Test Method to Determine the Existence of Segregation in Bituminous Mixtures

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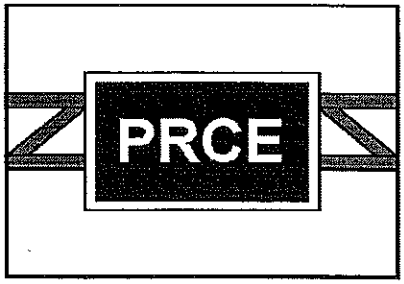

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Appendix C

Field and Lab Data and Analysis Site 1 : St. John's by Pass (US 27)

Testing and Research Section
Construction and Technology Division
Research Project No. RC-1363
Appendix C

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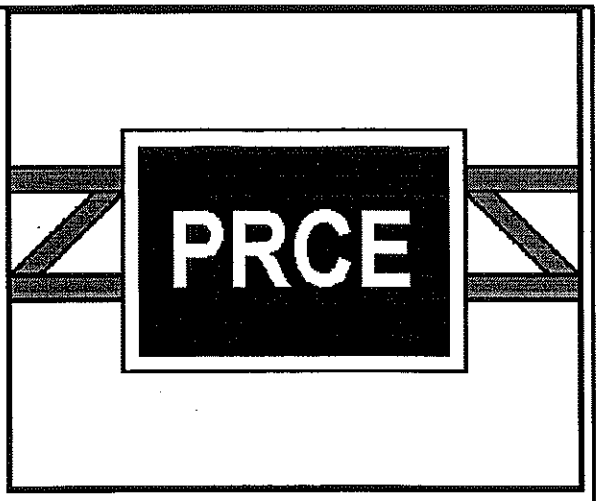

Final Report

Report Number	**Contract Number**
MDOT - PRCE - MSU -1997 -101	94-1699

Title and Subtitle
Test Method to Determine the Existence of Segregation in Bituminous Mixtures

Report Date
September 30, 1997

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Abstract
Segregation in asphalt concrete pavements is a construction-related problem that has been of concern for many years. However, no quantitative methods to assess segregation are found in any standard specifications. This report shows the progress of a research project to develop an expedient test for segregation. Nuclear density measurements were evaluated as possible indicators of segregation. Two spreadsheet-based programs, MBITSEG1 and MBITSEG2, were developed to perform statistical tests to access the presence of segregation based on differences in density measurements. With this approach, the presence of segregation can be expediently detected and the paving operation can be adjusted. To verify and calibrate the expedient test, seven test sites were selected exhibiting various types and degrees of segregation. Nuclear density measurements, laboratory density measurements and aggregate gradation tests were made at these sites and statistical patterns were analyzed using the programs. Results indicated that the observed trends for air-dry laboratory density and the percent passing No.4 and No.8 sieves are generally similar to those for nuclear measured density. Regression analyses show that nuclear-measured density values are not strongly correlated to lab values, but one-minute nuclear density measurements correlate most closely with air-dry lab density measurements for the surface course.

Key Words : segregation, nuclear density, asphalt pavements, statistical methods, quality control, bituminous mixtures

Conversion Factors

English	Metric
1 inch, in	2.544×10^{1} mm = 2.544 cm = 2.544×10^{-2} m
1 foot, ft	30.48×10^{1} mm = 30.48 cm = 30.48×10^{-2} m
1 yard, yd	91.44×10^{1} mm = 91.44 cm = 91.44×10^{-2} m
I mile (U.S.)	1.609×10^{3} m = 1.609 km
1 mil	0.0254 mm = 2.54×10^{-5} m = 25.4 μm
1 inch square, in^2	6.472×10^{2} mm^2 = 6.472 cm^2 = 6.472×10^{-4} m^2
1 foot square, ft^2	929.03×10^{2} mm^2 = 929.03 cm^2 = 929.03×10^{-4} m^2
1 yard square, yd^2	8361×10^{2} mm^2 = 8,361 cm^2 = 8361×10^{-4} m^2
I mile square (U.S.)	2.5889×10^{6} m^2 = 2.5889 km^2
1 pound mass, lbm or lb	0.4536 kg = 0.4536×10^{3} g
1 ton = 2000 lb	907.2 kg = 907.2×10^{3} g
1 slug	14.59 kg = 14.59×10^{3} g
1 pound-force, lbf	4.448 N = 4.448×10^{-3} kN
1 ton-force	8,896 N = 8.896 kN
1 pound per square inch, psi	6,895 Pa = 6.895 kPa
1 kip per square inch, ksi	6,895,000 Pa = 6.895 Mpa
1 pound-force/square foot, psf	47.88 Pa = 47.88×10^{-3} kPa
1 pound-mass per cubic foot, pcf	16.018 kg/m^3
For asphalt overlays	
100 pounds per square yard	about 1 in
170 pounds per square yard	about 1.5 in

Nuclear Density Grid Analysis

Pavement Segregation Analysis Spreadsheet
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T.F. Wolff
July 1996

Location: Sample Data -- from St. John's, samples xx1
Date: 9/11/95
Description: Samples xx1, unit weight

(updated 7/12/96)

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	141.6	144.5	144.5	143.5	145.4	143.1
5	141.5	144.5	145.4	145.7	146.4	143.4
4	138.8	145.2	144.6	146.4	147.3	144.5
3	140.2	146.6	145.6	145.7	148.8	146.0
2	138.0	145.8	145.8	144.4	148.6	146.9
1	139.4	148.1	145.5	145.4	148.8	144.6
Edge						
Tukey test	DIFF !	--	--	--	DIFF !	--
paired t tests	DIFF !	--	--	--	DIFF !	--
6 of 6 test	DIFF !	--	--	--	DIFF !	--

Clear — *Clears everything for a new problem*
Enter data, or press a key below.

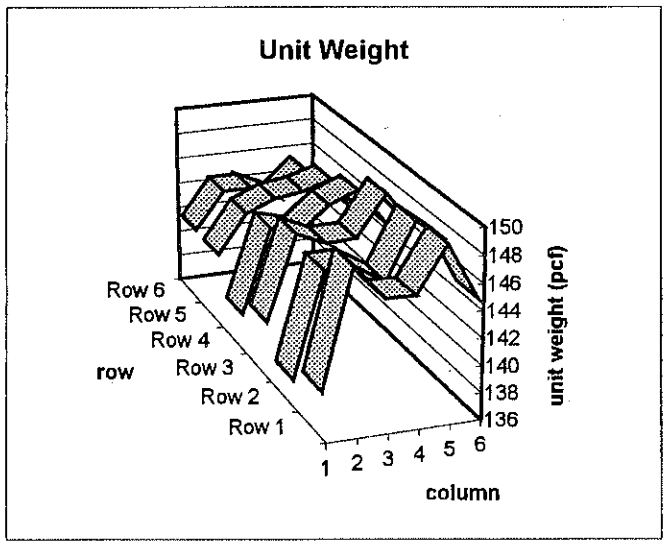
Example — *Enters example segregated data*

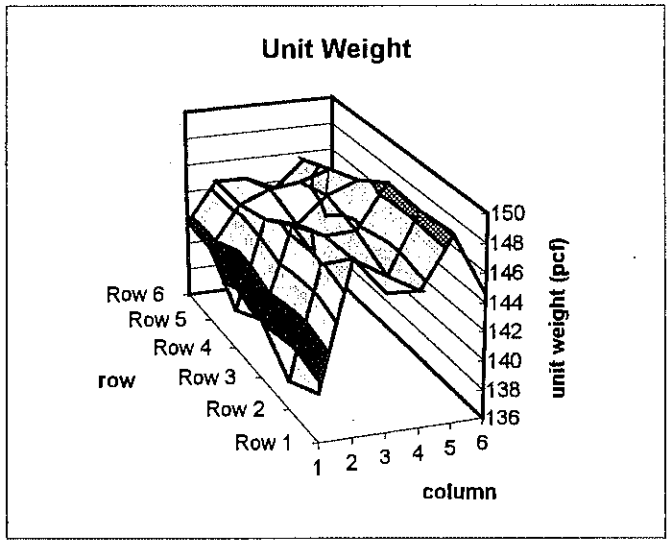
Random — *Enters a random sample*

YES ! <-- significant column differences?

Edge

Location: *Sample Data -- from St. John's, samples xx1*
Date: *9/11/95*
Description: *Samples xx1, unit weight*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

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Location: *Sample Data -- from St. John's, samples xx1*

Date: *9/11/95*

Description: *Samples xx1, unit weight*

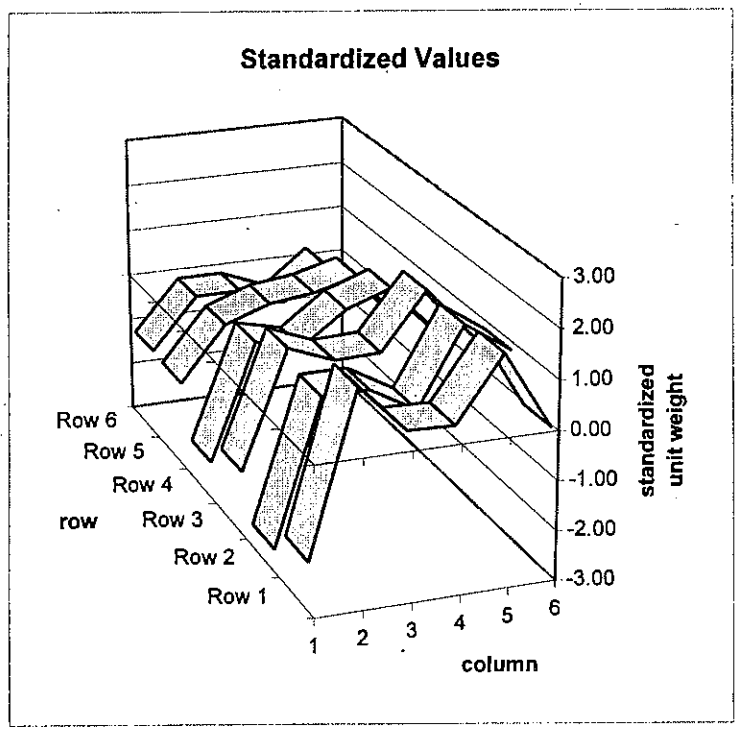
Color 1 *Color Above and Below Average*

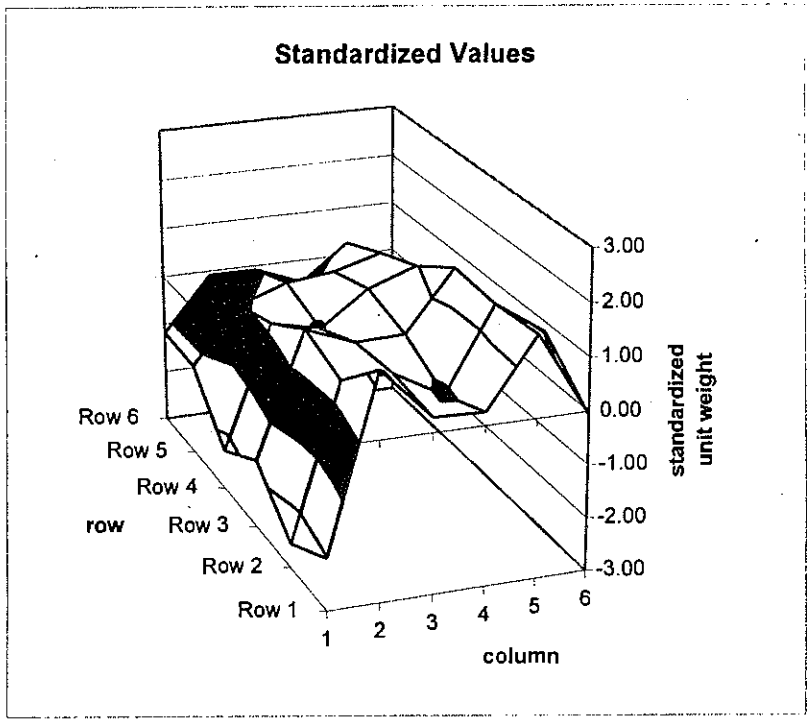
Clear Color

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	-1.19	-0.09	-0.09	-0.47	0.25	-0.62	-0.37	0.506
5	-1.22	-0.09	0.25	0.36	0.63	-0.51	-0.10	0.678
4	-2.25	0.18	-0.05	0.63	0.97	-0.09	-0.10	1.128
3	-1.72	0.71	0.33	0.36	1.54	0.48	0.28	1.077
2	-2.55	0.40	0.40	-0.13	1.46	0.82	0.07	1.387
1	-2.02	1.27	0.29	0.25	1.54	-0.05	0.21	1.260
Average	-1.82	0.40	0.19	0.17	1.06	0.01	0.00	**0.00**	1.006
Std. Dev.	0.551	0.526	0.207	0.397	0.541	0.556	0.463		**1.00**

Location: *Sample Data -- from St. John's, samples xx1*
Date: *9/11/95*
Description: *Samples xx1, unit weight*





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One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	139.92	-4.82	23.227	1.457	2.122
2	145.78	1.05	1.097	1.391	1.934
3	145.23	0.50	0.247	0.547	0.299
4	145.18	0.45	0.200	1.050	1.102
5	147.55	2.81	7.918	1.431	2.047
6	144.75	0.01	0.000	1.471	2.163
sum			32.689		9.666
all data	144.74			2.64285	6.9847

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	196.134722	5	39.227	**24.35028**	2.533554	9.973E-10
within columns:	48.3283333	30	1.611			
Total:	244.463056			**Different ?**	1	YES!

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Tukey's paired comparison test

Difference of means

Columns	1	2	3	4	5	6
1		-5.87	-5.32	-5.27	-7.63	-4.83
2	-5.87		0.55	0.60	-1.77	1.03
3	-5.32	0.55		0.05	-2.32	0.48
4	-5.27	0.60	0.05		-2.37	0.43
5	-7.63	-1.77	-2.32	-2.37		2.80
6	-4.83	1.03	0.48	0.43	2.80	

Critical Values

Columns	1	2	3	4	5	6
1		2.74	2.12	2.45	2.78	2.82
2	2.74		2.04	2.37	2.72	2.76
3	2.12	2.04		1.61	2.09	2.14
4	2.45	2.37	1.61		2.42	2.46
5	2.78	2.72	2.09	2.42		2.80
6	2.82	2.76	2.14	2.46	2.80	

Critical ?

Columns	1	2	3	4	5	6
1		1	1	1	1	1
2	1		0	0	0	0
3	1	0		0	1	0
4	1	0	0		0	0
5	1	0	1	0		1
6	1	0	0	0	1	
Sum	**5**	**1**	**2**	**1**	**3**	**2**
Different?	**1**	**0**	**0**	**0**	**1**	**0**

t-tests

two sample, equal variance, homoscedastic

Row vs. Ro	1	2	3	4	5	6
1		0.8534	0.9204	0.6576	0.6084	0.3199
2			0.7710	0.8202	0.8000	0.4869
3				0.5591	0.4831	0.2108
4					0.9909	0.6112
5						0.4508
6						

t-tests

two sample, equal variance, homoscedastic

Col vs Col	1	2	3	4	5	6
1		0.0000	0.0000	0.0000	0.0000	0.0002
2	0.0000		0.3884	0.4186	0.0553	0.2396
3	0.0000	0.3884		0.9196	0.0041	0.4679
4	0.0000	0.4186	0.9196		0.0085	0.5699
5	0.0000	0.0553	0.0041	0.0085		0.0075
6	0.0002	0.2396	0.4679	0.5699	0.0075	

Fail t-test at 0 05 level?

Col vs Col	1	2	3	4	5	6	Sum	Diff ?
1		1	1	1	1	1	5	1
2	1		0	0	0	0	1	0
3	1	0		0	1	0	2	0
4	1	0	0		1	0	2	0
5	1	0	1	1		1	4	1
6	1	0	0	0	1		2	0

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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Above Average? 1= true, 0 = false

0	0	0	0	1	0
0	0	1	1	1	0
0	1	0	1	1	0
0	1	1	1	1	1
0	1	1	0	1	1
0	1	1	1	1	0
0	4	4	4	6	2

Pavement Segregation Analysis Spreadsheet
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T.F. Wolff
July 1996

Location: Sample Data -- from St. John's, samples xx2
Date: 9/11/95
Description: Samples xx2, unit weight

(updated 7/12/96)

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	140.5	144.6	143.3	145.2	144.9	144.9
5	141.9	145.3	144.7	146.0	146.7	142.5
4	139.3	145.2	144.1	145.2	147.1	146.9
3	139.3	146.9	146.0	143.1	148.0	145.2
2	140.5	147.0	145.3	145.0	149.2	147.7
1	141.6	147.4	143.6	146.0	148.5	144.9
Edge						
Tukey test	DIFF !	--	--	--	--	--
paired t tests	DIFF !	--	DIFF !	--	DIFF !	--
6 of 6 test	DIFF !	--	--	--	DIFF !	--

Clear — *Clears everything for a new problem. Enter data, or press a key below.*

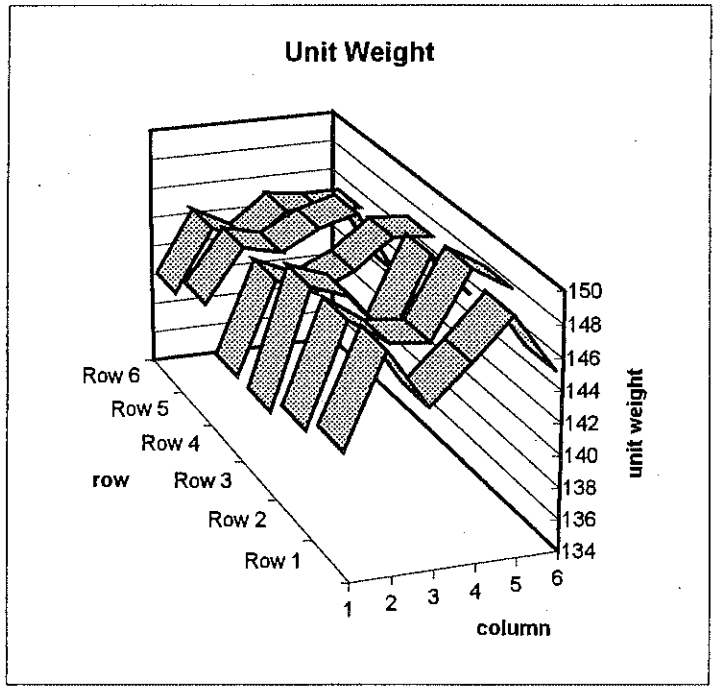
Example — *Enters example segregated data*

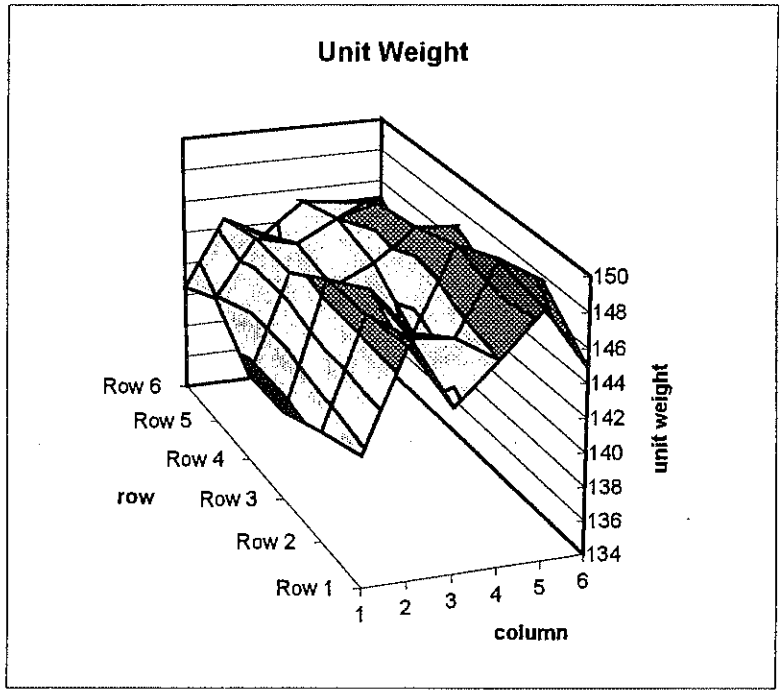
Random — *Enters a random sample*

YES ! <-- significant column differences?

