4	20.5	21.4	20.7
Set Average									20.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.44
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					lime Water				
Any abnormalities, comments, and/or notes.									

**Figure BE-6. Surface Resistivity Test Results Reported for Mix #5, Lab #6, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC 16	21.8	19.3	23.7	21.9	23.2	18.9	23.6	21.3	21.7125
GC 17	22.2	20.2	21.3	22	22	20.2	21.3	22.6	21.475
GC 18	19.3	20.2	19.6	21	19	20.2	19.6	21	19.9875
Set Average									21.05833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									23.16416667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Received 8/26, immediately put into lime water. Maintained in lime water until testing at 28-d and again at 56-d. Measurement of 91-d on 3 NOV at 4:30PM				
Any abnormalities, comments, and/or notes.					a = 1.5"				

**Figure BE-7. Surface Resistivity Test Results Reported for Mix #5, Lab #7, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	29	28	28	27	31	29	28	27	28.375
29	26	28	28	26	26	27	28	27	27
30	25	27	27	29	25	27	28	29	27.125
Set Average									27.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									30.25
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 8/26/10 and placed in lime water. Tested samples for 91 day Surface Resistivity on 11/03/10. Cylinders were discarded after this 91 day test.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure BE-8. Surface Resistivity Test Results Reported for Mix #5, Lab #8, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	22.8	23	22.2	23.8	22.2	23.3	22.6	23.5	22.925
26	21.2	21.9	21.8	22.6	20.2	21.9	21.6	23.5	21.8375
27	20.8	23.1	20.3	20.8	21.5	23	21.6	21.9	21.625
Set Average									22.12916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									24.34208333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									76
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Core 25 83140 M.L. 6620 psi 45.6 Mpa				
					Core 26 83160 M.L. 6620 psi 45.6 Mpa				
Any abnormalities, comments, and/or notes.									

**Figure BE-9. Surface Resistivity Test Results Reported for Mix #5, Lab #9, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
23	22.1	22.8	22.2	20.3	20.6	22.1	22.4	21.2	21.7125
24	21.5	22	18.4	21.4	19.4	22.6	18.2	21.6	20.6375
22	19.9	20.5	22.1	21.4	19.9	21.7	22.4	22.1	21.25
Set Average									21.2
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									23.32
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				73.2					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BE-10. Surface Resistivity Test Results Reported for Mix #5, Lab #10, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC-1	19.8	19.4	20.5	20.8	20.4	19.5	21.4	21.6	20.425
GC-2	20.8	19.1	19.8	20.5	21.4	18.9	19.9	20.2	20.075
GC-3	19.4	20.8	20.5	21.1	20.5	21.4	20.5	21.4	20.7
Set Average									20.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.44
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens					lime Water				
Any abnormalities, comments, and/or notes.									

**Figure BE-11. Surface Resistivity Test Results Reported for Mix #5, Lab #11, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
4	20.8	21.5	19.3	20.9	20.6	21.3	19.4	20.7	20.5625
5	20.4	19	20.4	19.4	20.7	19.7	19.9	19.8	19.9125
6	19.8	20.4	20.3	20	20.2	20.4	20.3	20.2	20.2
Set Average									20.225
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									22.2475
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BE-12. Surface Resistivity Test Results Reported for Mix #5, Lab #12, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GRUPO-31	19.3	18.2	18.7	18.5	19.6	18.7	19.1	19	18.9
GRUPO-32	18.3	17.8	18.5	18.3	18.9	18	18.8	18.8	18.4
GRUPO-33	18.6	19	20.1	19.6	18.8	19.7	20.6	19.5	19.5
Set Average									18.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									20.8
Chloride Ion Penetration Type									MODERATE
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)					n/a				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					n/a				
Curing history specific to your lab once you received the specimens					The specimens arrived on 8/26/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									



**Figure BE-13. Surface Resistivity Test Results Reported for Mix #5, Lab #13, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
34	23	23	23.6	21.5	22.9	23	23.6	21.9	22.8125
35	23.4	23.7	24.7	22.9	23.9	22.8	24.4	23.3	23.6375
36	20.9	23	22.4	24.3	20.1	22.6	21.8	24.3	22.425
Set Average									22.95833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									25.25416667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									59.9
Water Temperature of lime bath (°F)									57.2
Curing history specific to your lab once you received the specimens					Samples were put in lime water on Aug 26th, 2010				
Any abnormalities, comments, and/or notes.					No visible abnormalities, tested on November 3rd, 2010				

**Figure BE-14. Surface Resistivity Test Results Reported for Mix #5, Lab #14, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
GC-7	19	19	18.8	19.6	18.6	19.1	18.7	19.5	19.0375
GC-8	19	19.1	18.7	20.2	19	18.9	18.4	19.8	19.1375
GC-9	17.7	16.7	17.5	17.8	17.7	16.6	17.8	18	17.475
Set Average									18.55
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									20.405
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				69.3					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

## **Appendix BF**

### **Surface Resistivity Test Results Reported for Mix #6 @ 91 Days**

**Figure BF-1. Surface Resistivity Test Results Reported for Mix #6, Lab #1, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
IN #1	13.6	14.7	13.3	12.9	13.7	14.8	13.2	13.2	13.7
IN #2	13.1	12.9	13.1	13.6	13.1	12.9	13.3	13.9	13.2
IN #3	12.7	12.5	13.8	13.9	12.6	12.5	13.9	14.1	13.3
Set Average									13.3875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.7263
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									72
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									
Note:									
1. Temperature reading must be between 68-77 °F									
2. Initial resistivity reading must be between 47.9-48.4 kohm per cm									

**Figure BF-2. Surface Resistivity Test Results Reported for Mix #6, Lab #2, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	13.6	14.1	14.3	14.3	13.6	14	14.3	14.3	14.1
14	13.6	13.6	12.5	14.0	13.7	13.6	12.5	14.0	13.4
15	13.5	13.4	13.4	14	13.6	13.4	13.3	13.9	13.6
Set Average									13.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.1
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									71
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					None				

**Figure BF-3. Surface Resistivity Test Results Reported for Mix #6, Lab #3, @ 91 Days.**

Temp H <sub>2</sub> O: 71f		Temp Air: 73f		Ohms: 24k		Range: 3		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
11/30/2010	34	12.41	11.41	13.06	12.77	12.46	11.66	13.00	12.35	12.39
11/30/2010	35	12.93	13.2	13.27	13.9	13.41	12.92	13.4	14.29	13.42
11/30/2010	36	11.46	13.59	12.56	13.17	11.52	13.51	12.78	12.91	12.69
Set Average										12.83
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										14.11
Penetrability Based on Test										

**Figure BF-4. Surface Resistivity Test Results Reported for Mix #6, Lab #4, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
31	12.7	13.2	13.4	14	13.4	13.2	13.3	13	13.275
32	16	14.6	13.9	15.1	17.3	15.9	15	15.5	15.4125
33	13.3	15.8	12.5	13.1	12.8	15.5	13.2	14	13.8
Set Average									14.1625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.57875
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									64.6
Water Temperature of lime bath (°F)									72
Curing history specific to your lab once you received the specimens					Once cylinders were received were put on tanks.				
Any abnormalities, comments, and/or notes.					No comments				