Edge

Location: *Sample Data -- from St. John's, samples xx2*
Date: *9/11/95*
Description: *Samples xx2, unit weight*





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Location: *Sample Data -- from St. John's, samples xx2*

Date: *9/11/95*

Description: *Samples xx2, unit weight*

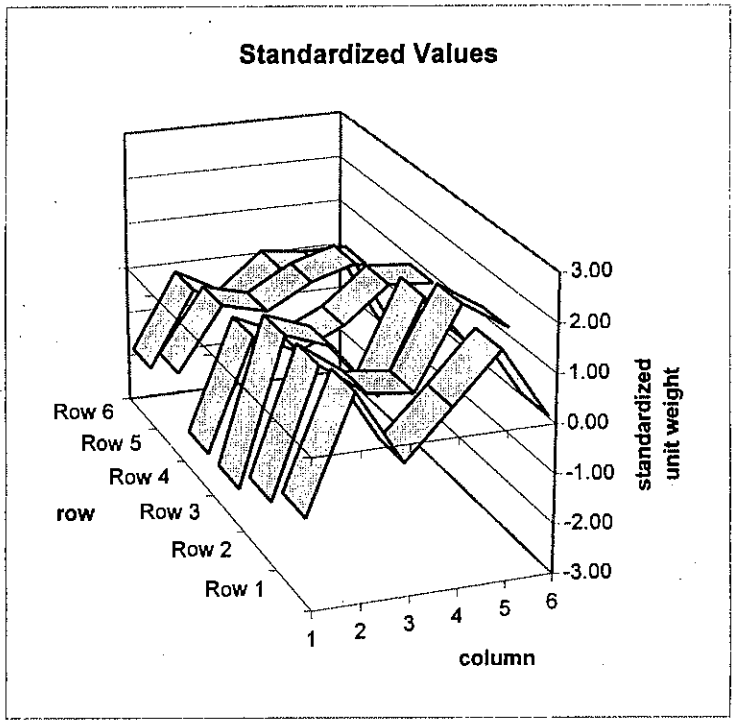
Color 1 *Color Above and Below Average*

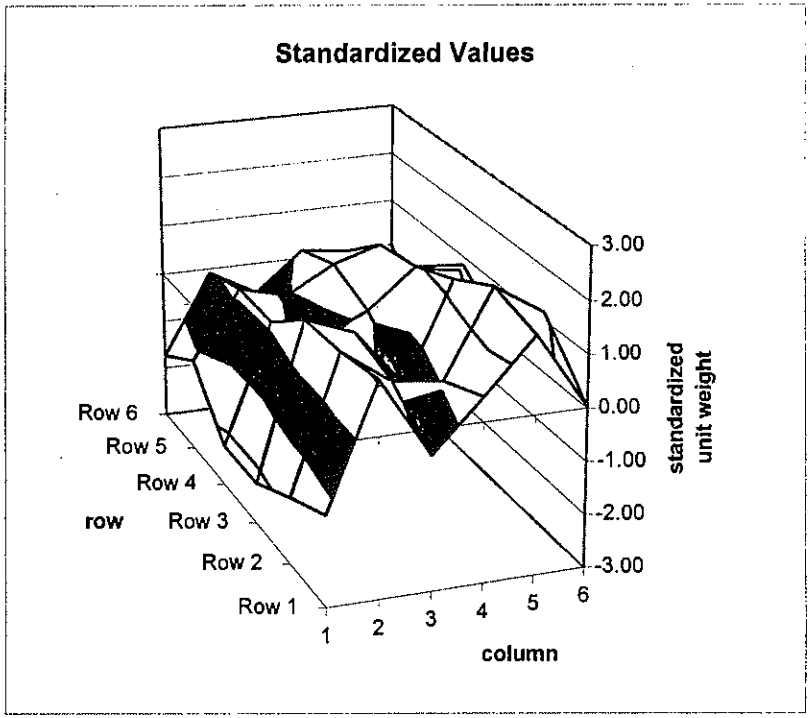
Clear Color

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	-1.74	-0.09	-0.61	0.15	0.03	0.03	-0.37	0.724
5	-1.18	0.19	-0.05	0.48	0.76	-0.94	-0.12	0.777
4	-2.23	0.15	-0.29	0.15	0.92	0.84	-0.08	1.149
3	-2.23	0.84	0.48	-0.69	1.28	0.15	-0.03	1.268
2	-1.74	0.88	0.19	0.07	1.77	1.16	0.39	1.218
1	-1.30	1.04	-0.49	0.48	1.48	0.03	0.21	1.019
Average	-1.74	0.50	-0.13	0.11	1.04	0.21	0.00	**0.00**	1.026
Std. Dev.	0.444	0.472	0.417	0.429	0.616	0.732	0.518		**1.00**

Location: *Sample Data -- from St. John's, samples xx2*
Date: *9/11/95*
Description: *Samples xx2, unit weight*





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One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	140.52	-4.30	18.514	1.100	1.210
2	146.07	1.25	1.556	1.169	1.367
3	144.50	-0.32	0.102	1.033	1.068
4	145.08	0.26	0.070	1.063	1.130
5	147.40	2.58	6.659	1.526	2.328
6	145.35	0.53	0.281	1.815	3.295
sum			27.182		10.397
all data	144.82			2.478919	6.1450

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	163.091389	5	32.618	**18.82367**	2.533554	1.881E-08
within columns:	51.985	30	1.733			
Total:	215.076389			**Different ?**	**1**	**YES!**

ANOVA

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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Tukey's paired comparison test

Difference of means

Columns	1	2	3	4	5	6
1		-5.55	-3.98	-4.57	-6.88	-4.83
2	-5.55		1.57	0.98	-1.33	0.72
3	-3.98	1.57		-0.58	-2.90	-0.85
4	-4.57	0.98	-0.58		-2.32	-0.27
5	-6.88	-1.33	-2.90	-2.32		2.05
6	-4.83	0.72	-0.85	-0.27	2.05	

Critical Values

Columns	1	2	3	4	5	6
1		2.19	2.06	2.08	2.56	2.89
2	2.19		2.13	2.15	2.62	2.94
3	2.06	2.13		2.02	2.51	2.85
4	2.08	2.15	2.02		2.53	2.87
5	2.56	2.62	2.51	2.53		3.23
6	2.89	2.94	2.85	2.87	3.23	

Critical ?

Columns	1	2	3	4	5	6
1		1	1	1	1	1
2	1		0	0	0	0
3	1	0		0	1	0
4	1	0	0		0	0
5	1	0	1	0		0
6	1	0	0	0	0	
Sum	**5**	**1**	**2**	**1**	**2**	**1**
Different?	**1**	**0**	**0**	**0**	**0**	**0**

t-tests

two sample, equal variance, homoscedastic

Row vs. Ro	1	2	3	4	5	6
1		0.7851	0.7304	0.6620	0.5428	0.2835
2			0.5742	0.5128	0.4066	0.2184
3				0.9476	0.8798	0.5778
4					0.9354	0.6054
5						0.5787
6						

t-tests

two sample, equal variance, homoscedastic

Col vs Col	1	2	3	4	5	6
1		0.0000	0.0001	0.0000	0.0000	0.0002
2	0.0000		0.0337	0.1584	0.1201	0.4351
3	0.0001	0.0337		0.3578	0.0032	0.3424
4	0.0000	0.1584	0.3578		0.0122	0.7625
5	0.0000	0.1201	0.0032	0.0122		0.0603
6	0.0002	0.4351	0.3424	0.7625	0.0603	

Fail t-test at 0.05 level?

Col vs Col	1	2	3	4	5	6	Sum	Diff ?
1		1	1	1	1	1	5	1
2	1		1	0	0	0	2	0
3	1	1		0	1	0	3	1
4	1	0	0		1	0	2	0
5	1	0	1	1		0	3	1
6	1	0	0	0	0		1	0

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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Above Average? 1= true, 0 = false

0	0	0	1	1	1
0	1	0	1	1	0
0	1	0	1	1	1
0	1	1	0	1	1
0	1	1	1	1	1
0	1	0	1	1	1
0	5	2	5	6	5

Pavement Segregation Analysis Spreadsheet
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T.F. Wolff
July 1996

Location: Sample Data -- from St. John's, samples xx3
Date: 9/11/95
Description: Samples xx3, unit weight

(updated 7/12/96)

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	140.7	146.0	143.9	145.3	145.5	143.2
5	141.0	145.7	144.5	146.0	146.2	142.9
4	139.4	145.0	144.7	146.0	145.5	137.0
3	141.5	145.9	143.8	145.1	146.5	145.5
2	140.8	147.1	144.6	143.7	148.0	145.5
1	140.4	146.2	145.5	143.5	147.2	145.4
Edge						
Tukey test	DIFF !	--	DIFF !	--	--	--
paired t tests	DIFF !	--	DIFF !	--	DIFF !	--
6 of 6 test	DIFF !	DIFF !	--	--	DIFF !	--

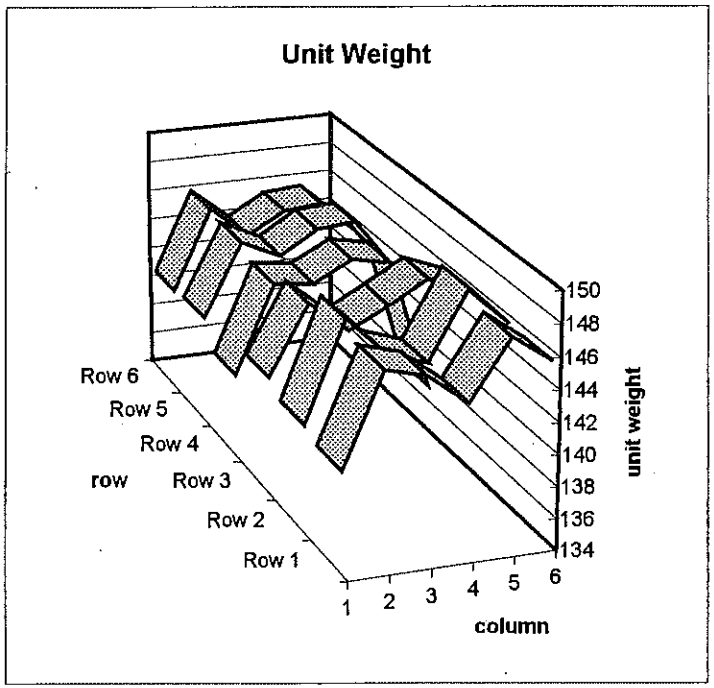
Clear *Clears everything for a new problem*
Enter data, or press a key below.

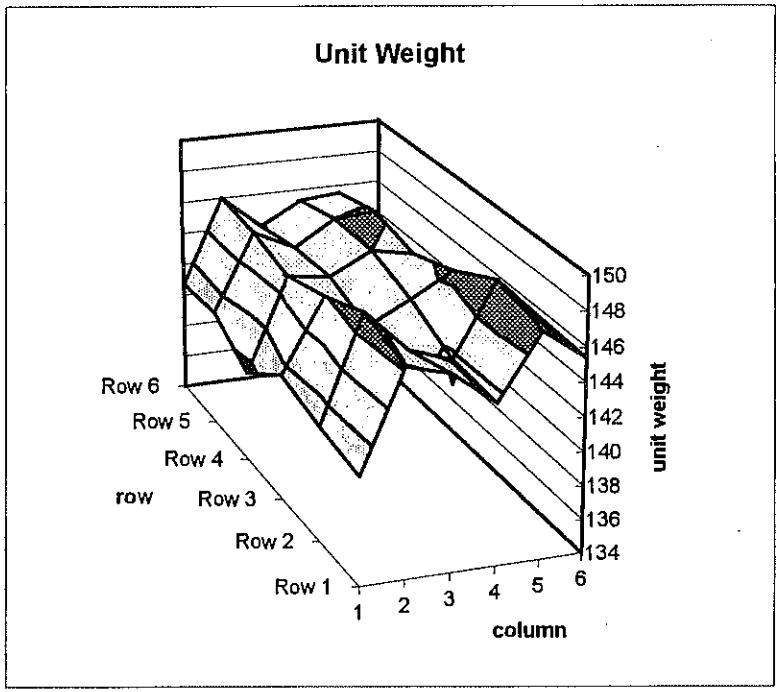
Example *Enters example segregated data*

Random *Enters a random sample*

YES ! <-- significant column differences?
Edge

Location: *Sample Data -- from St. John's, samples xx3*
Date: *9/11/95*
Description: *Samples xx3, unit weight*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

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Location: *Sample Data -- from St. John's, samples xx3*

Date: *9/11/95*

Description: *Samples xx3, unit weight*

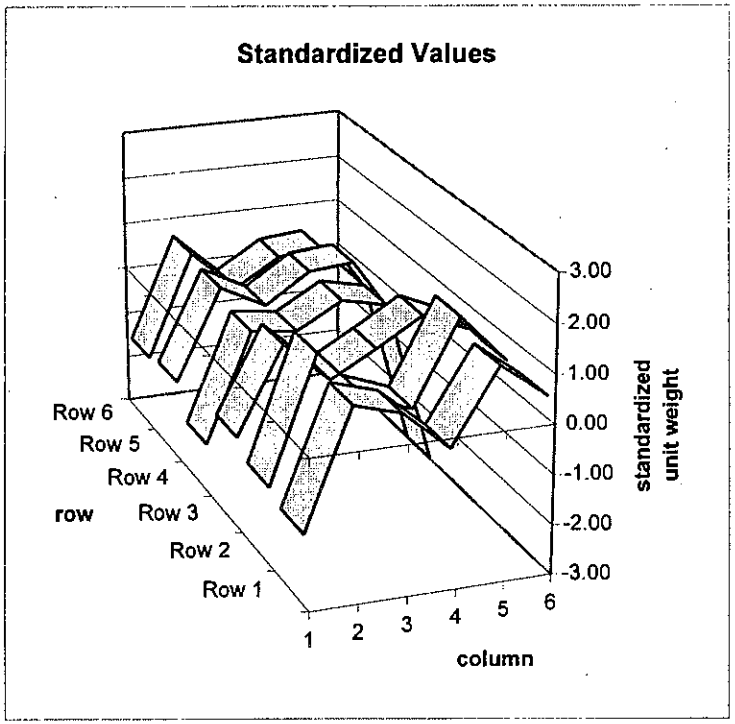
Color 1 *Color Above and Below Average*

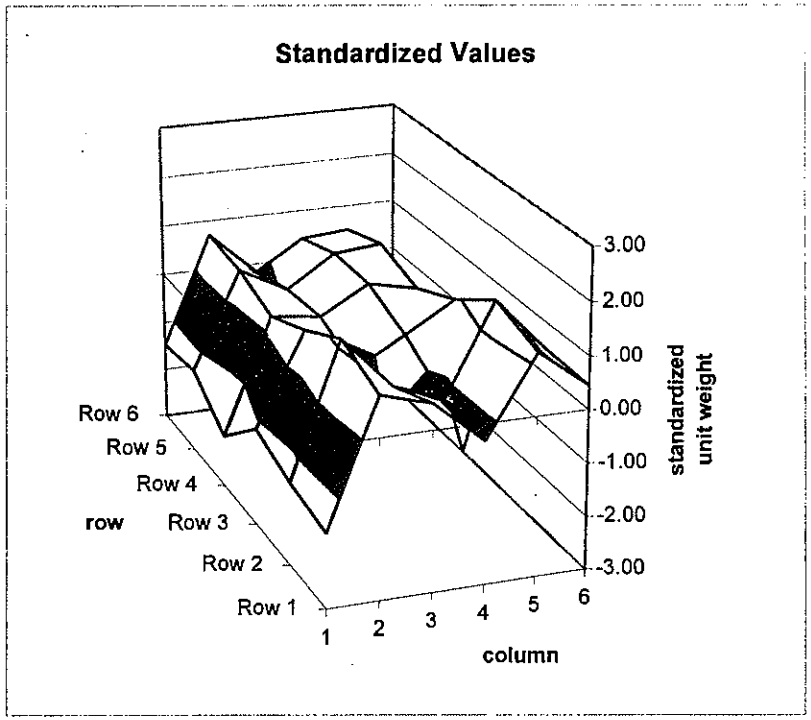
Clear Color

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	-1.48	0.70	-0.16	0.41	0.49	-0.45	-0.08	0.810
5	-1.36	0.58	0.08	0.70	0.78	-0.57	0.04	0.849
4	-2.01	0.29	0.17	0.70	0.49	-3.00	-0.56	1.550
3	-1.15	0.66	-0.20	0.33	0.91	0.49	0.17	0.748
2	-1.44	1.15	0.12	-0.25	1.52	0.49	0.27	1.058
1	-1.60	0.78	0.49	-0.33	1.19	0.45	0.17	1.000
Average	-1.51	0.69	0.08	0.26	0.90	-0.43	0.00	**0.00**	1.002
Std. Dev.	0.290	0.282	0.253	0.451	0.404	1.350	0.505		**1.00**

Location: *Sample Data -- from St. John's, samples xx3*
Date: *9/11/95*
Description: *Samples xx3, unit weight*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	140.63	-3.66	13.424	0.706	0.499
2	145.98	1.69	2.843	0.685	0.470
3	144.50	0.20	0.041	0.616	0.380
4	144.93	0.64	0.405	1.097	1.203
5	146.48	2.19	4.779	0.983	0.966
6	143.25	-1.05	1.097	3.284	10.787
sum			22.589		14.304
all data	144.30			2.432223	5.9157

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	135.531389	5	27.106	**11.37035**	2.533554	3.258E-06
within columns:	71.5183333	30	2.384			
Total:	207.049722			**Different ?**	1	YES!

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

Tukey's paired comparison test

Difference of means

Columns	1	2	3	4	5	6
1		-5.35	-3.87	-4.30	-5.85	-2.62
2	-5.35		1.48	1.05	-0.50	2.73
3	-3.87	1.48		-0.43	-1.98	1.25
4	-4.30	1.05	-0.43		-1.55	1.68
5	-5.85	-0.50	-1.98	-1.55		3.23
6	-2.62	2.73	1.25	1.68	3.23	

Critical Values

Columns	1	2	3	4	5	6
1		1.34	1.28	1.78	1.65	4.58
2	1.34		1.26	1.76	1.63	4.57
3	1.28	1.26		1.71	1.58	4.55
4	1.78	1.76	1.71		2.01	4.72
5	1.65	1.63	1.58	2.01		4.67
6	4.58	4.57	4.55	4.72	4.67	

Critical ?

Columns	1	2	3	4	5	6
1		1	1	1	1	0
2	1		1	0	0	0
3	1	1		0	1	0
4	1	0	0		0	0
5	1	0	1	0		0
6	0	0	0	0	0	
Sum	**4**	**2**	**3**	**1**	**2**	**0**
Different?	**1**	**0**	**1**	**0**	**0**	**0**

t-tests

two sample, equal variance, homoscedastic

Row vs. Ro	1	2	3	4	5	6
1		0.8662	0.9895	0.3575	0.8128	0.6487
2			0.8597	0.3046	0.6829	0.5352
3				0.3212	0.7727	0.5856
4					0.4279	0.5170
5						0.8128
6						

t-tests

two sample, equal variance, homoscedastic

Col vs Col	1	2	3	4	5	6
1		0.0000	0.0000	0.0000	0.0000	0.0855
2	0.0000		0.0028	0.0748	0.3307	0.0739
3	0.0000	0.0028		0.4185	0.0019	0.3811
4	0.0000	0.0748	0.4185		0.0275	0.2612
5	0.0000	0.3307	0.0019	0.0275		0.0435
6	0.0855	0.0739	0.3811	0.2612	0.0435	

Fail t-test at 0.05 level?

Col vs Col	1	2	3	4	5	6	Sum	Diff ?
1		1	1	1	1	0	4	1
2	1		1	0	0	0	2	0
3	1	1		0	1	0	3	1
4	1	0	0		1	0	2	0
5	1	0	1	1		1	4	1
6	0	0	0	0	1		1	0

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

Above Average? 1= true, 0 = false

0	1	0	1	1	0
0	1	1	1	1	0
0	1	1	1	1	0
0	1	0	1	1	1
0	1	1	0	1	1
0	1	1	0	1	1
0	6	4	4	6	3

Pavement Segregation Analysis Spreadsheet
Michigan State University - Pavement Research Center of Excellence

T.F. Wolff
July 1996

Location: Sample Data -- from St. John's
Date: 9/11/95
Description: Average of 3 samples, unit weight

(updated 7/12/96)

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	140.9	145.0	143.9	144.7	145.3	143.7
5	141.5	145.2	144.9	145.9	146.4	142.9
4	139.2	145.1	144.5	145.9	146.6	142.8
3	140.3	146.5	145.1	144.6	147.8	145.6
2	139.8	146.6	145.2	144.4	148.6	146.7
1	140.5	147.2	144.9	145.0	148.2	145.0
Edge						
Tukey test	DIFF !	--	--	--	DIFF !	--
paired t tests	DIFF !	--	DIFF !	--	DIFF !	--
6 of 6 test	DIFF !	DIFF !	--	--	DIFF !	--

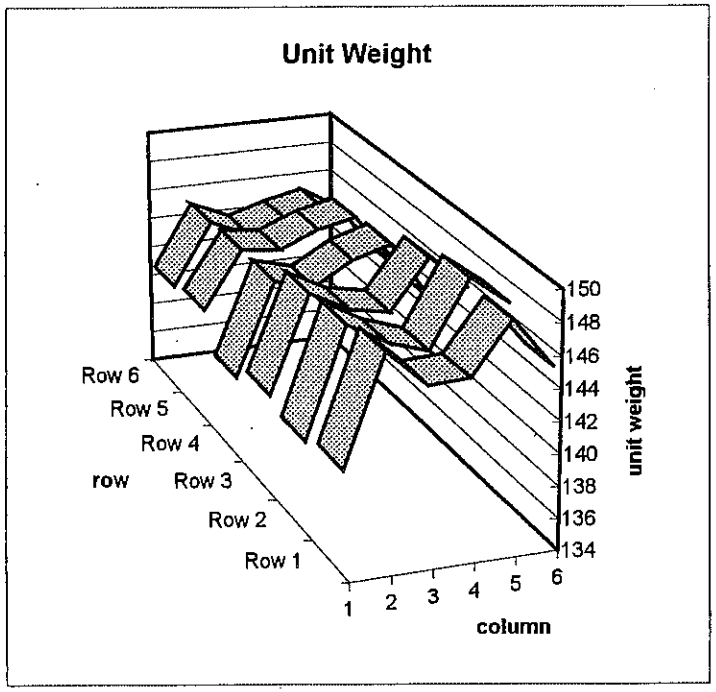
Clear *Clears everything for a new problem*
Enter data, or press a key below.

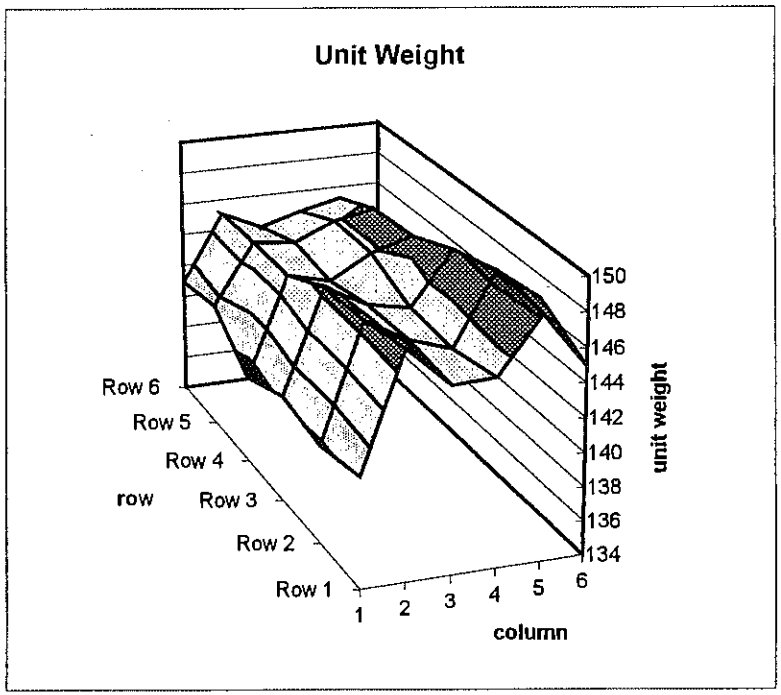
Example *Enters example segregated data*

Random *Enters a random sample*

YES ! <-- significant column differences?

Location: *Sample Data -- from St. John's*
Date: *9/11/95*
Description: *Average of 3 samples, unit weight*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

Michigan State University - Pavement Research Center of Excellence

Location: *Sample Data -- from St. John's*

Date: *9/11/95*

Description: *Average of 3 samples, unit weight*

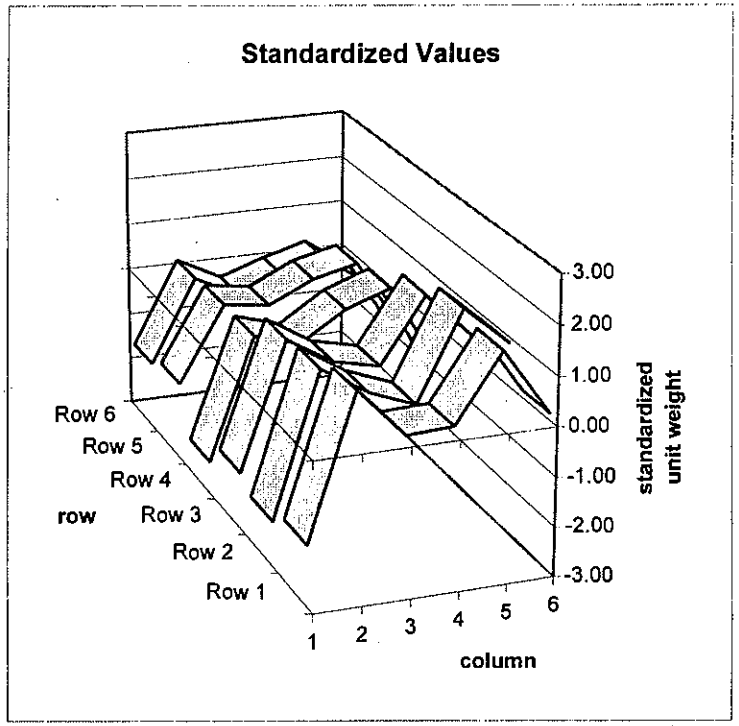
Color 1 *Color Above and Below Average*

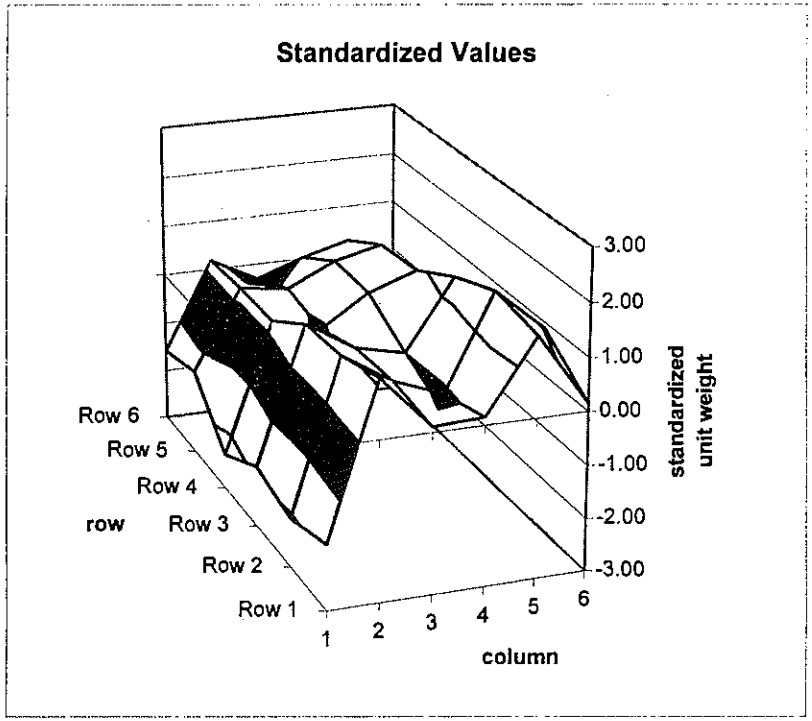
Clear Color

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	-1.58	0.18	-0.31	0.02	0.28	-0.38	-0.30	0.680
5	-1.35	0.24	0.11	0.55	0.78	-0.72	-0.07	0.811
4	-2.34	0.22	-0.06	0.54	0.86	-0.78	-0.26	1.161
3	-1.84	0.79	0.22	0.01	1.35	0.41	0.16	1.086
2	-2.08	0.86	0.26	-0.11	1.71	0.89	0.26	1.301
1	-1.78	1.12	0.11	0.15	1.52	0.15	0.21	1.142
Average	-1.83	0.57	0.05	0.19	1.08	-0.07	0.00	**0.00**	1.030
Std. Dev.	0.350	0.406	0.210	0.283	0.537	0.668	0.409		**1.00**

Location: *Sample Data -- from St. John's*
Date: *9/11/95*
Description: *Average of 3 samples, unit weight*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	140.36	-4.26	18.160	0.817	0.667
2	145.94	1.33	1.758	0.948	0.898
3	144.75	0.13	0.016	0.491	0.241
4	145.07	0.45	0.203	0.661	0.436
5	147.15	2.53	6.385	1.253	1.570
6	144.45	-0.17	0.028	1.558	2.428
sum			26.550		6.240
all data	144.62			2.332999	5.4429

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	159.298951	5	31.860	**30.63248**	2.533554	6.284E-11
within columns:	31.2019704	30	1.040			
Total:	190.500921			**Different ?**	**1**	**YES!**

ANOVA

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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Tukey's paired comparison test

Difference of means

Columns	1	2	3	4	5	6
1		-5.59	-4.39	-4.71	-6.79	-4.09
2	-5.59		1.20	0.88	-1.20	1.49
3	-4.39	1.20		-0.32	-2.40	0.29
4	-4.71	0.88	-0.32		-2.08	0.62
5	-6.79	-1.20	-2.40	-2.08		2.69
6	-4.09	1.49	0.29	0.62	2.69	

Critical Values

Columns	1	2	3	4	5	6
1		1.70	1.30	1.43	2.04	2.40
2	1.70		1.45	1.57	2.14	2.48
3	1.30	1.45		1.12	1.83	2.23
4	1.43	1.57	1.12		1.93	2.31
5	2.04	2.14	1.83	1.93		2.72
6	2.40	2.48	2.23	2.31	2.72	

Critical ?

Columns	1	2	3	4	5	6
1		-1	1	-1	1	1
2	1		0	0	0	0
3	1	0		0	1	0
4	1	0	0		1	0
5	1	0	1	1		0
6	1	0	0	0	0	
Sum	**5**	**1**	**2**	**2**	**3**	**1**
Different?	**1**	**0**	**0**	**0**	**1**	**0**

t-tests

two sample, equal variance, homoscedastic

Row vs. Ro	1	2	3	4	5	6
1		0.9512	0.9327	0.4937	0.6357	0.3690
2			0.8879	0.4846	0.6163	0.3763
3				0.5355	0.6947	0.4052
4					0.7456	0.9457
5						0.6044
6						

t-tests

two sample, equal variance, homoscedastic

Col vs Col	1	2	3	4	5	6
1		0.0000	0.0000	0.0000	0.0000	0.0002
2	0.0000		0.0204	0.0931	0.0906	0.0726
3	0.0000	0.0204		0.3586	0.0014	0.6677
4	0.0000	0.0931	0.3586		0.0049	0.3918
5	0.0000	0.0906	0.0014	0.0049		0.0080
6	0.0002	0.0726	0.6677	0.3918	0.0080	

Fail t-test at 0.05 level?

Col vs Col	1	2	3	4	5	6	Sum	Diff ?
1		1	1	1	1	1	5	1
2	1		1	0	0	0	2	0
3	1	1		0	1	0	3	1
4	1	0	0		1	0	2	0
5	1	0	1	1		1	4	1
6	1	0	0	0	1		2	0

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

Above Average? 1= true, 0 = false

0	1	0	1	1	0
0	1	1	1	1	0
0	1	0	1	1	0
0	1	1	1	1	1
0	1	1	0	1	1
0	1	1	1	1	1
0	6	4	5	6	3

Specific Gravity Test Data

MICHIGAN STATE UNIVERSITY PAVEMENT RESEARCH CENTER OF EXCELLENCE
SPECIFIC GRAVITY TEST DATA

Date	11/19/95	**Highway**	U.S. 27
Tested By	Tony Migaldi	**Site**	St. John's Bypass
Checked By	Steven J. Pantaleo		
Remarks	**Row 1 leveling coarse**	**File name**	stjrw1lc.xls

1	2	3	4	5	6	7	8	9	10
Specimen Number	**Course Description**	**Weight in air (g)**	**SSD Weight (g)**	**Weight in water (g)**	**Volume (SSD) [4-5](cm^3)**	**Volume (air) [3-5](cm^3)**	**Specific Gravity SSD [4/6]**	**Specific Gravity air [3/7]**	**Remarks**
111	**LC**	1733.6	1750.0	974.2	775.8	759.4	2.256	2.283	
112	**LC**	1680.8	1695.3	941.7	753.6	739.1	2.250	2.274	
113	**LC**	1599.0	1614.5	900.3	714.2	698.7	2.261	2.289	
121	**LC**	2019.2	2020.5	1155.3	865.2	863.9	2.335	2.337	
122	**LC**	1642.0	1644.3	938.2	706.1	703.8	2.329	2.333	
123	**LC**	1655.1	1656.6	949.7	706.9	705.4	2.343	2.346	
131	**LC**	1577.4	1578.3	906.3	672.0	671.1	2.349	2.350	
132	**LC**	2374.4	2378.6	1347.1	1031.5	1027.3	2.306	2.311	
133	**LC**	1824.2	1826.3	1044.4	781.9	779.8	2.336	2.339	
141	**LC**	1917.5	1922.2	1101.2	821.0	816.3	2.341	2.349	
142	**LC**	1828.5	1831.4	1047.3	784.1	781.2	2.336	2.341	
143	**LC**	2224.6	2227.6	1274.6	953.0	950.0	2.337	2.342	
151	**LC**	1776.1	1779.8	1018.5	761.3	757.6	2.338	2.344	
152	**LC**	1997.7	2002.4	1145.1	857.3	852.6	2.336	2.343	
153	**LC**	1696.0	1697.2	967.4	729.8	728.6	2.326	2.328	
161	**LC**	1870.3	1871.8	1085.5	786.3	784.8	2.381	2.383	
162	**LC**	1743.0	1744.2	1011.2	733.0	731.8	2.380	2.382	
163	**LC**	1626.0	1627.3	942.2	685.1	683.8	2.375	2.378	

MICHIGAN STATE UNIVERSITY PAVEMENT RESEARCH CENTER OF EXCELLENCE
SPECIFIC GRAVITY TEST DATA

Date	11/19/95	**Highway**	U.S. 27
Tested By	Tony Migaldi	**Site**	St. John's Bypass
Checked By	Steven J. Pantaleo		
Remarks	**Row 1 surface coarse**	**File name**	stjrw1sc.xls

1	2	3	4	5	6	7	8	9	10
Specimen Number	**Course Description**	**Weight in air (g)**	**SSD Weight (g)**	**Weight in water (g)**	**Volume (SSD) [4-5](cm^3)**	**Volume (air) [3-5](cm^3)**	**Specific Gravity SSD [4/6]**	**Specific Gravity air [3/7]**	**Remarks**
111	**SC**	1649.0	1651.0	939.4	711.6	709.6	2.320	2.324	
112	**SC**	1751.3	1755.5	1000.6	754.9	750.7	2.325	2.333	
113	**SC**	1816.3	1817.4	1033.2	784.2	783.1	2.318	2.319	
121	**SC**	1934.5	1935.4	1125.2	810.2	809.3	2.389	2.390	
122	**SC**	2141.6	2142.3	1245.3	897.0	896.3	2.388	2.389	
123	**SC**	1949.8	1951.7	1132.6	819.1	817.2	2.383	2.386	
131	**SC**	2114.1	2115.4	1217.5	897.9	896.6	2.356	2.358	
132	**SC**	1717.6	1718.9	987.8	731.1	729.8	2.351	2.354	
133	**SC**	2085.2	2086.6	1204.0	882.6	881.2	2.364	2.366	
141	**SC**	2203.6	2205.1	1269.5	935.6	934.1	2.357	2.359	
142	**SC**	2251.3	2252.7	1298.6	954.1	952.7	2.361	2.363	
143	**SC**	1710.6	1711.4	982.6	728.8	728.0	2.348	2.350	
151	**SC**	2240.2	2241.5	1312.9	928.6	927.3	2.414	2.416	
152	**SC**	2342.4	2344.7	1371.1	973.6	971.3	2.408	2.412	
153	**SC**	2020.1	2021.4	1184.0	837.4	836.1	2.414	2.416	
161	**SC**	1924.4	1926.3	1106.3	820.0	818.1	2.349	2.352	
162	**SC**	1957.9	1959.4	1126.9	832.5	831.0	2.354	2.356	
163	**SC**	1988.0	1989.7	1145.5	844.2	842.5	2.357	2.360	