**Figure BF-5. Surface Resistivity Test Results Reported for Mix #6, Lab #5, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
IN 19	16.2	15.7	15	14.8	16.7	15.7	15	15.2	15.5
IN 20	15.6	15.1	16.2	14.6	15.3	15.12	14.8	15.3	15.3
IN 21	15.7	15.2	15.6	15	15.2	15	16	16.4	15.5
Set Average									15.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									17.0
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				64.8					
Water Temperature of lime bath (°F)				63.7					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure BF-6. Surface Resistivity Test Results Reported for Mix #6, Lab #6, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
IN-46	15	14.5	13.3	14.4	15	14.6	13.3	14.1	14.275
IN-47	16.8	15	15.7	14.5	16.7	14.5	16	15.2	15.55
IN-48	13.1	13.3	12.8	13.4	13.2	13.4	12.9	12.8	13.1125
Set Average									14.3125
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									15.74375
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples casted on 31 AUG. Demolded at 2 days, put into lime water. Samples were kept in lime water and tested at 28 and 56 day. On Nov 30, 4:15 PM, 3 samples were tested for resistivity and tested in Compression.				
Any abnormalities, comments, and/or notes.					a=1.5"				
Perfromed on 11/30, 4:30 PM, mwh									
	Cyl	P(lb)	fc (psi)						
	IN-46	79,125	6,295						
	IN-47	80,490	6,405						
	IN-48	73,125	5,820						

**Figure BF-7. Surface Resistivity Test Results Reported for Mix #6, Lab #7, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	14.4	14.7	14.9	14.6	14.4	15.3	14.7	14.6	14.7
29	16	17	15	15.7	16.2	16.7	15.8	15.7	16.0125
30	15.1	14.9	14.3	14.3	15.5	14.7	14.3	14.1	14.65
Set Average									15.12083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									16.63291667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples received on 9/23/10 and placed in lime water. Tested samples for 91 day Surface Resistivity on 11/30/10. Cylinders were discarded after this 91 day test.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing				

**Figure BF-8. Surface Resistivity Test Results Reported for Mix #6, Lab #8, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	12.5	12.5	11.8	12.5	12.6	12.6	11.7	12.5	12.3375
26	13.4	13.3	13.5	14.1	13.4	13.5	13.7	13.8	13.5875
27	12.8	12.3	12.1	13.2	12.3	12.9	12.2	13.3	12.6375
Set Average									12.85416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.13958333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									76
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					Core 25    75480 M.L.    6130 psi    41.4 Mpa Core 26    75480 M.L.    6010 psi    42.3 MPa				

**Figure BF-9. Surface Resistivity Test Results Reported for Mix #6, Lab #9, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
7	14	13	13.7	13.4	13.6	12.9	13.7	13.5	13.475
9	14.3	13.6	13.1	13.1	13.8	14.2	13.1	13.1	13.5375
8	12.9	13.8	14.3	13.4	12.9	13.8	14.1	13.7	13.6125
Set Average									13.54166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.89583333
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BF-10. Surface Resistivity Test Results Reported for Mix #6, Lab #10, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
INDOT 4	13.9	13.3	13.2	11.8	12.9	12.9	13.3	11.8	12.8875
INDOT 5	12.6	11.9	13.9	12.4	12.7	12.3	14.2	12.5	12.8125
INDOT 6	12.7	13.7	13.3	13	12.8	13.6	13.4	13.5	13.25
Set Average									12.98333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.28166667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Place in Lime Tank				
Any abnormalities, comments, and/or notes.									

**Figure BF-11. Surface Resistivity Test Results Reported for Mix #6, Lab #11, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	11.2	10.3	11.5	11.6	11.3	10.6	11.7	11.9	11.2625
38	11.8	10.4	10.2	11.9	11.6	10.6	11.1	12.2	11.225
39	10	10.9	10.7	11	10.2	10.3	10.8	11	10.6125
Set Average									11.03333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									12.13666667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BF-12. Surface Resistivity Test Results Reported for Mix #6, Lab #12, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
INDOT - 16	12.6	13	12.9	11.6	12.8	12.8	13	11.7	12.6
INDOT - 17	12.4	13.2	12.1	11.9	12.3	13.3	12.3	12.1	12.5
INDOT - 18	11.7	12.9	12.7	13.6	11.7	13.2	12.9	13.6	12.8
Set Average									12.6
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.9
Chloride Ion Penetration Type									MODERATE
					NOON				
Temperature of Room Air (°F)					n/a				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					n/a				
Curing history specific to your lab once you received the specimens					The specimens arrived on 9/22/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure BF-13. Surface Resistivity Test Results Reported for Mix #6, Lab #13, @ 91 Days.**

Sample #	h								Average
	0°	90°	180°	270°	0°	90°	180°	270°	
22	11.8	11.7	12.2	13.2	11.8	11.6	12.6	13.2	12.2625
23	12.3	12.3	12.1	12.6	12.7	12.7	12.1	12.3	12.3875
24	12.6	11.9	12.8	11.1	12.3	12.2	12.7	11.4	12.125
Set Average									12.25833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									13.48416667
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)				69.8					
Water Temperature of lime bath (°F)				72.5					
Curing history specific to your lab once you received the specimens					Tested on November 30th, 2010				
Any abnormalities, comments, and/or notes.									



**Figure BF-14. Surface Resistivity Test Results Reported for Mix #6, Lab #14, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
IN-10	12	14.8	12.2	13.5	12.2	14.6	12.4	13.6	13.1625
IN-11	14.4	14.3	14.1	13.7	14.8	14.3	14.5	13.5	14.2
IN-12	12.7	14.2	13	11.9	13	13.8	14	11.8	13.05
Set Average									13.47083
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									14.81792
Chloride Ion Penetration Type									MODERATE
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix BG**

## **Surface Resistivity Test Results Reported for Mix #7 @ 91 Days**

**Figure BG-1. Surface Resistivity Test Results Reported for Mix #7, Lab #1, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NY HK165	73.5	76	72.3	76.2	73.4	76.9	70.9	75.9	74.3875
NY HK166	60.9	65.4	60.1	65.9	63.7	65.8	62	64.7	63.5625
NY HK167	66.3	64.3	66.3	65.3	66.9	63.5	66.5	65.5	65.5750
Set Average									67.8417
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									74.6258
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BG-2. Surface Resistivity Test Results Reported for Mix #7, Lab #2, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
HK 177	63.4	67.1	66.1	71.1	64.4	64.5	66.9	70.9	67
HK 178	64.1	65.3	61.1	59.9	66.5	65.4	62.3	60.5	63
HK 179	76	65.7	72.8	67.5	76.7	72.3	71.9	67.2	71
Set Average									67
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									74
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure BG-3. Surface Resistivity Test Results Reported for Mix #7, Lab #3, @ 91 Days.**

Temp H <sub>2</sub> O: 72f		Temp Air: 74f		Ohms: 24.0k		Range: 4		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
12/7/2010	201	69.1	67.4	66.0	64.5	72.4	66.6	65.4	65.5	67.11
12/7/2010	202	68.1	67.8	64.9	67.6	67.7	68.7	67.3	67.4	67.44
12/7/2010	203	61.7	62.2	66.5	68.7	60.4	62.7	66.4	71.9	65.06
Set Average										66.54
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										73.19
Penetrability Based on Test										

**Figure BG-4. Surface Resistivity Test Results Reported for Mix #7, Lab #4, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
195	70.5	59.2	61.7	75.9	85.4	66.7	63	71.6	69.25
196	77.8	68.6	56.9	70.8	64	66.4	57.8	71.3	66.7
197	63	44.9	43.6	58.4	63	59.8	47.3	57.4	47.3
Set Average									61.08333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									67.19166667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				62.2					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens					Samples once were received were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No Comments				

**Figure BG-5. Surface Resistivity Test Results Reported for Mix #7, Lab #5, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
HK183	69.2	59.7	68.7	62.7	68.4	63.1	71.4	66.2	66.2
HK184	61.7	71.7	66.5	67.2	61.6	69.6	66.7	68.1	66.6
HK185	59.4	63.9	60.7	55.1	60.8	61.9	60.2	54.2	59.5
Set Average									64.1
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									70.5
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				66.7					
Water Temperature of lime bath (°F)				64.3					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BG-6. Surface Resistivity Test Results Reported for Mix #7, Lab #6, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NY HK186	56.6	57.7	62.2	58.9	55.6	57.7	62.2	59.1	58.75
NY HK187	57.9	61.4	59.9	54.8	59.4	60.3	57.7	56.1	58.4375
NY HK188	59.1	53.9	53.7	60.6	58.2	54.1	59.8	59.5	57.3625
Set Average									58.18333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									64.00166667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens					Received on 9/30/10, put in lime water. Run test at 28 and 56 day. Test at 91 d tested on 7/DEC at 4.00 pm ET.				
Any abnormalities, comments, and/or notes.					a=1.5				



**Figure BG-7. Surface Resistivity Test Results Reported for Mix #7, Lab #7, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
162	94.2	83.4	81.6	80.6	94.2	85.5	80.2	79.9	84.95
163	79.5	76.5	74.6	83	81.7	76.1	74.6	82.3	78.5375
164	84.1	77.7	76.8	74.7	83.6	76.5	74.6	76.2	78.025
Set Average									80.50416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									88.55458333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples placed in lime water on 9/9/10. Tested samples for 91 day Surface Resistivity on 12/07/10. Then cylinders were broken for compressive strength.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing. Concrete had 91 day compressive strength of 7170, 7710, & 7400 psi				

**Figure BG-8. Surface Resistivity Test Results Reported for Mix #7, Lab #8, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
HK 192	66.7	66.9	66.8	61.3	65.9	67.7	67.2	63.2	65.7125
HK 193	75.5	71	73.6	73.2	74.7	70.8	76.3	72	73.3875
HK 194	57.3	64.3	65.4	65.4	56.1	63.8	65.5	65.8	62.95
Set Average									67.35
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									74.085
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									70
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					91 Days				
Any abnormalities, comments, and/or notes.					ML - 94640 7531 psi 51.9 Mpa ML - 94730 7538 psi 52.0 Mpa				

**Figure BG-9. Surface Resistivity Test Results Reported for Mix #7, Lab #9, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
171	68	71.8	67	76	67.9	75.9	68.5	72.9	71
172	72	70.2	61.8	66.6	72.5	69	61	66	67.3875
173	74.9	71.4	70.2	75.3	76.2	71.1	71.7	75.8	73.325
Set Average									70.57083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									77.62791667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				72.5					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BG-10. Surface Resistivity Test Results Reported for Mix #7, Lab #10, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NYSDOT168	70.1	76.1	73.9	64.7	69.1	76.3	74.4	65.5	71.2625
NYSDOT169	64.2	72	67.5	64.1	65.4	70	67.7	62.5	66.675
NYSDOT170	71.6	67.9	72.3	65.7	68.2	69.3	72.4	65.6	69.125
Set Average									69.02083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									75.92291667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

**Figure BG-11. Surface Resistivity Test Results Reported for Mix #7, Lab #11, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
198	76.4	73.2	79.1	80.5	76.8	74.6	74.4	81.6	77.075
199	71.8	62.8	69.2	62.6	72.7	66	69.7	64.9	67.4625
200	63	78.2	72.4	72.0	63.6	78.8	72.2	72.5	71.5875
Set Average									72.04166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									79.24583333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BG-12. Surface Resistivity Test Results Reported for Mix #7, Lab #12, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NYDOT - 180	52.1	52.2	52.8	59	54.8	52.8	55	59.6	54.8
NYDOT - 181	49.8	53.7	54.9	57.8	52	57.6	55.7	58.9	55.1
NYDOT - 182	61.4	62.5	60.1	65.9	64.2	64.6	60.4	69	63.5
Set Average									57.8
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									63.6
Chloride Ion Penetration Type									VERY LOW
					NOON				
Temperature of Room Air (°F)					68				
Temperature of Ca(OH) <sub>2</sub> Solution (°F)					67				
Curing history specific to your lab once you received the specimens					The specimens arrived on 10/30/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure BG-13. Surface Resistivity Test Results Reported for Mix #7, Lab #13, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BG-14. Surface Resistivity Test Results Reported for Mix #7, Lab #14, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
HK174	55.9	61.6	59.1	62.3	55.8	62.4	64.7	62	60.475
HK175	55.2	54.1	55.9	59.5	55.1	52.6	54.7	59.9	55.875
HK176	56.4	57.7	60.3	59.2	57.5	59.1	60.9	59.9	58.875
Set Average									58.40833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									64.24916667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				69					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



# **Appendix BH**

## **Surface Resistivity Test Results Reported for Mix #8 @ 91 Days**

**Figure BH-1. Surface Resistivity Test Results Reported for Mix #8, Lab #1, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NEDOT 31	80.6	66	75.3	79.6	80.8	73.5	74.4	79.6	76.2250
NEDOT 32	89.4	81	75.2	81.1	89.8	81.1	77.7	81.4	82.0875
NEDOT 33	76	75.1	74.6	75.2	79.3	76	76.3	75.9	76.0500
Set Average									78.1208
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									85.9329
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BH-2. Surface Resistivity Test Results Reported for Mix #8, Lab #2, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	75.4	73.2	75.4	73.2	76	73.4	75.8	73.5	74.5
17	78.4	77.4	76.5	77.4	78.2	77.4	76.8	77.5	77.5
18	75.3	75.2	74.2	75.5	75.5	75.2	73.7	75.7	75.0
Set Average									75.7
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									83.2
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure BH-3. Surface Resistivity Test Results Reported for Mix #8, Lab #3, @ 91 Days.**