MICHIGAN STATE UNIVERSITY PAVEMENT RESEARCH CENTER OF EXCELLENCE
SPECIFIC GRAVITY TEST DATA

Date	11/29/95	**Highway**	U.S. 27
Tested By	Tony Migaldi	**Site**	St. John's Bypass
Checked By	Steven J. Pantaleo		
Remarks	**Row 2 leveling coarse**	**File name**	stjrw2lc.xls

1	2	3	4	5	6	7	8	9	10
Specimen Number	**Course Description**	**Weight in air (g)**	**SSD Weight (g)**	**Weight in water (g)**	**Volume (SSD) [4-5](cm^3)**	**Volume (air) [3-5](cm^3)**	**Specific Gravity SSD [4/6]**	**Specific Gravity air [3/7]**	**Remarks**
211	**LC**	1731.4	1739.6	971.9	767.7	759.5	2.266	2.280	
212	**LC**	1881.7	1893.2	1054.7	838.5	827.0	2.258	2.275	
213	**LC**	1725.9	1733.7	965.4	768.3	760.5	2.257	2.269	
221	**LC**	1823.0	1824.5	1151.9	672.6	671.1	2.713	2.716	
222	**LC**	1717.4	1718.9	991.9	727.0	725.5	2.364	2.367	
223	**LC**	2010.2	2012.7	1154.3	858.4	855.9	2.345	2.349	
231	**LC**	1764.7	1766.2	1009.2	757.0	755.5	2.333	2.336	
232	**LC**	1677.7	1679.3	969.1	710.2	708.6	2.365	2.368	
233	**LC**	1853.8	1855.5	1067.3	788.2	786.5	2.354	2.357	
241	**LC**	1684.0	1689.3	961.8	727.5	722.2	2.322	2.332	
242	**LC**	1726.3	1732.5	991.9	740.6	734.4	2.339	2.351	
243	**LC**	1715.1	1723.4	986.3	737.1	728.8	2.338	2.353	
251	**LC**	1684.8	1685.4	961.5	723.9	723.3	2.328	2.329	
252	**LC**	1653.7	1656.1	946.5	709.6	707.2	2.334	2.338	
253	**LC**	1606.3	1608.2	916.1	692.1	690.2	2.324	2.327	
261	**LC**	1835.3	1836.4	1060.5	775.9	774.8	2.367	2.369	
262	**LC**	1834.7	1836.6	1057.3	779.3	777.4	2.357	2.360	
263	**LC**	1572.4	1573.8	909.7	664.1	662.7	2.370	2.373	

MICHIGAN STATE UNIVERSITY PAVEMENT RESEARCH CENTER OF EXCELLENCE
SPECIFIC GRAVITY TEST DATA

Date	11/29/95	**Highway**	U.S. 27
Tested By	Tony Migaldi	**Site**	St. John's Bypass
Checked By	Steven J. Pantaleo		
Remarks	**Row 2 surface coarse**	**File name**	stjrw2sc.xls

1	2	3	4	5	6	7	8	9	10
Specimen Number	**Course Description**	**Weight in air (g)**	**SSD Weight (g)**	**Weight in water (g)**	**Volume (SSD) [4-5](cm^3)**	**Volume (air) [3-5](cm^3)**	**Specific Gravity SSD [4/6]**	**Specific Gravity air [3/7]**	**Remarks**
211	**SC**	1831.0	1834.8	1043.7	791.1	787.3	2.319	2.326	
212	**SC**	1683.6	1686.1	965.6	720.5	718.0	2.340	2.345	
213	**SC**	1691.8	1695.6	967.7	727.9	724.1	2.329	2.336	
221	**SC**	1921.5	1923.2	1120.3	802.9	801.2	2.395	2.398	
222	**SC**	2009.1	2012.1	1167.9	844.2	841.2	2.383	2.388	
223	**SC**	1896.3	1897.4	1106.1	791.3	790.2	2.398	2.400	
231	**SC**	2184.3	2185.9	1259.1	926.8	925.2	2.359	2.361	
232	**SC**	2142.6	2144.1	1234.6	909.5	908.0	2.357	2.360	
233	**SC**	2053.5	2054.1	1179.7	874.4	873.8	2.349	2.350	
241	**SC**	2196.4	2199.5	1255.6	943.9	940.8	2.330	2.335	
242	**SC**	2119.3	2120.8	1219.6	901.2	899.7	2.353	2.356	
243	**SC**	2180.3	2182.2	1251.3	930.9	929.0	2.344	2.347	
251	**SC**	2220.1	2221.3	1297.5	923.8	922.6	2.405	2.406	
252	**SC**	2269.2	2270.0	1329.9	940.1	939.3	2.415	2.416	
253	**SC**	2202.6	2204.1	1289.8	914.3	912.8	2.411	2.413	
261	**SC**	2047.1	2048.9	1185.1	863.8	862.0	2.372	2.375	
262	**SC**	2051.9	2054.6	1186.9	867.7	865.0	2.368	2.372	
263	**SC**	2027.0	2027.6	1172.6	855.0	854.4	2.371	2.372	

MICHIGAN STATE UNIVERSITY PAVEMENT RESEARCH CENTER OF EXCELLENCE
SPECIFIC GRAVITY TEST DATA

Date	12/15/95	**Highway**	U.S. 27
Tested By	Tony Migaldi	**Site**	St. John's Bypass
Checked By	Steven J. Pantaleo		
Remarks	**Row 3 leveling coarse**	**File name**	stjrw3lc.xls

1	2	3	4	5	6	7	8	9	10
Specimen Number	**Course Description**	**Weight in air (g)**	**SSD Weight (g)**	**Weight in water (g)**	**Volume (SSD) [4-5](cm^3)**	**Volume (air) [3-5](cm^3)**	**Specific Gravity SSD [4/6]**	**Specific Gravity air [3/7]**	**Remarks**
311	**LC**	1763.3	1773.0	920.0	853.0	843.3	2.079	2.091	
312	**LC**	1705.7	1719.0	958.4	760.6	747.3	2.260	2.282	
313	**LC**	1637.7	1683.2	925.1	758.1	712.6	2.220	2.298	
321	**LC**	1807.4	1808.8	1041.2	767.6	766.2	2.356	2.359	
322	**LC**	1945.5	1947.0	1118.4	828.6	827.1	2.350	2.352	
323	**LC**	1799.6	1802.6	1033.2	769.4	766.4	2.343	2.348	
331	**LC**	1831.1	1832.0	1053.6	778.4	777.5	2.354	2.355	
332	**LC**	1818.1	1821.5	1043.1	778.4	775.0	2.340	2.346	
333	**LC**	1677.9	1681.2	958.5	722.7	719.4	2.326	2.332	
341	**LC**	1774.3	1780.4	1020.0	760.4	754.3	2.341	2.352	
342	**LC**	1765.1	1770.2	1010.6	759.6	754.5	2.330	2.339	
343	**LC**	1768.6	1776.2	1012.1	764.1	756.5	2.325	2.338	
351	**LC**	1716.2	1719.6	984.3	735.3	731.9	2.339	2.345	
352	**LC**	1655.0	1661.1	947.2	713.9	707.8	2.327	2.338	
353	**LC**	1744.8	1750.6	998.2	752.4	746.6	2.327	2.337	
361	**LC**	1890.7	1894.6	1090.5	804.1	800.2	2.356	2.363	
362	**LC**	1810.8	1815.3	1043.1	772.2	767.7	2.351	2.359	
363	**LC**	1802.8	1806.3	1043.0	763.3	759.8	2.366	2.373	

MICHIGAN STATE UNIVERSITY PAVEMENT RESEARCH CENTER OF EXCELLENCE
SPECIFIC GRAVITY TEST DATA

Date	12/15/95	**Highway**	U.S. 27
Tested By	Tony Migaldi	**Site**	St. John's Bypass
Checked By	Steven J. Pantaleo		
Remarks	**Row 3 surface coarse**	**File name**	stjrw3sc.xls

1	2	3	4	5	6	7	8	9	10
Specimen Number	**Course Description**	**Weight in air (g)**	**SSD Weight (g)**	**Weight in water (g)**	**Volume (SSD) [4-5](cm^3)**	**Volume (air) [3-5](cm^3)**	**Specific Gravity SSD [4/6]**	**Specific Gravity air [3/7]**	**Remarks**
311	**SC**	1718.0	1720.9	981.7	739.2	736.3	2.328	2.333	
312	**SC**	1791.8	1794.2	1020.4	773.8	771.4	2.319	2.323	
313	**SC**	1793.5	1796.8	1021.8	775.0	771.7	2.318	2.324	
321	**SC**	1913.6	1916.8	1115.5	801.3	798.1	2.392	2.398	
322	**SC**	1910.9	1913.2	1112.5	800.7	798.4	2.389	2.393	
323	**SC**	1999.7	2001.4	1162.7	838.7	837.0	2.386	2.389	
331	**SC**	2113.7	2114.8	1214.7	900.1	899.0	2.350	2.351	
332	**SC**	2038.0	2040.3	1175.6	864.7	862.4	2.360	2.363	
333	**SC**	2036.2	2038.3	1174.1	864.2	862.1	2.359	2.362	
341	**SC**	2159.1	2160.5	1240.7	919.8	918.4	2.349	2.351	
342	**SC**	2269.9	2273.4	1300.5	972.9	969.4	2.337	2.342	
343	**SC**	2094.4	2096.1	1203.1	893.0	891.3	2.347	2.350	
351	**SC**	2090.6	2091.9	1223.2	868.7	867.4	2.408	2.410	
352	**SC**	2105.6	2107.7	1224.4	883.3	881.2	2.386	2.389	
353	**SC**	2049.7	2052.2	1197.4	854.8	852.3	2.401	2.405	
361	**SC**	1960.8	1963.2	1131.5	831.7	829.3	2.360	2.364	
362	**SC**	1763.6	1767.1	1014.8	752.3	748.8	2.349	2.355	
363	**SC**	1922.0	1924.1	1112.1	812.0	809.9	2.370	2.373	

MICHIGAN STATE UNIVERSITY PAVEMENT RESEARCH CENTER OF EXCELLENCE
SPECIFIC GRAVITY TEST DATA

Date	12/16/95	**Highway**	U.S. 27
Tested By	Tony Migaldi	**Site**	St. John's Bypass
Checked By	Steven J. Pantaleo		
Remarks	**Row 4 leveling coarse**	**File name**	stjrw4lc.xls

1	2	3	4	5	6	7	8	9	10
Specimen Number	**Course Description**	**Weight in air (g)**	**SSD Weight (g)**	**Weight in water (g)**	**Volume (SSD) [4-5](cm^3)**	**Volume (air) [3-5](cm^3)**	**Specific Gravity SSD [4/6]**	**Specific Gravity air [3/7]**	**Remarks**
411	**LC**	2483.4	2511.2	1398.9	1112.3	1084.5	2.258	2.290	
412	**LC**	1673.2	1688.4	936.5	751.9	736.7	2.246	2.271	
413	**LC**	1673.6	1678.6	934.4	744.2	739.2	2.256	2.264	
421	**LC**	1866.7	1870.4	1063.2	807.2	803.5	2.317	2.323	
422	**LC**	1906.0	1910.5	1087.2	823.3	818.8	2.321	2.328	
423	**LC**	2182.7	2185.7	1244.9	940.8	937.8	2.323	2.327	
431	**LC**	1704.4	1705.3	972.4	732.9	732.0	2.327	2.328	
432	**LC**	1570.4	1573.2	898.7	674.5	671.7	2.332	2.338	
433	**LC**	1661.5	1664.4	948.4	716.0	713.1	2.325	2.330	
441	**LC**	1622.6	1627.6	931.2	696.4	691.4	2.337	2.347	
442	**LC**	1960.0	1964.6	1122.0	842.6	838.0	2.332	2.339	
443	**LC**	1839.2	1842.2	1053.0	789.2	786.2	2.334	2.339	
451	**LC**	2007.6	2014.0	1149.9	864.1	857.7	2.331	2.341	
452	**LC**	1742.8	1745.4	996.1	749.3	746.7	2.329	2.334	
453	**LC**	1679.0	1680.2	960.4	719.8	718.6	2.334	2.336	
461	**LC**	1897.4	1902.1	1094.0	808.1	803.4	2.354	2.362	
462	**LC**	1688.9	2282.3	975.7	1306.6	713.2	1.747	2.368	
463	**LC**	1817.6	2232.5	1054.4	1178.1	763.2	1.895	2.382	

MICHIGAN STATE UNIVERSITY PAVEMENT RESEARCH CENTER OF EXCELLENCE
SPECIFIC GRAVITY TEST DATA

Date	12/16/95	**Highway**	U.S. 27
Tested By	Tony Migaldi	**Site**	St. John's Bypass
Checked By	Steven J. Pantaleo		
Remarks	**Row 4 surface coarse**	**File name**	stjrw4sc.xls

1	2	3	4	5	6	7	8	9	10
Specimen Number	**Course Description**	**Weight in air (g)**	**SSD Weight (g)**	**Weight in water (g)**	**Volume (SSD) [4-5](cm^3)**	**Volume (air) [3-5](cm^3)**	**Specific Gravity SSD [4/6]**	**Specific Gravity air [3/7]**	**Remarks**
411	**SC**	1730.2	1731.7	982.6	749.1	747.6	2.312	2.314	
412	**SC**	1727.1	1729.1	987.5	741.6	739.6	2.332	2.335	
413	**SC**	1641.7	1643.0	936.6	706.4	705.1	2.326	2.328	
421	**SC**	1855.7	1856.8	1081.5	775.3	774.2	2.395	2.397	
422	**SC**	1780.3	1781.0	1039.1	741.9	741.2	2.401	2.402	
423	**SC**	1819.5	1820.6	1061.2	759.4	758.3	2.397	2.399	
431	**SC**	2063.6	2065.0	1191.9	873.1	871.7	2.365	2.367	
432	**SC**	2104.1	2106.1	1212.9	893.2	891.2	2.358	2.361	
433	**SC**	1989.3	1990.3	1144.0	846.3	845.3	2.352	2.353	
441	**SC**	2205.3	2207.1	1267.9	939.2	937.4	2.350	2.353	
442	**SC**	2065.6	2066.1	1190.7	875.4	874.9	2.360	2.361	
443	**SC**	2129.8	2131.1	1226.7	904.4	903.1	2.356	2.358	
451	**SC**	2000.5	2002.2	1170.5	831.7	830.0	2.407	2.410	
452	**SC**	1964.4	1965.8	1146.6	819.2	817.8	2.400	2.402	
453	**SC**	2014.2	2015.3	1176.6	838.7	837.6	2.403	2.405	
461	**SC**	1915.9	1919.0	1098.7	820.3	817.2	2.339	2.344	
462	**SC**	1933.8	1935.8	1119.1	816.7	814.7	2.370	2.374	
463	**SC**	1883.6	1885.9	1088.3	797.6	795.3	2.364	2.368	

MICHIGAN STATE UNIVERSITY PAVEMENT RESEARCH CENTER OF EXCELLENCE
SPECIFIC GRAVITY TEST DATA

Date	12/19/95	**Highway**	U.S. 27
Tested By	Tony Migaldi	**Site**	St. John's Bypass
Checked By	Steven J. Pantaleo		
Remarks	**Row 5 leveling coarse**	**File name**	stjrw5lc.xls

1	2	3	4	5	6	7	8	9	10
Specimen Number	**Course Description**	**Weight in air (g)**	**SSD Weight (g)**	**Weight in water (g)**	**Volume (SSD) [4-5](cm^3)**	**Volume (air) [3-5](cm^3)**	**Specific Gravity SSD [4/6]**	**Specific Gravity air [3/7]**	**Remarks**
511	**LC**	1486.9	1497.3	831.4	665.9	655.5	2.249	2.268	
512	**LC**	1484.6	1494.3	833.6	660.7	651.0	2.262	2.280	
513	**LC**	1617.5	1627.7	906.1	721.6	711.4	2.256	2.274	
521	**LC**	1962.0	1969.7	1119.3	850.4	842.7	2.316	2.328	
522	**LC**	1536.9	1539.1	881.1	658.0	655.8	2.339	2.344	
523	**LC**	1554.6	1556.5	887.2	669.3	667.4	2.326	2.329	
531	**LC**	1588.4	1590.0	906.4	683.6	682.0	2.326	2.329	
532	**LC**	1539.9	1542.0	884.6	657.4	655.3	2.346	2.350	
533	**LC**	1732.7	1736.0	986.7	749.3	746.0	2.317	2.323	
541	**LC**	1888.8	1895.1	1086.4	808.7	802.4	2.343	2.354	
542	**LC**	1685.3	1690.3	972.9	717.4	712.4	2.356	2.366	
543	**LC**	1936.9	1943.7	1110.1	833.6	826.8	2.332	2.343	
551	**LC**	1619.4	1621.6	922.2	699.4	697.2	2.319	2.323	
552	**LC**	1843.6	1848.0	1054.1	793.9	789.5	2.328	2.335	
553	**LC**	1503.6	1505.2	860.7	644.5	642.9	2.335	2.339	
561	**LC**	1785.9	1794.3	1052.3	742.0	733.6	2.418	2.434	
562	**LC**	1894.9	1905.1	1039.1	866.0	855.8	2.200	2.214	
563	**LC**	1726.7	1745.9	990.6	755.3	736.1	2.312	2.346	

MICHIGAN STATE UNIVERSITY PAVEMENT RESEARCH CENTER OF EXCELLENCE
SPECIFIC GRAVITY TEST DATA

Date	12/19/95	**Highway**	U.S. 27
Tested By	Tony Migaldi	**Site**	St. John's Bypass
Checked By	Steven J. Pantaleo		
Remarks	**Row 5 surface coarse**	**File name**	stjrw5sc.xls

1	2	3	4	5	6	7	8	9	10
Specimen Number	**Course Description**	**Weight in air (g)**	**SSD Weight (g)**	**Weight in water (g)**	**Volume (SSD) [4-5](cm^3)**	**Volume (air) [3-5](cm^3)**	**Specific Gravity SSD [4/6]**	**Specific Gravity air [3/7]**	**Remarks**
511	**SC**	1835.4	1838.1	1045.9	792.2	789.5	2.320	2.325	
512	**SC**	1775.8	1778.3	1017.1	761.2	758.7	2.336	2.341	
513	**SC**	1690.9	1693.6	965.4	728.2	725.5	2.326	2.331	
521	**SC**	1723.2	1724.6	1004.7	719.9	718.5	2.396	2.398	
522	**SC**	2031.3	2031.9	1176.5	855.4	854.8	2.375	2.376	
523	**SC**	1984.4	1985.2	1156.1	829.1	828.3	2.394	2.396	
531	**SC**	2051.2	2053.8	1182.1	871.7	869.1	2.356	2.360	
532	**SC**	2135.2	2137.3	1225.6	911.7	909.6	2.344	2.347	
533	**SC**	2050.6	2053.2	1173.6	879.6	877.0	2.334	2.338	
541	**SC**	2110.4	2116.3	1214.9	901.4	895.5	2.348	2.357	
542	**SC**	2079.3	2085.3	1196.8	888.5	882.5	2.347	2.356	
543	**SC**	1955.2	1955.3	1124.8	830.5	830.4	2.354	2.355	
551	**SC**	2037.2	2038.1	1179.4	858.7	857.8	2.373	2.375	
552	**SC**	1802.3	1803.1	1052.7	750.4	749.6	2.403	2.404	
553	**SC**	2092.3	2092.9	1219.1	873.8	873.2	2.395	2.396	
561	**SC**	1891.6	1894.9	1088.9	806.0	802.7	2.351	2.357	
562	**SC**	1966.4	1968.3	1127.6	840.7	838.8	2.341	2.344	
563	**SC**	1878.2	1880.1	1075.7	804.4	802.5	2.337	2.340	