Temp H <sub>2</sub> O: 71f		Temp Air: 74f		Ohms: 25.1k		Range: 4		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
1/4/2011	34	79.8	79.5	84.2	84.1	76.6	79.7	83.3	83.1	81.29
1/4/2011	35	75.1	77	75.2	75.9	76.3	76.7	74.6	76.7	75.94
1/4/2011	36	87.2	84.8	83.9	79.3	83.7	85.5	85.6	80.3	83.79
Set Average										80.34
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										88.37
Penetrability Based on Test										

**Figure BH-4. Surface Resistivity Test Results Reported for Mix #8, Lab #4, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	71.5	68.4	66	72.7	70.3	64.7	66.5	73.6	69.2125
20	73.5	65.4	68.4	62.9	70.8	67.4	68.7	66.7	67.975
21	71.9	74.5	69.1	71.7	67	74	66.2	70.9	70.6625
Set Average									69.28333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									76.21166667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									62.1
Water Temperature of lime bath (°F)									72.1
Curing history specific to your lab once you received the specimens					Cylinders once received were put on lime water after test				
Any abnormalities, comments, and/or notes.					No Comments				

**Figure BH-5. Surface Resistivity Test Results Reported for Mix #8, Lab #5, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NE 7	83.8	80.3	75.6	72.6	78.8	81.0	76.4	73.0	77.7
NE 8	77.3	67.2	67.2	66.9	76.8	67.8	69.7	71.7	70.6
NE 9	70.6	76.3	76.2	76.2	69.1	74.3	72.3	76.5	73.9
Set Average									74.1
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									81.5
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				66.4					
Water Temperature of lime bath (°F)				64.2					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BH-6. Surface Resistivity Test Results Reported for Mix #8, Lab #6, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
37	59.8	60.4	57.6	56.4	60	60.4	57.7	57.3	58.7
38	62.3	60.1	59	57.7	60.3	62.9	58.8	59.3	60.05
39	59.3	59.6	60.3	60.7	59.6	59.7	61.4	60.5	60.1375
Set Average									59.62916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									65.59208333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									74
Air Temperature of testing room (°F)									74
Curing history specific to your lab once you received the specimens					Received on October 29, put in lime the following day. Ran tests at 28 and 56d, and immediately replaced into lime water. Tested at 91 days on Dec 27, at 8.30 am ET.				
Any abnormalities, comments, and/or notes.					a = 1.5 inches				

**Figure BH-7. Surface Resistivity Test Results Reported for Mix #8, Lab #7, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	76.1	74.4	73.7	75.9	76.9	72.8	75.9	74.6	75.0375
26	75.2	71.1	75.7	72.3	74.3	72.5	72.6	73.5	73.4
27	72.7	72	75.2	77.7	76	75.3	78.1	77.8	75.6
Set Average									74.67916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									82.14708333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 10/28/10 and placed in lime water. Tested samples for 91 day Surface Resistivity using the Resipod compact meter on 1/03/11. Cylinders were discarded after the 91 day test.				
Any abnormalities, comments, and/or notes.					Received the Resipod compact meter on 10/12/10. Ed McGaffin performed the Surface Resistivity testing.				



**Figure BH-8. Surface Resistivity Test Results Reported for Mix #8, Lab #8, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
40	90.8	88.7	89.8	86.3	91.1	91.5	90.2	86.7	89.3875
41	84.4	82.6	83.6	85.8	86.7	83.9	86.9	87.1	85.125
42	78.6	80.9	78.8	74.2	80.5	82.1	79.2	74.2	78.5625
Set Average									84.35833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									92.79416667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BH-9. Surface Resistivity Test Results Reported for Mix #8, Lab #9, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
23	80.6	81.9	82.5	79.1	81.8	80.6	82.7	78.7	80.9875
22	84.7	80.3	83.9	85.6	84.6	79.7	81.8	84.3	83.1125
24	79.5	80	77.5	81.2	79.4	80.4	79.3	81.6	79.8625
Set Average									81.32083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									89.45291667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				73.3					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BH-10. Surface Resistivity Test Results Reported for Mix #8, Lab #10, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NEDOT10	74.3	68.4	66.1	68	71.7	67.8	66.8	68.8	68.9875
NEDOT11	70	74.7	71	70.1	69.2	74.6	70.4	69.8	71.225
NEDOT12	75.5	71.9	77.9	74.6	78.3	73.1	78.5	73.1	75.3625
Set Average									71.85833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									79.04416667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									72
Water Temperature of lime bath (°F)									71
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.					92 day test - Company holiday on 1/3/11				

**Figure BH-11. Surface Resistivity Test Results Reported for Mix #8, Lab #11, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	65.3	74.5	78.1	66.3	63.6	74.4	79	69.3	71.3125
14	64.9	77.4	59.4	62	72.5	70.1	70.8	61.4	67.3125
15	62.9	69.9	68.8	65.5	65.3	72.8	68.1	66.3	67.45
Set Average									68.69166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									75.56083333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BH-12. Surface Resistivity Test Results Reported for Mix #8, Lab #12, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
NEDOT 28	50	51.1	58.1	53.8	50.2	55.8	58.1	58.5	54.45
NEDOT 29	51.2	45.9	51.3	54.4	56.2	50.1	55.7	53.8	52.325
NEDOT 30	45.9	45.7	50.3	56.1	51	51	48.9	59.2	51.0125
58.1									52.59583333
51.3									1.1
50.3									57.85541667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				71					
Curing history specific to your lab once you received the specimens					The specimens arrived on 10/26/2010 (noon) and were immediately removed from the shipping package and the specimens were then placed into fully saturated Ca(OH) <sub>2</sub> solution for curing. Upon arrival specimens were fully hydrated and remained to be during the transition into curing tank.				
Any abnormalities, comments, and/or notes.									

**Figure BH-13. Surface Resistivity Test Results Reported for Mix #8, Lab #13, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BH-14. Surface Resistivity Test Results Reported for Mix #8, Lab #14, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
1	64	72	68	67	65	73	67	67	67.875
2	62	60	63	63	61	60	61	62	61.5
3	64	61	62	64	63	62	64	65	63.125
Set Average									64.1666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									70.5833333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

## **Appendix BJ**

### **Surface Resistivity Test Results Reported for Mix #9 @ 91 Days**



**Figure BJ-1. Surface Resistivity Test Results Reported for Mix #9, Lab #1, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CDOT 29	35.7	37.6	34.9	35.3	36.9	41.4	37.1	33.8	36.5875
CDOT 39	32.8	33.8	37.6	36.3	32.9	33.5	36.2	39.1	35.275
CDOT 41	36.5	33.3	34.2	31.4	36	34.2	34.8	32.6	34.125
Set Average									35.3292
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									38.8621
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BJ-2. Surface Resistivity Test Results Reported for Mix #9, Lab #2, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
30	33.8	33.2	33.6	34.5	33.9	33.1	33.2	34.6	33.7
35	35.1	35.4	34.6	36.6	36	34	34.7	37	35.4
38	36.6	35	36.5	36.1	36.9	35.3	36.4	36	36.1
Set Average									35.1
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									38.6
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				

**Figure BJ-3. Surface Resistivity Test Results Reported for Mix #9, Lab #3, @ 91 Days.**

Temp H <sub>2</sub> O: 73f		Temp Air: 75f		Ohms: 24.6k		Scale: 4		Range: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
1/19/2011	4	33.5	34.2	33.2	33.4	33.6	35.8	36.3	33.3	34.16
1/19/2011	12	34.6	33.8	33	31.2	34.2	34.7	33.1	31.4	33.25
1/19/2011	25	30.9	32.8	31.9	32.8	32.6	34.3	32.4	33.4	32.64
Set Average										33.35
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										36.69
Penetrability Based on Test										

**Figure BJ-4. Surface Resistivity Test Results Reported for Mix #9, Lab #4, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #			180°	270°	0°	90°	180°	270°	Average
2	38.6	35.7	36.5	40.1	34.7	36.9	39.4	35.7	37.2
5	34.1	38.1	40	37.6	39.9	38.8	37.4	40.3	38.275
46	33	36.5	35.8	32.9	34.8	34.7	31.7	32.8	34
Set Average									36.49166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									40.14083333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									71.2
Water Temperature of lime bath (°F)									73.1
Curing history specific to your lab once you received the specimens					Samples once received were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.					No Abnormalities on the cylinders were found				

**Figure BJ-5. Surface Resistivity Test Results Reported for Mix #9, Lab #5, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
cdot 40	34.9	32.4	35.2	31.5	35.0	32.1	35.6	30.3	33.4
cdot 45	35.4	34.5	34.8	35.5	35.6	34.8	32.8	35.0	34.8
cdot 48	33.1	30.3	32.5	32.3	33.3	32.5	33.3	32.4	32.5
Set Average									33.5
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									36.9
Chloride Ion Penetration Type									LOW

Air Temperature of testing room (°F):	66.2
Water Temperature of lime bath (°F):	67.4
Curing history specific to your lab once you received the specimens	
Any abnormalities, comments, and/or notes.	

**Figure BJ-6. Surface Resistivity Test Results Reported for Mix #9, Lab #6, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CO 21	30.2	32	32.3	28.5	29.7	30.5	30.7	25.6	29.9375
CO 22	29.3	30	30.8	30.6	28.5	28.6	32.3	30.3	30.05
CO 32	30.3	31.8	28.8	30.6	30.6	31.8	28.5	30	30.3
Set Average									30.09583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									33.10541667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Immediately put into lime water, tested at 91 day on 18/JAN at 4:30 PM				
Any abnormalities, comments, and/or notes.					a=1.5"				

**Figure BJ-7. Surface Resistivity Test Results Reported for Mix #9, Lab #7, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
3	43.3	42.2	41.6	40.6	43.3	42.3	41.7	41.2	42.025
7	41	39.2	42.4	43.4	40	40.1	40.7	42	41.1
10	43.1	38.2	40.4	42.8	44	40.2	41.8	43.8	41.7875
Set Average									41.6375
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									45.80125
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens					Samples received on 11/12/10 and placed in lime water. Tested samples for 91 day Surface Resistivity on 01/18/11. Cylinders were discarded after this 91 day test.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure BJ-8. Surface Resistivity Test Results Reported for Mix #9, Lab #8, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
27	33.3	32	32.2	31.3	33.5	32.3	32.4	31.3	32.2875
37	32.9	34.9	33.8	34.1	34	34.5	34.2	33.8	34.025
44	34.6	35.8	35.7	34.3	35.7	36.3	35.9	34.9	35.4
Set Average									33.90416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									37.29458333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									72
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					Core 27    71880M.L.    5720 Psi    39.4 MPa Core 44    69900M.L.    5560 Psi    38.3 MPa				



**Figure BJ-9. Surface Resistivity Test Results Reported for Mix #9, Lab #9, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
43	34.2	37.6	34.2	33.9	35.2	37.3	35.4	33.1	35.1125
31	32.2	35.6	37	36	33.9	35.8	37.4	35.8	35.4625
47	39.3	34.7	33.3	36.1	39.8	35.9	33.7	35.9	36.0875
Set Average									35.55416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									39.10958333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				71.3					
Water Temperature of lime bath (°F)				73.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BJ-10. Surface Resistivity Test Results Reported for Mix #9, Lab #10, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CODOT23	35.7	32.9	33	37.1	36.1	32.5	33.7	36.6	34.7
CODOT26	32.8	30.4	31.6	28.4	33.3	30.2	30.6	28.7	30.75
CODOT34	33.5	33.9	35.2	35.1	33.5	33.8	35.1	34.9	34.375
Set Average									33.275
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									36.6025
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

**Figure BJ-11. Surface Resistivity Test Results Reported for Mix #9, Lab #11, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	31	31.4	29.1	30.9	31.2	30.4	29.1	30.9	30.5
16	29.8	31	31.3	30.1	29.9	29.8	31.9	29.4	30.4
19	31.6	29.8	30	30.6	31.6	30.4	30.2	30.8	30.625
Set Average									30.50833333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									33.55916667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BJ-12. Surface Resistivity Test Results Reported for Mix #9, Lab #12, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
17	28.6	28.9	26.7	24.9	25.9	26.7	27.6	25.9	26.9
20	26.3	27.3	24.4	27	23.9	26.8	25.1	26.8	25.95
28	26.6	26.5	23.5	24.5	24.4	25.8	23.9	25.6	25.1
Set Average									25.98333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									28.58166667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BJ-13. Surface Resistivity Test Results Reported for Mix #9, Lab #13, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
6	30.9	31	30	30.7	30.1	31.2	30.9	31.6	30.8
8	29.7	25.5	27.2	29.6	27.8	25.3	28.1	29.3	27.8125
14	29.7	29.3	30.1	32	30.8	30.1	30.8	32.3	30.6375
Set Average									29.75
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									32.725
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									63.5
Water Temperature of lime bath (°F)									69.8
Curing history specific to your lab once you received the specimens					Received and placed in lime water on 2010/11/18, tested on 2011/01/18				
Any abnormalities, comments, and/or notes.									

**Figure BJ-14. Surface Resistivity Test Results Reported for Mix #9, Lab #14, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
33	24.5	27.4	27.9	28.7	24.9	27.6	28	28	27.125
36	29.5	28.8	29.3	31.6	29.2	26.9	29.9	31	29.525
42	32	31.7	31.7	31.9	31.4	30	31.3	32.1	31.5125
Set Average									29.3875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									32.32625
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix BK**

## **Surface Resistivity Test Results Reported for Mix #10 @ 91 Days**

**Figure BK-1. Surface Resistivity Test Results Reported for Mix #10, Lab #1, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CEMEX 7	61.9	60.7	66.4	66.6	61.6	60.8	66.8	67.7	64.0625
CEMEX 27	65.9	66.5	67.9	68.3	65.5	66.2	66.2	66.2	66.5875
CEMEX 47	59.8	63.4	62.4	70.6	59.8	64.1	62.4	70.5	64.1250
Set Average									64.9250
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									71.4175
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				70					
Water Temperature of lime bath (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure BK-2. Surface Resistivity Test Results Reported for Mix #10, Lab #2, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
6	57.7	57.8	54.4	55.4	57.2	57.8	57.2	57.4	56.9
22	61.4	58.2	58.9	57.4	61.4	58.5	59.1	57.3	59.0
40	62.5	57.8	57.2	58.2	62.3	57.5	58.5	58.4	59.1
Set Average									58.3
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									64.1
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BK-3. Surface Resistivity Test Results Reported for Mix #10, Lab #3, @ 91 Days.**