MICHIGAN STATE UNIVERSITY PAVEMENT RESEARCH CENTER OF EXCELLENCE
SPECIFIC GRAVITY TEST DATA

Date	12/19/95	**Highway**	U.S. 27
Tested By	Tony Migaldi	**Site**	St. John's Bypass
Checked By	Steven J. Pantaleo		
Remarks	**Row 6 leveling coarse**	**File name**	stjrw6lc.xls

1	2	3	4	5	6	7	8	9	10
Specimen Number	**Course Description**	**Weight in air (g)**	**SSD Weight (g)**	**Weight in water (g)**	**Volume (SSD) [4-5](cm^3)**	**Volume (air) [3-5](cm^3)**	**Specific Gravity SSD [4/6]**	**Specific Gravity air [3/7]**	**Remarks**
611	**LC**	1702.3	1717.8	958.6	759.2	743.7	2.263	2.289	
612	**LC**	1454.6	1460.9	817.0	643.9	637.6	2.269	2.281	
613	**LC**	1665.6	1675.4	948.4	727.0	717.2	2.305	2.322	
621	**LC**	1836.1	1837.5	1051.4	786.1	784.7	2.337	2.340	
622	**LC**	1520.9	1524.5	868.5	656.0	652.4	2.324	2.331	
623	**LC**	1888.6	1890.4	1094.4	796.0	794.2	2.375	2.378	
631	**LC**	1845.0	1858.8	1060.2	798.6	784.8	2.328	2.351	
632	**LC**	1885.1	1895.1	995.6	899.5	889.5	2.107	2.119	
633	**LC**	1608.7	1928.1	988.2	939.9	620.5	2.051	2.593	
641	**LC**	1925.6	1984.2	1190.2	794.0	735.4	2.499	2.618	
642	**LC**	1835.2	1838.9	1129.4	709.5	705.8	2.592	2.600	
643	**LC**	1825.0	1828.9	1171.0	657.9	654.0	2.780	2.791	
651	**LC**	1728.3	1789.0	949.6	839.4	778.7	2.131	2.219	
652	**LC**	2216.9	2219.1	1009.1	1210.0	1207.8	1.834	1.835	
653	**LC**	2382.6	2525.4	1235.6	1289.8	1147.0	1.958	2.077	
661	**LC**	1673.0	1675.7	1032.8	642.9	640.2	2.606	2.613	
662	**LC**	2174.8	2318.0	1208.9	1109.1	965.9	2.090	2.252	
663	**LC**	2094.3	2143.4	1079.0	1064.4	1015.3	2.014	2.063	

MICHIGAN STATE UNIVERSITY PAVEMENT RESEARCH CENTER OF EXCELLENCE
SPECIFIC GRAVITY TEST DATA

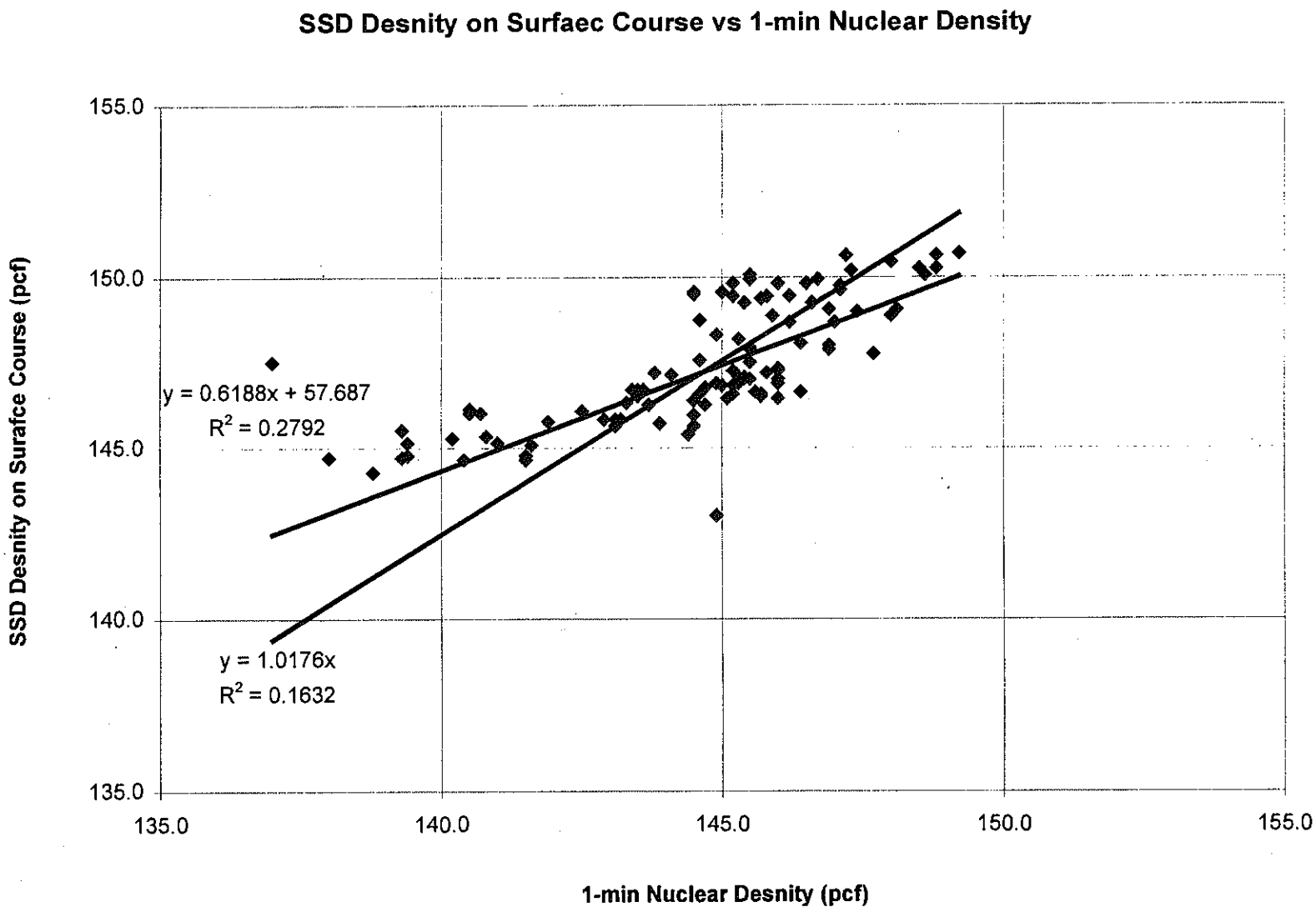
Date	12/19/95	**Highway**	U.S. 27
Tested By	Tony Migaldi	**Site**	St. John's Bypass
Checked By	Steven J. Pantaleo		
Remarks	**Row 6 surface coarse**	**File name**	stjrw6sc.xls

1	2	3	4	5	6	7	8	9	10
Specimen Number	**Course Description**	**Weight in air (g)**	**SSD Weight (g)**	**Weight in water (g)**	**Volume (SSD) [4-5](cm^3)**	**Volume (air) [3-5](cm^3)**	**Specific Gravity SSD [4/6]**	**Specific Gravity air [3/7]**	**Remarks**
611	**SC**	2034.7	2314.9	1140.0	1174.9	894.7	1.970	2.274	
612	**SC**	1604.0	1623.4	930.1	693.3	673.9	2.342	2.380	
613	**SC**	1682.8	1706.8	977.4	729.4	705.4	2.340	2.386	
621	**SC**	1914.3	1915.4	1116.4	799.0	797.9	2.397	2.399	
622	**SC**	2037.0	2038.4	1183.4	855.0	853.6	2.384	2.386	
623	**SC**	1829.2	1830.7	1068.1	762.6	761.1	2.401	2.403	
631	**SC**	2019.1	2020.7	1159.4	861.3	859.7	2.346	2.349	
632	**SC**	1950.6	1952.4	1119.7	832.7	830.9	2.345	2.348	
633	**SC**	1942.0	1944.8	1112.0	832.8	830.0	2.335	2.340	
641	**SC**	2114.0	2115.6	1215.7	899.9	898.3	2.351	2.353	
642	**SC**	2232.2	2234.5	1284.9	949.6	947.3	2.353	2.356	
643	**SC**	2222.4	2224.3	1279.4	944.9	943.0	2.354	2.357	
651	**SC**	2411.6	2415.0	1405.3	1009.7	1006.3	2.392	2.397	
652	**SC**	2188.8	2192.1	1269.7	922.4	919.1	2.377	2.381	
653	**SC**	2032.1	2035.2	1188.9	846.3	843.2	2.405	2.410	
661	**SC**	1917.3	1920.4	1097.5	822.9	819.8	2.334	2.339	
662	**SC**	1906.1	1911.0	1077.2	833.8	828.9	2.292	2.300	
663	**SC**	1857.8	1861.1	1064.8	796.3	793.0	2.337	2.343	

Regression Analysis between Nuclear and Lab Density

St. John's Density Data

Test Number	$\gamma_{nuclear}$ (lbs/ft^3)	surface coarse				leveling coarse			
		$S.G._{SSD}$	$S.G._{AIR}$	γ_{SSD} (lbs/ft^3)	γ_{AIR} (lbs/ft^3)	$S.G._{SSD}$	$S.G._{AIR}$	γ_{SSD} (lbs/ft^3)	γ_{AIR} (lbs/ft^3)
151	148.80	2.414	2.416	150.63	150.76	2.338	2.344	145.89	146.27
152	148.50	2.408	2.412	150.26	150.51	2.336	2.343	145.77	146.20
153	147.20	2.414	2.416	150.63	150.76	2.326	2.328	145.14	145.27
251	148.60	2.405	2.406	150.07	150.13	2.328	2.329	145.27	145.33
252	149.20	2.415	2.416	150.70	150.76	2.334	2.338	145.64	145.89
253	148.00	2.411	2.413	150.45	150.57	2.324	2.327	145.02	145.20
351	148.80	2.408	2.410	150.26	150.38	2.339	2.345	145.95	146.33
352	148.00	2.386	2.389	148.89	149.07	2.327	2.338	145.20	145.89
353	146.50	2.401	2.405	149.82	150.07	2.327	2.337	145.20	145.83
451	147.30	2.407	2.410	150.20	150.38	2.331	2.341	145.45	146.08
452	147.10	2.400	2.402	149.76	149.88	2.329	2.334	145.33	145.64
453	145.50	2.403	2.405	149.95	150.07	2.334	2.336	145.64	145.77
551	146.40	2.373	2.375	148.08	148.20	2.319	2.323	144.71	144.96
552	146.70	2.403	2.404	149.95	150.01	2.328	2.335	145.27	145.70
553	146.20	2.395	2.396	149.45	149.51	2.335	2.339	145.70	145.95
651	145.40	2.392	2.397	149.26	149.57	2.131	2.219	132.97	138.47
652	144.90	2.377	2.381	148.32	148.57	1.834	1.835	114.44	114.50
653	145.50	2.405	2.410	150.07	150.38	1.958	2.077	122.18	129.60
161	144.60	2.349	2.352	146.58	146.76	2.381	2.383	148.57	148.70
162	144.90	2.354	2.356	146.89	147.01	2.380	2.382	148.51	148.64
163	145.40	2.357	2.360	147.08	147.26	2.375	2.378	148.20	148.39
261	146.90	2.372	2.375	148.01	148.20	2.367	2.369	147.70	147.83
262	147.70	2.368	2.372	147.76	148.01	2.357	2.360	147.08	147.26
263	145.50	2.371	2.372	147.95	148.01	2.370	2.373	147.89	148.08
361	146.00	2.360	2.364	147.26	147.51	2.356	2.363	147.01	147.45
362	145.20	2.349	2.355	146.58	146.95	2.351	2.359	146.70	147.20
363	145.50	2.370	2.373	147.89	148.08	2.366	2.373	147.64	148.08
461	144.50	2.339	2.344	145.95	146.27	2.354	2.362	146.89	147.39
462	146.90	2.370	2.374	147.89	148.14	1.747	2.368	109.01	147.76
463	137.00	2.364	2.368	147.51	147.76	1.895	2.382	118.25	148.64
561	143.40	2.351	2.357	146.70	147.08	2.418	2.434	150.88	151.88
562	142.50	2.341	2.344	146.08	146.27	2.200	2.214	137.28	138.15
563	142.90	2.337	2.340	145.83	146.02	2.312	2.346	144.27	146.39
661	143.10	2.334	2.339	145.64	145.95	2.606	2.613	162.61	163.05
662	144.90	2.292	2.300	143.02	143.52	2.090	2.252	130.42	140.52
663	143.20	2.337	2.343	145.83	146.20	2.014	2.063	125.67	128.73


SSD Desnity on Surfaec Course vs 1-min Nuclear Density
SSD Desnity on Surafce Course (pcf)
155.0
150.0
145.0
140.0
135.0
y = 0.6188x + 57.687
R2 = 0.2792
y = 1.0176x
R2 = 0.1632
135.0
140.0
145.0
150.0
155.0
1-min Nuclear Desnity (pcf)

St. John's Density Data

Test Number	$\gamma_{nuclear}$ (lbs/ft^3)	surface coarse				leveling coarse			
		$S.G._{SSD}$	$S.G._{AIR}$	γ_{SSD} (lbs/ft^3)	γ_{AIR} (lbs/ft^3)	$S.G._{SSD}$	$S.G._{AIR}$	γ_{SSD} (lbs/ft^3)	γ_{AIR} (lbs/ft^3)
111	139.40	2.320	2.324	144.77	145.02	2.256	2.283	140.77	142.46
112	141.60	2.325	2.333	145.08	145.58	2.250	2.274	140.40	141.90
113	140.40	2.318	2.319	144.64	144.71	2.261	2.289	141.09	142.83
211	138.00	2.319	2.326	144.71	145.14	2.266	2.280	141.40	142.27
212	140.50	2.340	2.345	146.02	146.33	2.258	2.275	140.90	141.96
213	140.80	2.329	2.336	145.33	145.77	2.257	2.269	140.84	141.59
311	140.20	2.328	2.333	145.27	145.58	2.079	2.091	129.73	130.48
312	139.30	2.319	2.323	144.71	144.96	2.260	2.282	141.02	142.40
313	141.50	2.318	2.324	144.64	145.02	2.220	2.298	138.53	143.40
411	138.80	2.312	2.314	144.27	144.39	2.258	2.290	140.90	142.90
412	139.30	2.332	2.335	145.52	145.70	2.246	2.271	140.15	141.71
413	139.40	2.326	2.328	145.14	145.27	2.256	2.264	140.77	141.27
511	141.50	2.320	2.325	144.77	145.08	2.249	2.268	140.34	141.52
512	141.90	2.336	2.341	145.77	146.08	2.262	2.280	141.15	142.27
513	141.00	2.326	2.331	145.14	145.45	2.256	2.274	140.77	141.90
611	141.60	1.970	2.274	122.93	141.90	2.263	2.289	141.21	142.83
612	140.50	2.342	2.380	146.14	148.51	2.269	2.281	141.59	142.33
613	140.70	2.340	2.386	146.02	148.89	2.305	2.322	143.83	144.89
121	148.10	2.389	2.390	149.07	149.14	2.335	2.337	145.70	145.83
122	147.40	2.388	2.389	149.01	149.07	2.329	2.333	145.33	145.58
123	146.20	2.383	2.386	148.70	148.89	2.343	2.346	146.20	146.39
221	145.80	2.395	2.398	149.45	149.64	2.713	2.716	169.29	169.48
222	147.00	2.383	2.388	148.70	149.01	2.364	2.367	147.51	147.70
223	147.10	2.398	2.400	149.64	149.76	2.345	2.349	146.33	146.58
321	146.60	2.392	2.398	149.26	149.64	2.356	2.359	147.01	147.20
322	146.90	2.389	2.393	149.07	149.32	2.350	2.352	146.64	146.76
323	145.90	2.386	2.389	148.89	149.07	2.343	2.348	146.20	146.52
421	145.20	2.395	2.397	149.45	149.57	2.317	2.323	144.58	144.96
422	145.20	2.401	2.402	149.82	149.88	2.321	2.328	144.83	145.27
423	145.00	2.397	2.399	149.57	149.70	2.323	2.327	144.96	145.20
521	144.50	2.396	2.398	149.51	149.64	2.316	2.328	144.52	145.27
522	145.30	2.375	2.376	148.20	148.26	2.339	2.344	145.95	146.27
523	145.70	2.394	2.396	149.39	149.51	2.326	2.329	145.14	145.33
621	144.50	2.397	2.399	149.57	149.70	2.337	2.340	145.83	146.02
622	144.60	2.384	2.386	148.76	148.89	2.324	2.331	145.02	145.45
623	146.00	2.401	2.403	149.82	149.95	2.375	2.378	148.20	148.39