Temp H <sub>2</sub> O: 70f		Temp Air: 73f		Ohms: 24.5k		Range: 4		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
2/14/2011	3	65.2	58.7	61.1	65.4	65.5	63.1	61.90	70.7	63.95
2/14/2011	17	72.7	77.2	69.5	70.3	66.0	77.4	69.2	64.1	70.80
2/14/2011	43	61.2	65.6	60.5	55.6	65.9	66.8	60.7	57.3	61.70
Set Average										65.48
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										72.03
Penetrability Based on Test										

**Figure BK-4. Surface Resistivity Test Results Reported for Mix #10, Lab #4, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #			180°	270°	0°	90°	180°	270°	Average
1	52.6	50.5	52.1	48.8	51.2	50.9	51.9	54	51.5
41	54.7	50.3	51.2	53.2	52.3	47.8	52.8	46.4	51.0875
46	52.7	54.5	57.9	53.4	53.1	56.9	56.5	53.5	54.8
Set Average									52.4625
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									57.70875
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				71.2					
Water Temperature of lime bath (°F)				73.1					
Curing history specific to your lab once you received the specimens						Samples once received were taken out of the box and immediately immersed in a water-lime bath.			
Any abnormalities, comments, and/or notes.						No Abnormalities on the cylinders were found			

**Figure BK-5. Surface Resistivity Test Results Reported for Mix #10, Lab #5, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
Cex 31	60.2	49.3	53	48.5	61.5	51.3	52.5	54.5	53.9
Cex 32	56.9	59.3	55.8	50.5	59.3	60.6	58.7	55.32	57.1
Cex 39	54	60.1	53.3	53	55.2	57.8	53.8	50.9	54.8
Set Average									55.2
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									60.7
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)			75						
Water Temperature of lime bath (°F)			67						
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BK-6. Surface Resistivity Test Results Reported for Mix #10, Lab #6, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
9	54.6	55.1	52.4	56.2	55.1	56.3	50.3	54.7	54.3375
15	53.4	62.9	55	59.5	53.4	61.2	56.7	57.1	57.4
35	58.8	58.6	66.6	57.5	59.2	58.6	66.2	56.3	60.225
Set Average									57.32083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									63.05291667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Put in lime water after receipt. Run test at 91 days on 9/FEB at 11.30 am ET.				
Any abnormalities, comments, and/or notes.					a=1.5"				

**Figure BK-7. Surface Resistivity Test Results Reported for Mix #10, Lab #7, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
12	60.5	69.2	67.4	60.1	65	74.1	68.1	59.6	65.5
23	62	61.8	63.1	62.3	59.8	62.8	65.4	64.4	62.7
48	63	62.7	57.5	64.1	64.7	65.5	56.6	65.2	62.4125
Set Average									63.5375
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									69.89125
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples received on 12/03/10 and placed in lime water. Tested samples for 91 day Surface Resistivity on 02/09/11 and then discarded the cylinders.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure BK-8. Surface Resistivity Test Results Reported for Mix #10, Lab #8, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
21	57.3	63.1	55.9	59.8	58.8	64.5	56.9	59.3	59.45
25	60.7	62.3	66.8	69.4	62.3	65.3	60.7	69.7	64.65
26	63.5	68.8	60.6	63.5	61	68.6	62.2	65.9	64.2625
Set Average									62.7875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									69.06625
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									76
Water Temperature of lime bath (°F)									73
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									Core 21    148510 Machine Load    11820 Psi    81.5 Mpa Core 26    137570 Machine Load    10950 Psi    75.5 Mpa

**Figure BK-9. Surface Resistivity Test Results Reported for Mix #10, Lab #9, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
24	63.8	69.3	62.4	69.3	60.7	70.4	63.8	67.8	65.9375
37	63.5	65.5	61.8	68.2	66.7	64.6	62.4	68.7	65.175
4	58.2	63.8	64.1	63.3	57.1	59.3	66.3	62.2	61.7875
Set Average									64.3
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									70.73
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				71					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure BK-10. Surface Resistivity Test Results Reported for Mix #10, Lab #10, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CEMEX 18	57.8	58.7	61	57.6	58.2	58.4	61.3	57.3	58.7875
CEMEX 29	57.1	60.6	58.5	53.7	57.8	60.9	58.8	53.2	57.575
CEMEX 42	56.6	53.3	50.2	53.8	56.2	53	49.9	53.9	53.3625
Set Average									56.575
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									62.2325
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

**Figure BK-11. Surface Resistivity Test Results Reported for Mix #10, Lab #11, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
2	45.3	45.5	47.1	44.8	45.1	44	47.7	44.1	45.45
8	48.3	48.5	44.9	48.2	47.1	51	43.1	42.1	46.65
28	50.4	52.2	45.7	49.5	51.6	51.3	47.5	50	49.775
Set Average									47.29166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									52.02083333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BK-12. Surface Resistivity Test Results Reported for Mix #10, Lab #12, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
CEMEX-11	43.4	42.6	33.6	40.5	49.8	44.9	38.8	45.5	42.3875
CEMEX-34	42	39.5	39.5	41.9	45.5	43.2	46	45.1	42.8375
CEMEX-38	53.2	48.6	51.4	49.1	54.3	47.2	53.4	48.9	50.7625
Set Average									45.32916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									49.86208333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				71					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BK-13. Surface Resistivity Test Results Reported for Mix #10, Lab #13, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	63.1	56.1	65.5	55	62.3	58	63	57.1	60.0125
44	60.8	52.9	57.3	55.7	60.1	51.1	60.1	57.5	56.9375
16	60.5	59.5	57.3	52.3	60	61.4	59.7	54.1	58.1
Set Average									58.35
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									64.185
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									74.3
Water Temperature of lime bath (°F)									69.8
Curing history specific to your lab once you received the specimens									Tested on February 9th, 2011
Any abnormalities, comments, and/or notes.									