St. John's Density Data

Test Number	$\gamma_{nuclear}$ (lbs/ft^3)	surface coarse				leveling coarse			
		$S.G._{SSD}$	$S.G._{AIR}$	γ_{SSD} (lbs/ft^3)	γ_{AIR} (lbs/ft^3)	$S.G._{SSD}$	$S.G._{AIR}$	γ_{SSD} (lbs/ft^3)	γ_{AIR} (lbs/ft^3)
131	145.50	2.356	2.358	147.01	147.14	2.349	2.350	146.58	146.64
132	143.60	2.351	2.354	146.70	146.89	2.306	2.311	143.89	144.21
133	145.50	2.364	2.366	147.51	147.64	2.336	2.339	145.77	145.95
231	145.80	2.359	2.361	147.20	147.33	2.333	2.336	145.58	145.77
232	145.30	2.357	2.360	147.08	147.26	2.365	2.368	147.58	147.76
233	144.60	2.349	2.350	146.58	146.64	2.354	2.357	146.89	147.08
331	145.60	2.350	2.351	146.64	146.70	2.354	2.355	146.89	146.95
332	146.00	2.360	2.363	147.26	147.45	2.340	2.346	146.02	146.39
333	143.80	2.359	2.362	147.20	147.39	2.326	2.332	145.14	145.52
431	144.60	2.365	2.367	147.58	147.70	2.327	2.328	145.20	145.27
432	144.10	2.358	2.361	147.14	147.33	2.332	2.338	145.52	145.89
433	144.70	2.352	2.353	146.76	146.83	2.325	2.330	145.08	145.39
531	145.40	2.356	2.360	147.01	147.26	2.326	2.329	145.14	145.33
532	144.70	2.344	2.347	146.27	146.45	2.346	2.350	146.39	146.64
533	144.50	2.334	2.338	145.64	145.89	2.317	2.323	144.58	144.96
631	144.50	2.346	2.349	146.39	146.58	2.328	2.351	145.27	146.70
632	143.30	2.345	2.348	146.33	146.52	2.107	2.119	131.48	132.23
633	143.90	2.335	2.340	145.70	146.02	2.051	2.593	127.98	161.80
141	145.40	2.357	2.359	147.08	147.20	2.341	2.349	146.08	146.58
142	146.00	2.361	2.363	147.33	147.45	2.336	2.341	145.77	146.08
143	143.50	2.348	2.350	146.52	146.64	2.337	2.342	145.83	146.14
241	144.40	2.330	2.335	145.39	145.70	2.322	2.332	144.89	145.52
242	145.00	2.353	2.356	146.83	147.01	2.339	2.351	145.95	146.70
243	143.70	2.344	2.347	146.27	146.45	2.338	2.353	145.89	146.83
341	145.70	2.349	2.351	146.58	146.70	2.341	2.352	146.08	146.76
342	143.10	2.337	2.342	145.83	146.14	2.330	2.339	145.39	145.95
343	145.10	2.347	2.350	146.45	146.64	2.325	2.338	145.08	145.89
441	146.40	2.350	2.353	146.64	146.83	2.337	2.347	145.83	146.45
442	145.20	2.360	2.361	147.26	147.33	2.332	2.339	145.52	145.95
443	146.00	2.356	2.358	147.01	147.14	2.334	2.339	145.64	145.95
541	145.70	2.348	2.357	146.52	147.08	2.343	2.354	146.20	146.89
542	146.00	2.347	2.356	146.45	147.01	2.356	2.366	147.01	147.64
543	146.00	2.354	2.355	146.89	146.95	2.332	2.343	145.52	146.20
641	143.50	2.351	2.353	146.70	146.83	2.499	2.618	155.94	163.36
642	145.20	2.353	2.356	146.83	147.01	2.592	2.600	161.74	162.24
643	145.30	2.354	2.357	146.89	147.08	2.780	2.791	173.47	174.16

ssd SC vs. nuc

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.528421238
R Square	0.279229005
Adjusted R Square	0.272429278
Standard Error	2.503789945
Observations	108

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regression	1	257.4333886	257.4334	41.06474	4.16E-09
Residual	106	664.5101933	6.268964		
Total	107	921.9435819			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*ower 95%*	*pper 95%*	*ower 95.0*
Intercept	57.68726912	13.9674173	4.130131	7.25E-05	29.99549	85.37905	29.99549
X Variable 1	0.618820807	0.096567361	6.408178	4.16E-09	0.427367	0.810275	0.427367

SUMMARY OUTPUT

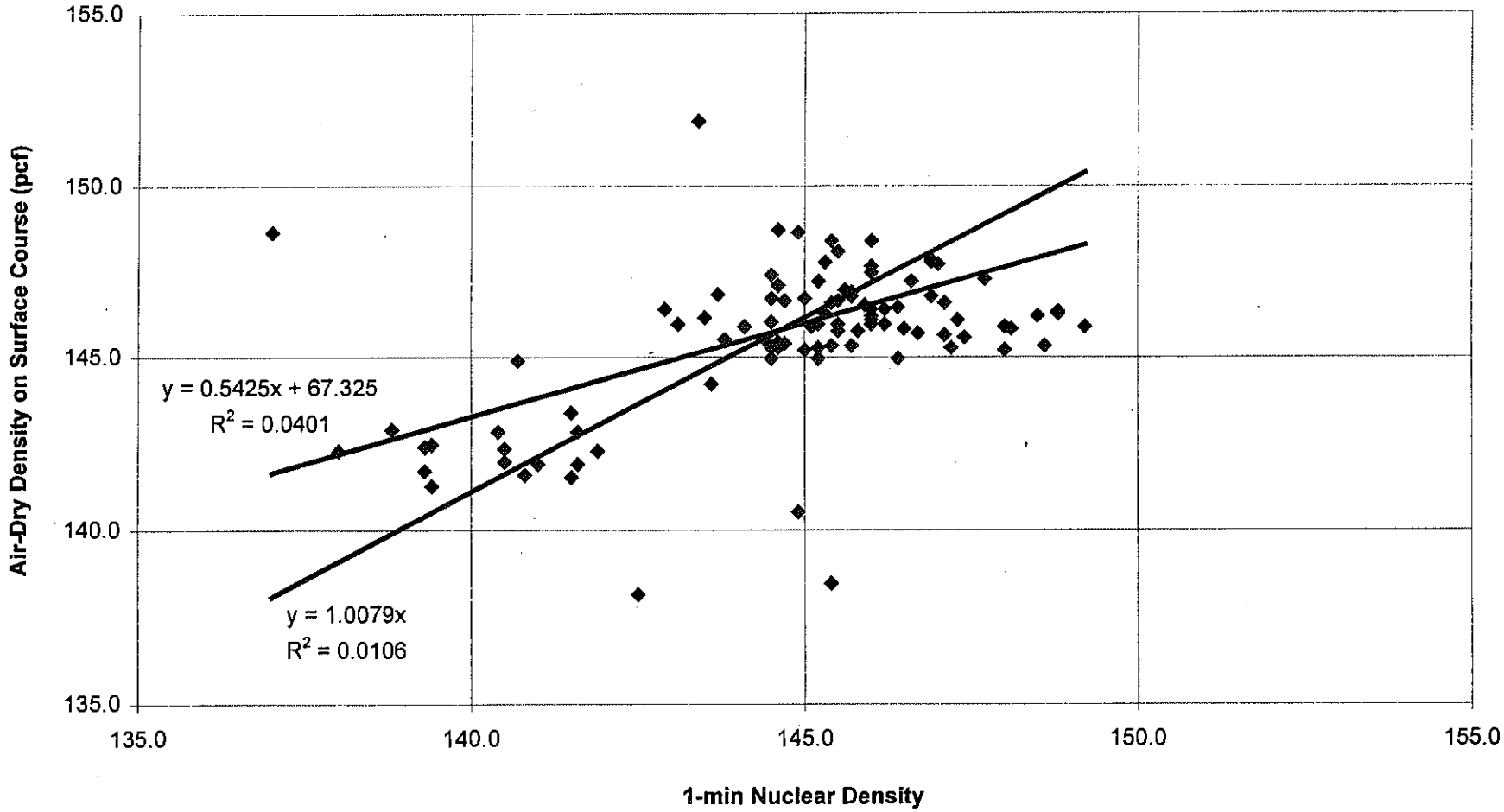
Regression Statistics	
Multiple R	0.275738
R Square	0.076031
Adjusted	0.067315
Standard	8.050062
Observati	108

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regressio	1	565.25	565.25	8.722522	0.003872
Residual	106	6869.171	64.8035		
Total	107	7434.421			

	Coefficient	*andard Err*	*t Stat*	*P-value*	*ower 95%*	*pper 95% wer 95.00*	*per 95.00*	
Intercept	11.3614	44.90735	0.252996	0.800761	-77.6718	100.3946	-77.6718	100.3946
X Variable	0.916965	0.310479	2.953392	0.003872	0.301411	1.532519	0.301411	1.532519

Air-Dry Density on Leveling Course vs 1-min Nuclear Density



SUMMARY OUTPUT

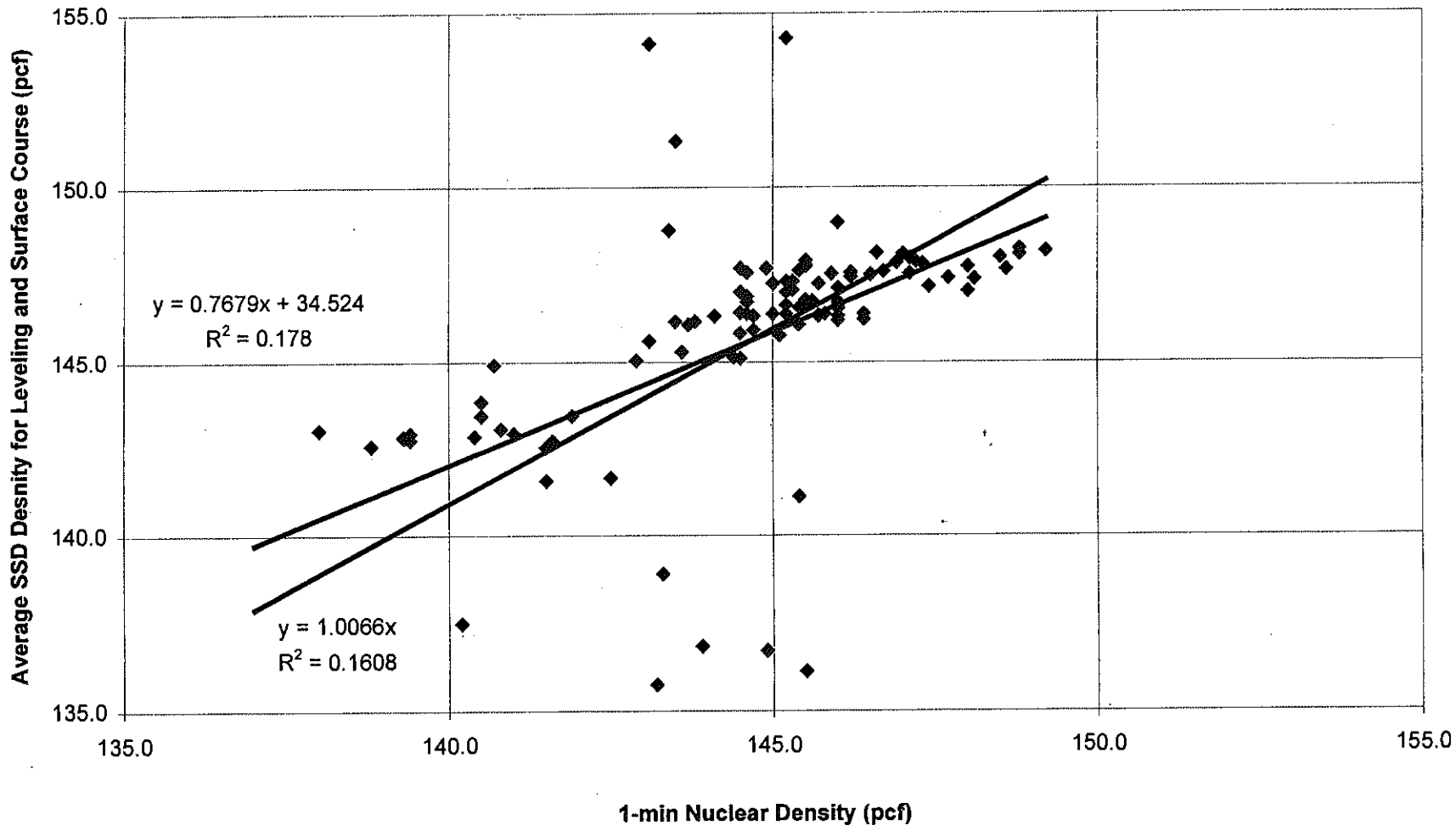
Regression Statistics	
Multiple R	0.200157
R Square	0.040063
Adjusted	0.031007
Standard	6.687233
Observati	108

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regressio	1	197.832	197.832	4.423884	0.037806
Residual	106	4740.223	44.71908		
Total	107	4938.055			

	Coefficient	*andard Err*	*t Stat*	*P-value*	*ower 95%*	*pper 95%*	*wer 95.00*	*per 95.00*
Intercept	67.32518	37.3048	1.804733	0.073956	-6.63525	141.2856	-6.63525	141.2856
X Variable	0.542476	0.257916	2.103303	0.037806	0.031132	1.053821	0.031132	1.053821

Average SSD Density for Leveling and Surafce Course vs 1-min Nuclear Desnity



avg ssd vs nuc

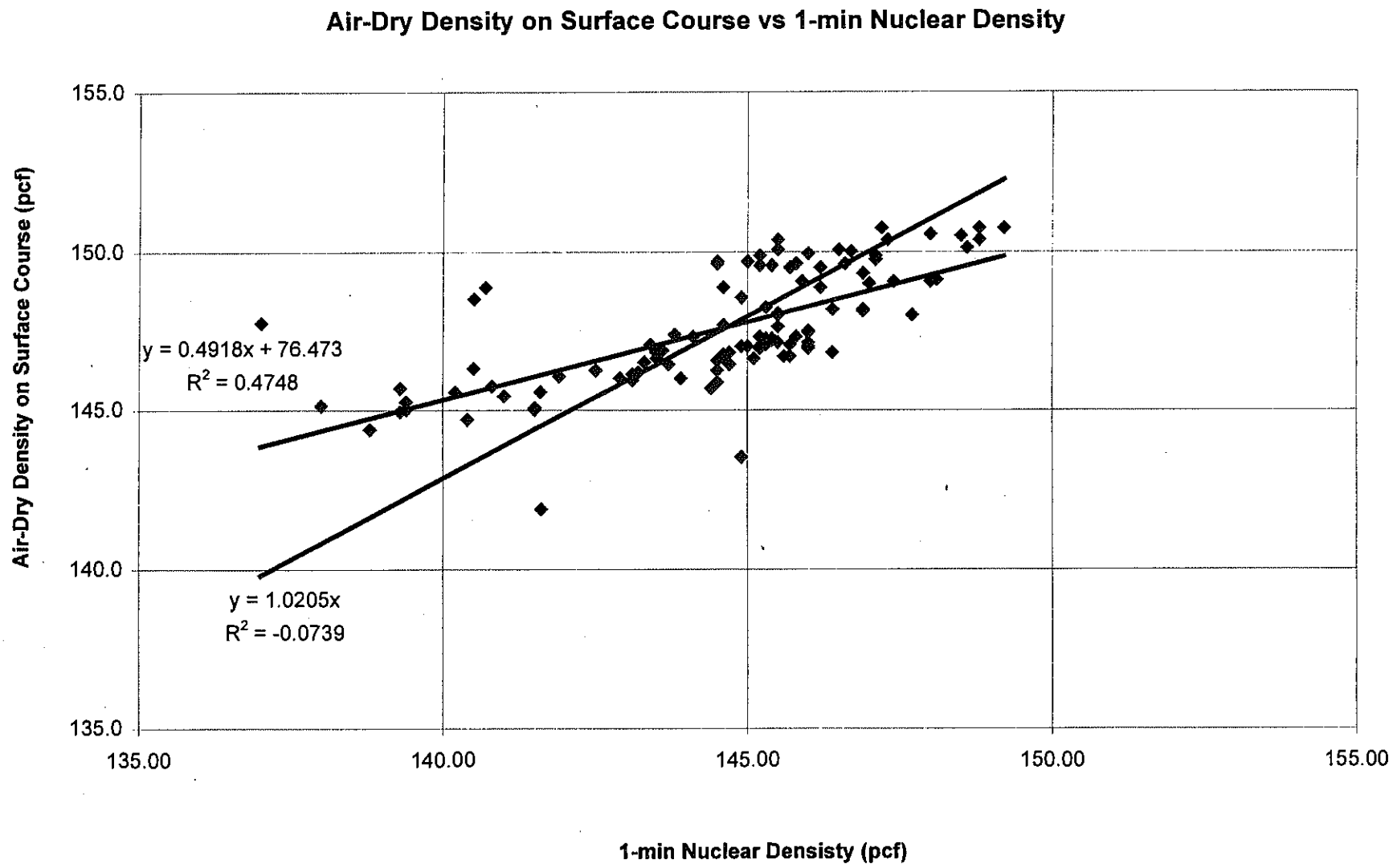
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.421872
R Square	0.177976
Adjusted	0.170221
Standard	4.156015
Observati	108

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regressio	1	396.4025	396.4025	22.94997	5.43E-06
Residual	106	1830.881	17.27246		
Total	107	2227.283			

	Coefficient	*andard Err*	*t Stat*	*P-value*	*ower 95%*	*pper 95%*	*wer 95.00*	*per 95.00*
Intercept	34.52433	23.18437	1.489121	0.139425	-11.441	80.48963	-11.441	80.48963
X Variable	0.767893	0.160291	4.790613	5.43E-06	0.4501	1.085686	0.4501	1.085686


Air-Dry Density on Surface Course vs 1-min Nuclear Density
Air-Dry Density on Surface Course (pcf)
155.0
150.0
145.0
140.0
135.0
y = 0.4918x + 76.473
R2 = 0.4748
y = 1.0205x
R2 = -0.0739
135.00
140.00
145.00
150.00
155.00
1-min Nuclear Densisty (pcf)

SUMMARY OUTPUT

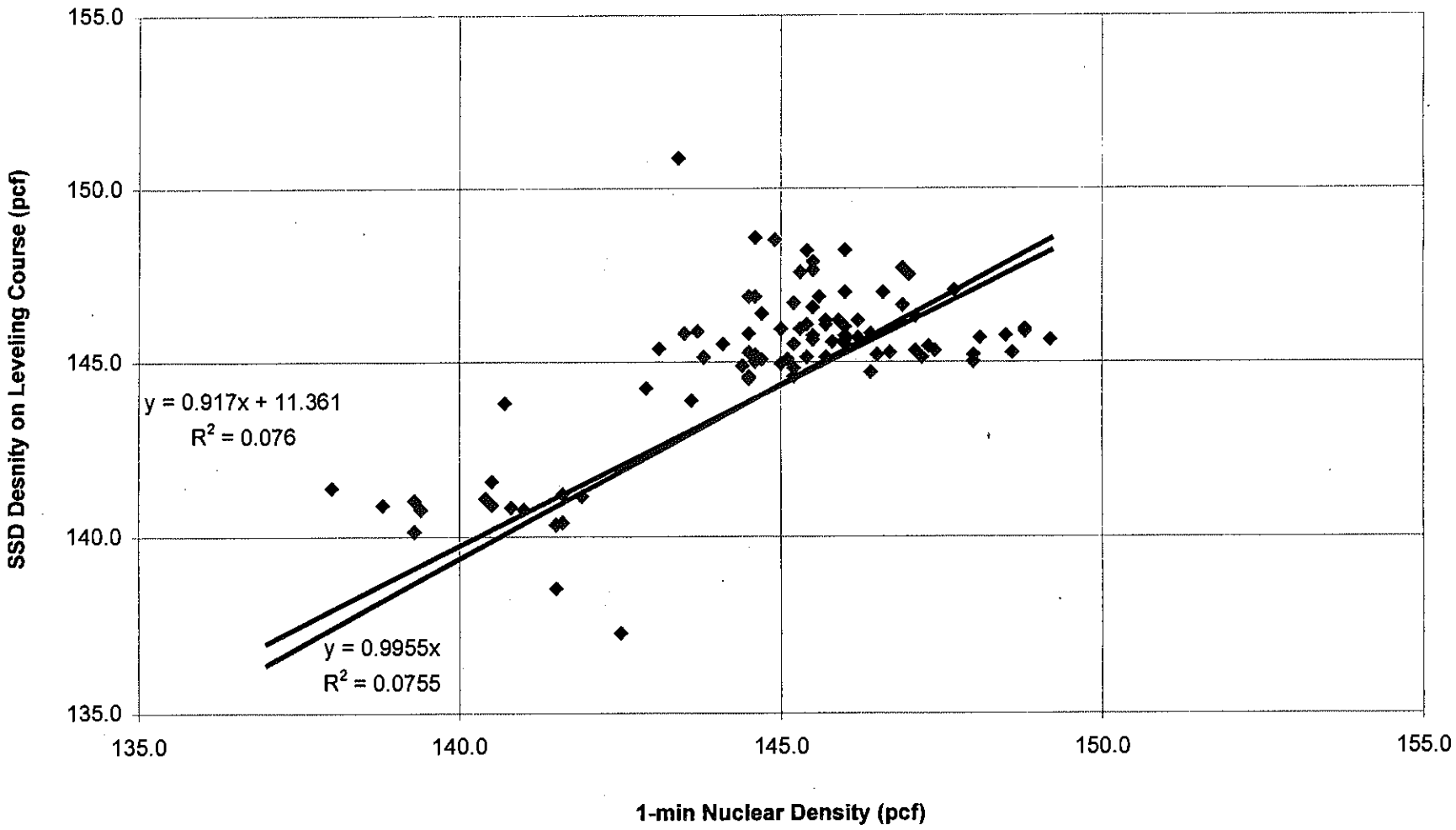
Regression Statistics	
Multiple R	0.689044
R Square	0.474782
Adjusted	0.469827
Standard	1.302727
Observati	108