**Figure BK-14. Surface Resistivity Test Results Reported for Mix #10, Lab #14, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
13	56	51	50	60	55	50	50	58	53.75
33	55	43	54	52	54	44	56	51	51.125
36	51	54	49	53	52	53	51	52	51.875
Set Average									52.25
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									57.475
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix BL**

## **Surface Resistivity Test Results Reported for Mix #11 @ 91 Days**

**Figure BL-1. Surface Resistivity Test Results Reported for Mix #11, Lab #1, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
Titan 1	33.8	32.2	32.2	34.3	33.3	29.7	33	33.2	32.7125
Titan 4	34.5	32.6	29.7	37.2	33.6	34.1	29.1	34.8	33.2000
Titan 23	34.1	31.8	32.9	30.9	32.8	30.9	33.4	31.8	32.3250
Set Average									32.7458
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									36.0204
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BL-2. Surface Resistivity Test Results Reported for Mix #11, Lab #2, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
26	31.8	31.7	31.2	29.3	30.7	31.3	30.6	29.3	30.7
30	31.6	29.6	30.7	29.7	31.8	29.4	29.9	29.5	30.3
47	31.2	29.8	32.5	31.6	30.6	30.2	33.2	31.2	31.3
Set Average									30.8
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									33.8
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				76					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens					Specimens were put in lime tank immediately after receiving them				
Any abnormalities, comments, and/or notes.					N/A				



**Figure BL-3. Surface Resistivity Test Results Reported for Mix #11, Lab #3, @ 91 Days.**

Temp H <sub>2</sub> O: 72f		Temp Air: 75f		Ohms: 24k		Range: 4		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
2/16/2010	20	34.2	33.1	32.4	33.3	37.8	34	33.20	34.4	34.05
2/16/2010	31	34.3	34.2	33.1	30.8	34.5	35.4	32.4	30.0	33.09
2/16/2010	36	35.1	33.9	37.8	36.5	33.8	34.2	37.4	37.3	35.75
Set Average										34.30
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										37.73
Penetrability Based on Test										



**Figure BL-5. Surface Resistivity Test Results Reported for Mix #11, Lab #5, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
TIN 5	29.1	29.7	29.8	30.1	30.4	28.2	32.2	29.4	29.9
TIN 9	29.0	27.3	29.1	30.1	28.5	27.3	28.5	30.0	28.7
TIN 11	29.8	30.9	28.8	30.9	28.0	29.9	28.2	30.6	29.6
Set Average									29.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									32.3
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				76					
Water Temperature of lime bath (°F)				66.4					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BL-6. Surface Resistivity Test Results Reported for Mix #11, Lab #6, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	30.3	30.1	30.8	27.9	29.2	30.4	30.7	29.1	29.8125
36	28	28.9	30.7	27.9	28.7	29.4	29.8	28.2	28.95
38	29.5	29.4	31	31	29.2	29.6	30.8	31.1	30.2
Set Average									29.65416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									32.61958333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									74
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Put in lime water after receipt. Run test at 91 days on 16/FEB at 4.00 pm ET.				
Any abnormalities, comments, and/or notes.					a=1.5"				

**Figure BL-7. Surface Resistivity Test Results Reported for Mix #11, Lab #7, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
3	37.1	37.3	33.9	37.6	39.9	39.3	35.2	38.2	37.3125
32	35.4	38.2	36.8	36.8	36	38	36.3	36.7	36.775
33	34.2	34.2	36.6	36.6	36.1	36.4	36.1	37.1	35.9125
Set Average									36.66666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									40.33333333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									73
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples received on 12/09/10 and placed in lime water. Tested samples for 91 day Surface Resistivity on 2/16/11. Cylinders were discarded after this 91 day test.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure BL-8. Surface Resistivity Test Results Reported for Mix #11, Lab #8, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
25	32.6	32.2	32.5	29.1	32.9	33.1	33.2	30.3	31.9875
34	35.1	33.5	34	37.2	34.3	33.7	34.4	37.5	34.9625
39	32.9	33.6	37.2	34.2	32.9	33.6	37.6	34.9	34.6125
Set Average									33.85416667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									37.23958333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				76					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					Core 25 142030 Machine Load 11302 Psi 77.9 Mpa				
					Core 39 149900 Machine Load 11929 Psi 82.2 Mpa				

**Figure BL-9. Surface Resistivity Test Results Reported for Mix #11, Lab #9, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
41	40.2	39.6	37.8	36.9	39.6	39.6	37.4	38.1	38.65
14	34.7	31.7	31.5	36.1	34.1	32.3	32.4	35	33.475
3	35.4	34.6	37.3	34.9	34.1	37	37.6	34.7	35.7
Set Average									35.94166667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									39.53583333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				73.2					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BL-10. Surface Resistivity Test Results Reported for Mix #11, Lab #10, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
Titan 6	29	28.7	31.6	30	29.1	28.6	31.6	30.2	29.85
Titan 21	34.2	33.5	31.5	31.6	34.1	33.5	31.7	31.4	32.6875
Titan 24	30.4	30.4	32.6	32.5	31.2	30.5	32.3	32.8	31.5875
Set Average									31.375
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									34.5125
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									



**Figure BL-11. Surface Resistivity Test Results Reported for Mix #11, Lab #11, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	25.8	27.9	26.2	27.3	26.9	27	25.7	26	26.6
48	27.6	29.2	28.2	28.5	27	29.2	28.9	28.5	28.3875
37	28.2	26.8	29.1	29	29.4	27	28.3	26.8	28.075
Set Average									27.6875
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									30.45625
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				75					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BL-12. Surface Resistivity Test Results Reported for Mix #11, Lab #12, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
Titan - 12	24.8	24.8	24.8	23.8	24.7	25.2	25.3	25.2	24.825
Titan - 15	22.6	24.6	23.3	22.6	24.1	23.6	23.2	24	23.5
Titan - 22	25.3	24	25.1	21.6	25.8	25.8	26.4	23.7	24.7125
Set Average									24.34583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									26.78041667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				71					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BL-13. Surface Resistivity Test Results Reported for Mix #11, Lab #13, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
28	28.4	28.1	31.8	28.7	29.6	28.5	30.8	29.2	29.3875
24	29.4	30.3	34.4	31	30.5	33.4	30.8	31.6	31.425
27	31.8	31	30.1	35.2	32.4	31.8	31.2	35.7	32.4
Set Average									31.07083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									34.17791667
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)									68
Water Temperature of lime bath (°F)									64
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.					None to report				

**Figure BL-14. Surface Resistivity Test Results Reported for Mix #11, Lab #14, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
7	29	30	31	31	28	30	32	31	30.25
8	33	31	30	30	32	30	32	30	31
18	31	31	33	29	32	31	33	28	31
Set Average									30.75
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									33.825
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				72					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

# **Appendix BM**

## **Surface Resistivity Test Results Reported for Mix #12 @ 91 Days**

**Figure BM-1. Surface Resistivity Test Results Reported for Mix #12, Lab #1, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FL1	42.5	35.7	36.2	34.7	42.8	36.3	35.7	34.8	37.3375
FL2	36.9	34.9	33	37.9	38.2	34.7	35.8	37.7	36.1375
FL3	29.8	33.9	32.7	33.7	29.6	34.4	32.8	32.5	32.4250
Set Average									35.3000
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									38.8300
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				71					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BM-2. Surface Resistivity Test Results Reported for Mix #12, Lab #2, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
4.0	42.1	38.4	48.1	41.8	44.3	38.4	47.7	43.6	43.1
5.0	44.7	42.0	41.1	42.5	42.6	41.7	42.0	43.7	42.5
6.0	40.5	44.1	43.0	40.2	40.1	42.5	42.3	40.1	41.6
Set Average									42.4
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									46.6
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				71					
Water Temperature of lime bath (°F)				69					
Curing history specific to your lab once you received the specimens				Specimens were put in lime tank immediately after receiving them					
Any abnormalities, comments, and/or notes.				N/A					