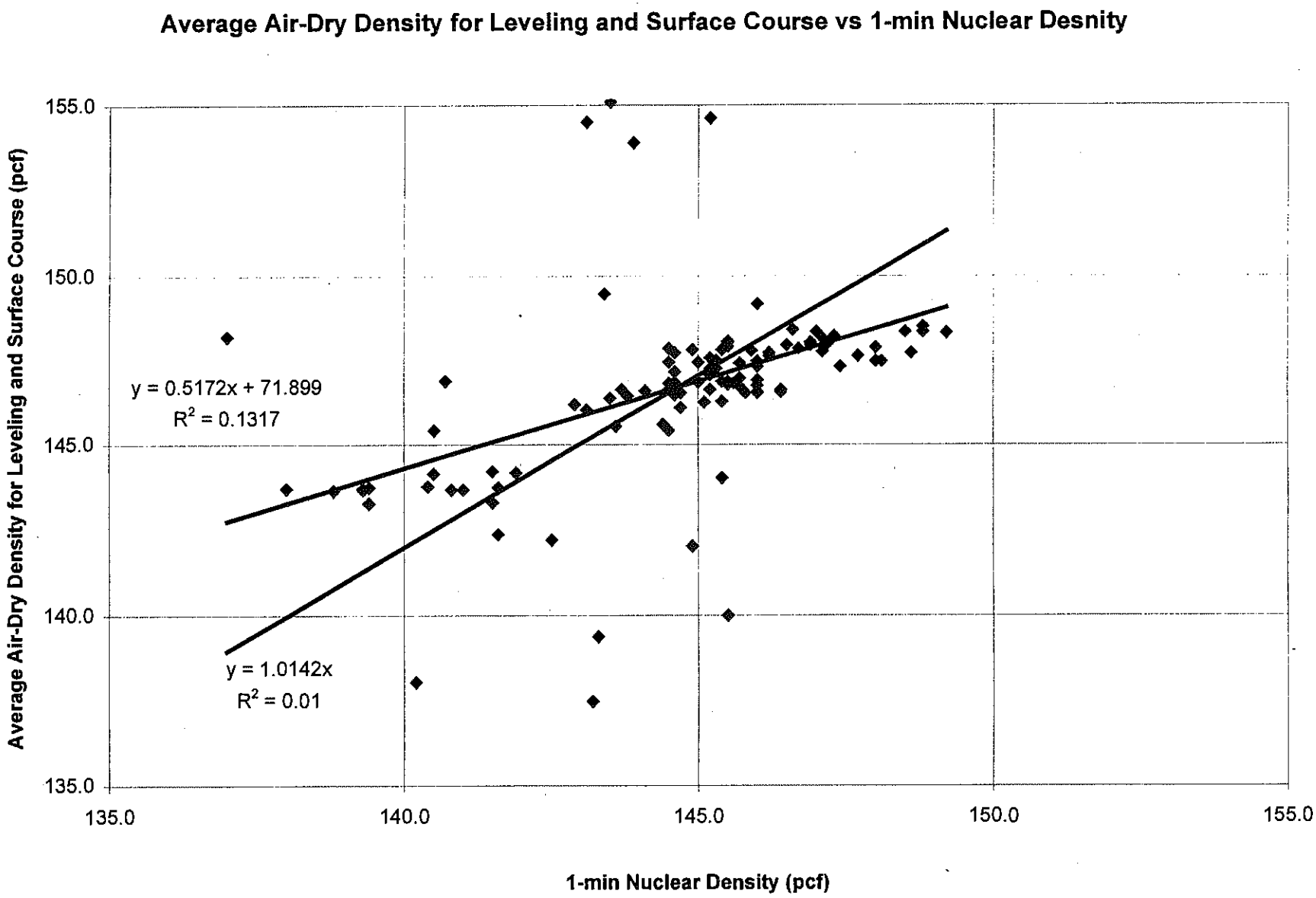
ANOVA

	df	*SS*	*MS*	*F*	*gnificance F*
Regressio	1	162.6172	162.6172	95.82082	1.67E-16
Residual	106	179.8922	1.697097		
Total	107	342.5094			

	Coefficient	*andard Err*	*t Stat*	*P-value*	*ower 95*	*pper 95*	*ower 95.0*	*pper 95.0%*
Intercept	76.47289	7.267273	10.52291	3.7E-18	62.0648	90.88097	62.0648	90.88097
X Variable	0.491831	0.050244	9.788811	1.67E-16	0.392217	0.591445	0.392217	0.591445

SSD Density on Leveling Course vs 1-min Nuclear Density




Average Air-Dry Density for Leveling and Surface Course vs 1-min Nuclear Desnity
Average Air-Dry Density for Leveling and Surface Course (pcf)
155.0
150.0
145.0
140.0
135.0
y = 0.5172x + 71.899
R2 = 0.1317
y = 1.0142x
R2 = 0.01
135.0
140.0
145.0
150.0
155.0
1-min Nuclear Density (pcf)

avg air LC+SC vs. nuc1

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.362923
R Square	0.131713
Adjusted	0.123522
Standard	3.343883
Observati	108

ANOVA

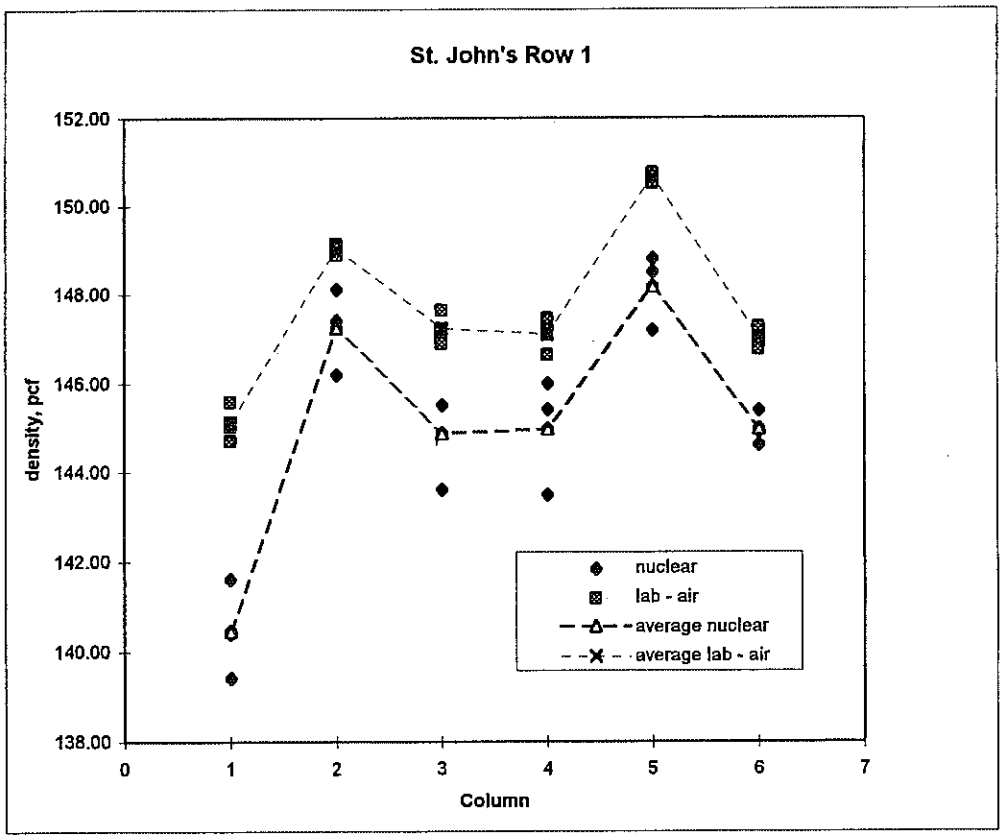
	df	*SS*	*MS*	*F*	*gnificance F*
Regressio	1	179.7935	179.7935	16.07948	0.000113
Residual	106	1185.245	11.18155		
Total	107	1365.038			

	Coefficient	*andard Err*	*t Stat*	*P-value*	*ower 95*	*pper 95*	*ower 95.0*	*pper 95.0*
Intercept	71.89903	18.65388	3.854373	0.000199	34.91587	108.8822	34.91587	108.8822
X Variable	0.517154	0.128968	4.009923	0.000113	0.261461	0.772846	0.261461	0.772846

Density Data for Each Row

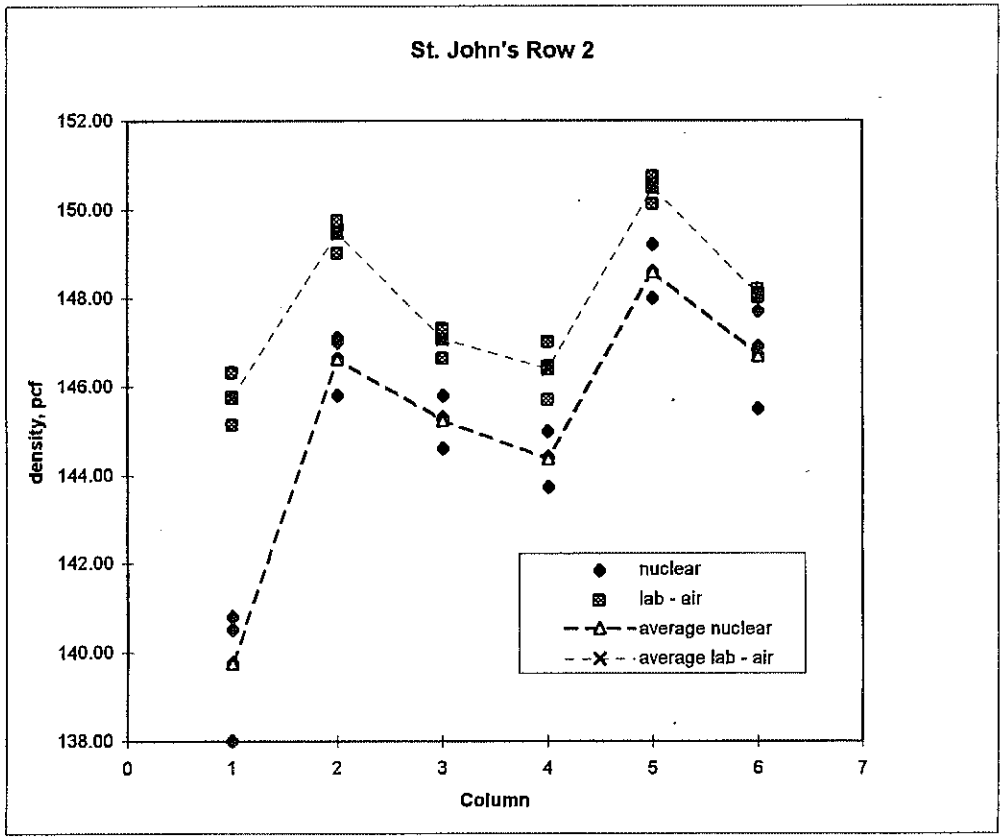
File name: stjrow1.xls

column	Test Number	$\gamma_{nuclear}$ (lbs/ft^3)	surface S.G.$_{SSD}$	surface S.G.$_{AIR}$	coarse γ_{SSD} (lbs/ft^3)	coarse γ_{AIR} (lbs/ft^3)
1	111	139.40	2.320	2.324	144.77	145.02
1	112	141.60	2.325	2.333	145.08	145.58
1	113	140.40	2.318	2.319	144.64	144.71
2	121	148.10	2.389	2.390	149.07	149.14
2	122	147.40	2.388	2.389	149.01	149.07
2	123	146.20	2.383	2.386	148.70	148.89
3	131	145.50	2.356	2.358	147.01	147.14
3	132	143.60	2.351	2.354	146.70	146.89
3	133	145.50	2.364	2.366	147.51	147.64
4	141	145.40	2.357	2.359	147.08	147.20
4	142	146.00	2.361	2.363	147.33	147.45
4	143	143.50	2.348	2.350	146.52	146.64
5	151	148.80	2.414	2.416	150.63	150.76
5	152	148.50	2.408	2.412	150.26	150.51
5	153	147.20	2.414	2.416	150.63	150.76
6	161	144.60	2.349	2.352	146.58	146.76
6	162	144.90	2.354	2.356	146.89	147.01
6	163	145.40	2.357	2.360	147.08	147.26
1	avg	140.47				145.10
2	avg	147.23				149.03
3	avg	144.87				147.22
4	avg	144.97				147.10
5	avg	146.17				150.68
6	avg	144.97				147.01



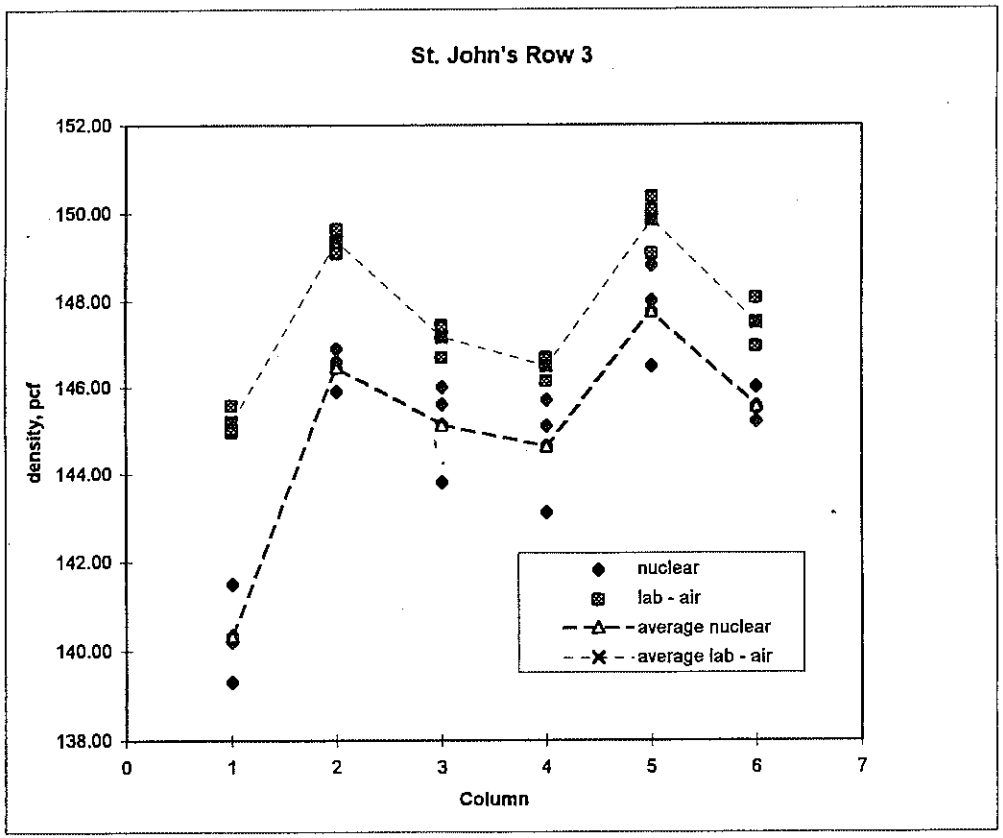
file name: stjrow2.xls

column	Test Number	$\gamma_{nuclear}$ (lbs/ft^3)	surface coarse $S.G._{SSD}$	$S.G._{AIR}$	γ_{SSD} (lbs/ft^3)	γ_{AIR} (lbs/ft^3)
1	211	138.00	2.319	2.326	144.71	145.14
1	212	140.50	2.340	2.345	146.02	146.33
1	213	140.80	2.329	2.336	145.33	145.77
2	221	145.80	2.395	2.398	149.45	149.64
2	222	147.00	2.383	2.388	148.70	149.01
2	223	147.10	2.398	2.400	149.64	149.76
3	231	145.80	2.359	2.361	147.20	147.33
3	232	145.30	2.357	2.360	147.08	147.26
3	233	144.60	2.349	2.350	146.58	146.64
4	241	144.40	2.330	2.335	145.39	145.70
4	242	145.00	2.353	2.356	146.83	147.01
4	243	143.70	2.344	2.347	146.27	146.45
5	251	148.60	2.405	2.406	150.07	150.13
5	252	149.20	2.415	2.416	150.70	150.76
5	253	148.00	2.411	2.413	150.45	150.57
6	261	146.90	2.372	2.375	148.01	148.20
6	262	147.70	2.368	2.372	147.76	148.01
6	263	145.50	2.371	2.372	147.95	148.01
1	avg	139.77				145.75
2	avg	146.63				149.47
3	avg	145.23				147.08
4	avg	144.37				146.39
5	avg	148.60				150.49
6	avg	146.70				148.08