**Figure BM-3. Surface Resistivity Test Results Reported for Mix #12, Lab #3, @ 91 Days.**

Temp H <sub>2</sub> O: 74f		Temp Air: 77f		Ohms: 23.4k		Range: 4		Spacing: 38.1mm		
Date	Sample	0°	90°	180°	270°	0°	90°	180°	270°	Average
6/7/2011	7	44.3	40.6	44.1	46.7	46.0	41.2	43.0	45.5	43.93
6/7/2011	8	49.4	46.3	50.4	45.9	38.3	43.4	47.6	45.9	45.90
6/7/2011	9	33.1	35	34.1	32.5	31	34	33.3	34.2	33.40
Set Average										41.08
Curing Condition ( 1.1 lime tank or 1.0 for moist room)										45.18
Penetrability Based on Test										



**Figure BM-4. Surface Resistivity Test Results Reported for Mix #12, Lab #4, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
10	62.8	51.8	49.8	44.7	65.8	49.2	50.9	46.1	52.6
11	41.1	45.2	49.7	42.2	43.8	48.3	50.4	45.9	45.8
12	41.1	45.8	45.7	38.6	44.8	43	44.2	40.8	43
Set Average									47.13333333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									51.84666667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									69.1
Water Temperature of lime bath (°F)									74.2
Curing history specific to your lab once you received the specimens					Samples once received were taken out of the box and immediately immersed in a water-lime bath.				
Any abnormalities, comments, and/or notes.									
					No Abnormalities on the cylinders were found				

Figure BM-5. Surface Resistivity Test Results Reported for Mix #12, Lab #5, @ 91 Days.

Surface Resistivity (SR) Readings (Kohm-cm)									Average
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BM-6. Surface Resistivity Test Results Reported for Mix #12, Lab #6, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
16	32.8	35.5	34.9	35.3	32.5	35.5	35.1	35.4	34.625
17	36.6	41.6	34.9	36.8	37	42.3	34.8	38.3	37.7875
18	34.8	29.8	29.7	36	34.8	27.6	30.8	36.4	32.4875
Set Average									34.96666667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									38.46333333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				74					
Water Temperature of lime bath (°F)				74					
Curing history specific to your lab once you received the specimens					received and immediately put into lime water				
Any abnormalities, comments, and/or notes.					a=1.5"				

**Figure BM-7. Surface Resistivity Test Results Reported for Mix #12, Lab #7, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
19	44.1	44.4	37.8	41.8	44	43.1	38	40.6	41.725
20	38.4	39.2	40.2	40.3	37.5	40.2	40.8	39.3	39.4875
21	40.2	38.8	38	39.8	41.2	37.7	37.7	39.2	39.075
Set Average									40.09583333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									44.10541667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)									75
Water Temperature of lime bath (°F)									74
Curing history specific to your lab once you received the specimens					Samples received on 4/1/11 and placed in lime water. Tested samples for 91 day Surface Resistivity on 6/7/11. Cylinders were discarded after this 91 day test.				
Any abnormalities, comments, and/or notes.					Ed McGaffin performed the Surface Resistivity testing.				

**Figure BM-8. Surface Resistivity Test Results Reported for Mix #12, Lab #8, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
22	31.6	33.5	29.7	31.7	32.1	32.3	30.2	34.3	31.925
23	34.7	32.7	32.2	34.6	33.9	33.3	32.5	34	33.4875
24	33.8	32.1	33.4	32.9	33	32.4	33.3	33.7	33.075
Set Average									32.82916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									36.11208333
Chloride Ion Penetration Type									LOW
Air Temperature of testing room (°F)				76					
Water Temperature of lime bath (°F)				73					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BM-9. Surface Resistivity Test Results Reported for Mix #12, Lab #9, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
27	36.9	33.7	35.1	34.1	37.2	34	35.2	34	35.025
26	37.3	34.9	33.4	41.3	36.7	34.4	32.8	42.4	36.65
25	35.7	41	38.1	39	38.3	41.2	37.9	39.3	38.8125
Set Average									36.82916667
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									40.51208333
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				72.3					
Water Temperature of lime bath (°F)				73.2					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BM-10. Surface Resistivity Test Results Reported for Mix #12, Lab #10, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FLDOT 28	41.3	40	38.9	41.1	41.4	40.6	39.4	41.5	40.525
FLDOT 29	37	34.7	37.9	40.3	37.5	34.9	37.6	40	37.4875
FLDOT 30	39.8	40.5	38.3	43.1	39.8	40.7	38.1	43	40.4125
Set Average									39.475
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									43.4225
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				73					
Water Temperature of lime bath (°F)				72					
Curing history specific to your lab once you received the specimens					Lime Water				
Any abnormalities, comments, and/or notes.									

Figure BM-11. Surface Resistivity Test Results Reported for Mix #12, Lab #11, @ 91 Days.

Surface Resistivity (SR) Readings (Kohm-cm)									Average
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	
									#DIV/0!
									#DIV/0!
									#DIV/0!
Set Average									#DIV/0!
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									#DIV/0!
Chloride Ion Penetration Type									#DIV/0!
Air Temperature of testing room (°F)									
Water Temperature of lime bath (°F)									
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									



**Figure BM-12. Surface Resistivity Test Results Reported for Mix #12, Lab #12, @ 91 Days.**

Surface Resistivity (SR) Readings (Kohm-cm)									
Sample #	0°	90°	180°	270°	0°	90°	180°	270°	Average
FLDOT-34	33.6	31.7	32.4	32.5	33.7	32.7	32.8	32.2	32.7
FLDOT-35	35.8	35	31.9	36.7	37.7	35.8	32.8	36.5	35.3
FLDOT-36	31.5	30.2	30.7	31.5	29.6	31	30.7	30.5	30.7
Set Average									32.9
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									36.2
Chloride Ion Penetration Type									LOW
				A.M.	NOON	P.M.			
Temperature of Room Air (°F)				71					
Temperature of Ca(OH) <sub>2</sub> Solution (°F)				70					
Curing history specific to your lab once you received the specimens									
Any abnormalities, comments, and/or notes.									

**Figure BM-13. Surface Resistivity Test Results Reported for Mix #12, Lab #13, @ 91 Days.**

Sample #	h								Average
	0°	90°	180°	270°	0°	90°	180°	270°	
37	39.7	38.9	37.3	36.3	39.5	39.5	36.8	36.8	38.1
38	38.9	37.4	40.2	41.9	39.5	36.7	40.2	41.1	39.4875
39	36.4	40.4	42.1	41.6	36.8	40.2	40.9	41.0	39.925
Set Average									39.17083333
Curing Condition Correction (x 1.1 lime tank or 1.0 for moist room)									1.1
Penetrability Based on Test									43.08791667
Chloride Ion Penetration Type									VERY LOW
Air Temperature of testing room (°F)				77.5					
Water Temperature of lime bath (°F)				71.6					
Curing history specific to your lab once you received the specimens					Specimens unpacked and placed in lime water on April 4th, 2011; Specimens tested on June 7th, 2011				
Any abnormalities, comments, and/or notes.									