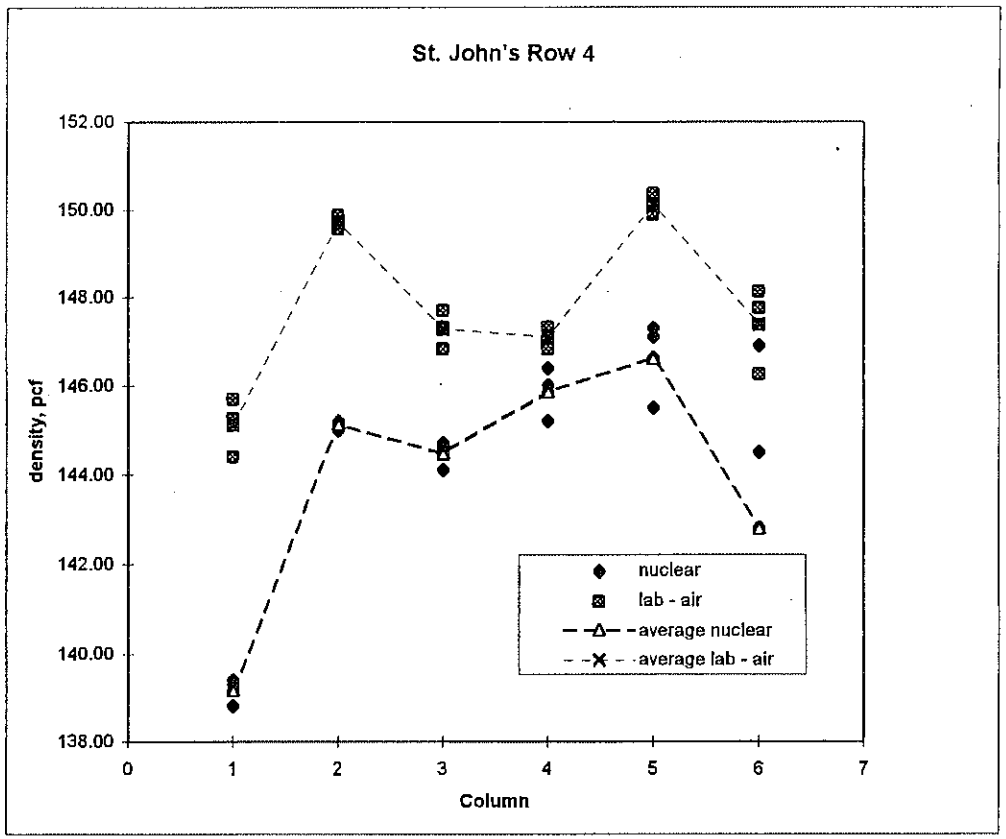
file name: stjrow3.xls

column	Test Number	$\gamma_{nuclear}$ (lbs/ft^3)	surface S.G.$_{SSD}$	surface S.G.$_{AIR}$	coarse γ_{SSD} (lbs/ft^3)	coarse γ_{AIR} (lbs/ft^3)
1	311	140.20	2.328	2.333	145.27	145.58
1	312	139.30	2.319	2.323	144.71	144.96
1	313	141.50	2.318	2.324	144.64	145.02
2	321	146.60	2.392	2.398	149.26	149.64
2	322	146.90	2.389	2.393	149.07	149.32
2	323	145.90	2.386	2.389	148.89	149.07
3	331	145.60	2.350	2.351	146.64	146.70
3	332	146.00	2.360	2.363	147.26	147.45
3	333	143.80	2.359	2.362	147.20	147.39
4	341	145.70	2.349	2.351	146.58	146.70
4	342	143.10	2.337	2.342	145.83	146.14
4	343	145.10	2.347	2.350	146.45	146.64
5	351	148.80	2.408	2.140	150.26	150.38
5	352	148.00	2.386	2.389	148.89	149.07
5	353	146.50	2.401	2.405	149.82	150.07
6	361	146.00	2.360	2.364	147.26	147.51
6	362	145.20	2.349	2.355	146.58	146.95
6	363	145.50	2.370	2.373	147.89	148.08
1	avg	140.33				145.18
2	avg	146.47				149.34
3	avg	145.13				147.18
4	avg	144.63				146.49
5	avg	147.77				149.84
6	avg	145.57				147.51



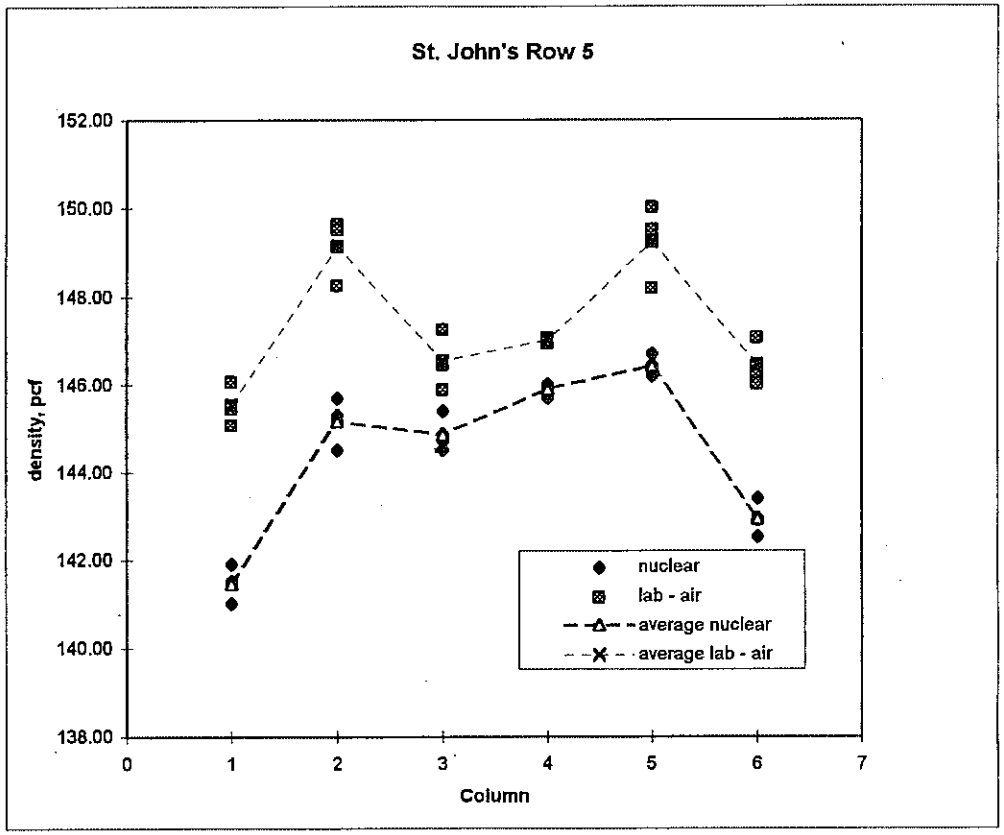
file name: stjrow4.xls

column	Test Number	$\gamma_{nuclear}$ (lbs/ft^3)	surface S.G.$_{SSD}$	coarse S.G.$_{AIR}$	γ_{SSD} (lbs/ft^3)	γ_{AIR} (lbs/ft^3)
1	411	138.80	2.312	2.314	144.27	144.39
1	412	139.30	2.332	2.335	145.52	145.70
1	413	139.40	2.326	2.328	145.14	145.27
2	421	145.20	2.395	2.397	149.45	149.57
2	422	145.20	2.401	2.402	149.82	149.88
2	423	145.00	2.397	2.399	149.57	149.70
3	431	144.60	2.365	2.367	147.58	147.70
3	432	144.10	2.358	2.361	147.14	147.33
3	433	144.70	2.352	2.353	146.76	146.83
4	441	146.40	2.350	2.353	146.64	146.83
4	442	145.20	2.360	2.361	147.26	147.33
4	443	146.00	2.356	2.358	147.01	147.14
5	451	147.30	2.407	2.410	150.20	150.38
5	452	147.10	2.400	2.402	149.76	149.88
5	453	145.50	2.403	2.405	149.95	150.07
6	461	144.50	2.339	2.344	145.95	146.27
6	462	146.90	2.370	2.374	147.89	148.14
6	463	137.00	2.364	2.368	147.51	147.76
1	avg	139.17				145.12
2	avg	145.13				149.72
3	avg	144.47				147.28
4	avg	145.87				147.10
5	avg	146.63				150.11
6	avg	142.80				147.39



file name: stjrow5.xls

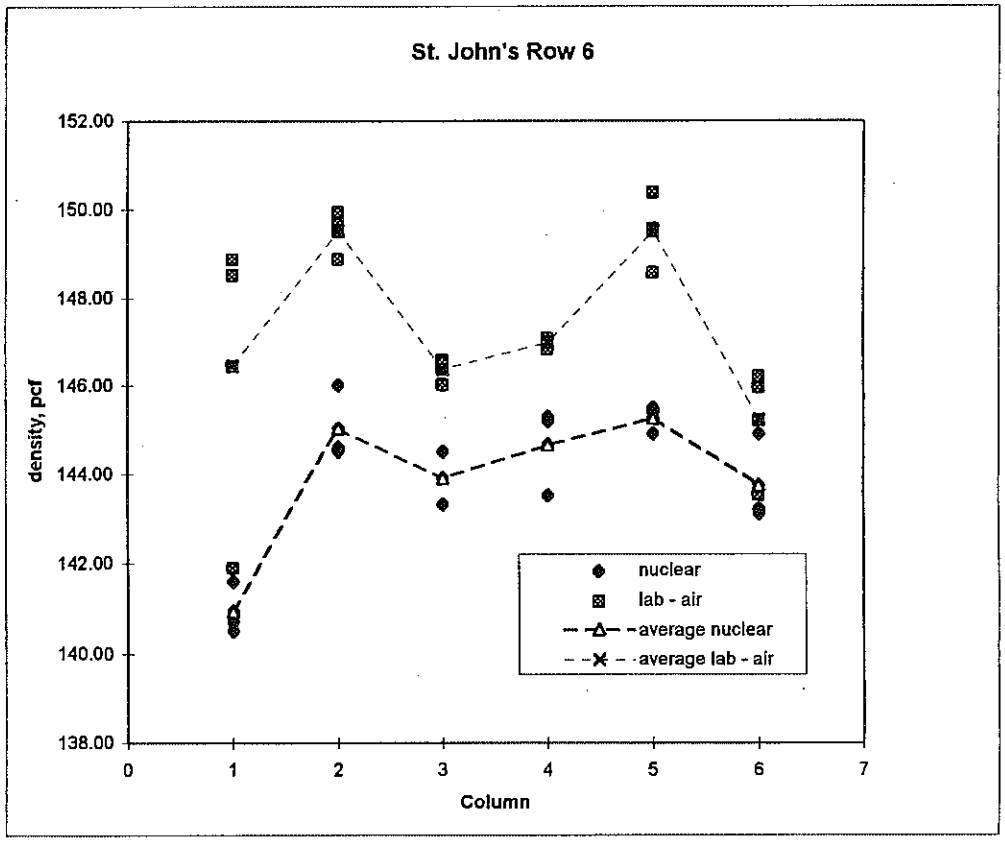
column	Test Number	$\gamma_{nuclear}$ (lbs/ft^3)	surface coarse			
			$S.G._{SSD}$	$S.G._{AIR}$	γ_{SSD} (lbs/ft^3)	γ_{AIR} (lbs/ft^3)
1	511	141.50	2.320	2.325	144.77	145.08
1	512	141.90	2.336	2.341	145.77	146.08
1	513	141.00	2.326	2.331	145.14	145.45
2	521	144.50	2.396	2.398	149.51	149.64
2	522	145.30	2.375	2.376	148.20	148.26
2	523	145.70	2.394	2.396	149.39	149.51
3	531	145.40	2.356	2.360	147.01	147.26
3	532	144.70	2.344	2.347	146.27	146.45
3	533	144.50	2.334	2.338	145.64	145.89
4	541	145.70	2.348	2.357	146.52	147.08
4	542	146.00	2.347	2.356	146.45	147.01
4	543	146.00	2.354	2.355	146.89	146.95
5	551	146.40	2.373	2.375	148.08	148.20
5	552	146.70	2.403	2.404	149.95	150.01
5	553	146.20	2.395	2.396	149.45	149.51
6	561	143.40	2.351	2.357	146.70	147.08
6	562	142.50	2.341	2.344	146.08	146.27
6	563	142.90	2.337	2.340	145.83	146.02
1	avg	141.47				145.54
2	avg	145.17				149.14
3	avg	144.87				146.54
4	avg	145.90				147.01
5	avg	146.43				149.24
6	avg	142.93				146.45



file name: stjrow6.xls

column	Test Number	$\gamma_{nuclear}$ (lbs/ft^3)	surface coarse $S.G._{SSD}$	$S.G._{AIR}$	γ_{SSD} (lbs/ft^3)	γ_{AIR} (lbs/ft^3)
1	611	141.60	1.970	2.274	122.93	141.90
1	612	140.50	2.342	2.380	146.14	148.51
1	613	140.70	2.340	2.386	146.02	148.89
2	621	144.50	2.397	2.399	149.57	149.70
2	622	144.60	2.384	2.386	148.76	148.89
2	623	146.00	2.401	2.403	149.82	149.95
3	631	144.50	2.346	2.349	146.39	146.58
3	632	143.30	2.345	2.348	146.33	146.52
3	633	143.90	2.335	2.340	145.70	146.02
4	641	143.50	2.351	2.353	146.70	146.83
4	642	145.20	2.353	2.356	146.83	147.01
4	643	145.30	2.354	2.357	146.89	147.08
5	651	145.40	2.392	2.397	149.26	149.57
5	652	144.90	2.377	2.381	148.32	148.57
5	653	145.50	2.405	2.410	150.07	150.38
6	661	143.10	2.334	2.339	145.64	145.95
6	662	144.90	2.292	2.300	143.02	143.52
6	663	143.20	2.337	2.343	145.83	146.20

1	avg	140.93	146.43
2	avg	145.03	149.51
3	avg	143.90	146.37
4	avg	144.67	146.97
5	avg	145.27	149.51
6	avg	143.73	145.23



Air-dry Lab Density Grid Analysis

Pavement Segregation Analysis Spreadsheet
Michigan State University - Pavement Research Center of Excellence

T.F. Wolff
July 1996

Location: Sample Data -- from St. John's, samples xx1
Date: 11/19/95
Description: Samples xx1, surface course unit weight in air

(updated 7/12/96)

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	141.9	149.7	146.6	146.8	149.6	146.0
5	145.1	149.6	147.3	147.1	148.2	147.1
4	144.4	149.6	147.7	146.8	150.4	146.3
3	145.6	149.6	146.7	146.7	150.4	147.5
2	145.1	149.6	147.3	145.7	150.1	148.2
1	145.0	149.1	147.1	147.2	150.8	146.8
Edge						
Tukey test	DIFF !	DIFF !	DIFF !	DIFF !	DIFF !	DIFF !
paired t tests	DIFF !	DIFF !	DIFF !	DIFF !	DIFF !	DIFF !
6 of 6 test	DIFF !	DIFF !	--	DIFF !	DIFF !	--

Clear — *Clears everything for a new problem*
Enter data, or press a key below.

Example — *Enters example segregated data*

Random — *Enters a random sample*

YES ! <-- significant column differences?
Edge

DATA ENTRY

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

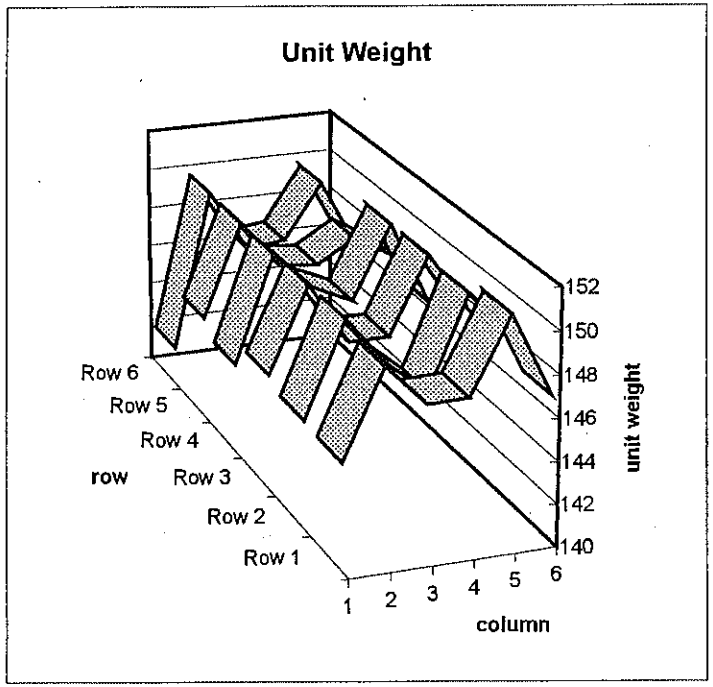
Michigan State University - Pavement Research Center of Excellence

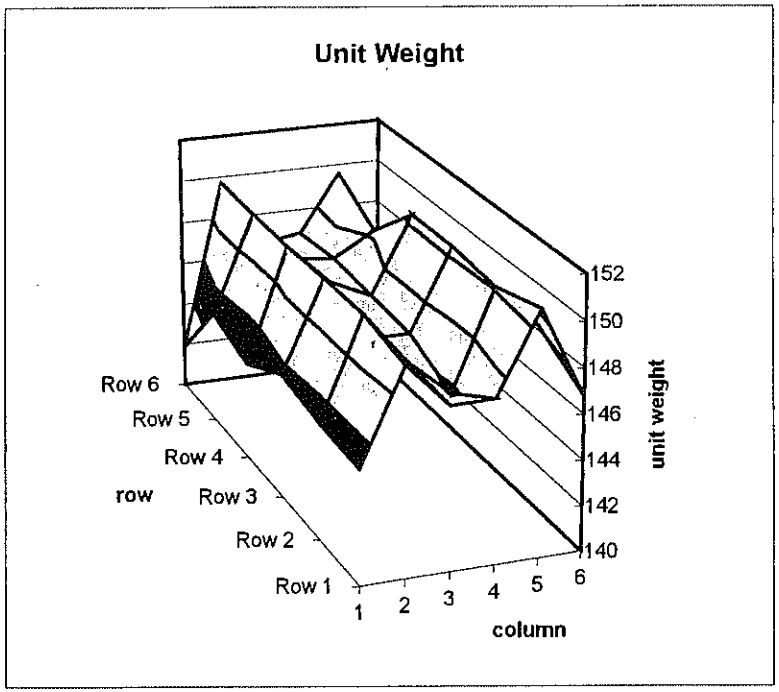
Location: *Sample Data -- from St. John's, samples xx1*
Date: *11/19/95*
Description: *Samples xx1, surface course unit weight in air*

Color 1 *Color Above and Below Average*
Clear Color

Column	1	2	3	4	5	6	Average	Standard Deviation	Coeff of Variation
Row									
6	141.9	149.7	146.6	146.8	149.6	146.0	146.76	2.858	1.95%
5	145.1	149.6	147.3	147.1	148.2	147.1	147.39	1.501	1.02%
4	144.4	149.6	147.7	146.8	150.4	146.3	147.52	2.202	1.49%
3	145.6	149.6	146.7	146.7	150.4	147.5	147.75	1.870	1.27%
2	145.1	149.6	147.3	145.7	150.1	148.2	147.69	2.030	1.37%
1	145.0	149.1	147.1	147.2	150.8	146.8	147.67	2.003	1.36%
Average	144.52	149.56	147.12	146.72	149.90	146.96	147.46	**147.46**	2.077	1.41%
Std. Dev.	1.338	0.207	0.417	0.534	0.923	0.823	0.707		**1.99032**	
Coeff. of Var.	0.93%	0.14%	0.28%	0.36%	0.62%	0.56%	0.48%			**1.35%**

Location: *Sample Data -- from St. John's, samples xx1*
Date: *11/19/95*
Description: *Samples xx1, surface course unit weight in air*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

Michigan State University - Pavement Research Center of Excellence

Location: *Sample Data -- from St. John's, samples xx1*

Date: *11/19/95*

Description: *Samples xx1, surface course unit weight in air*

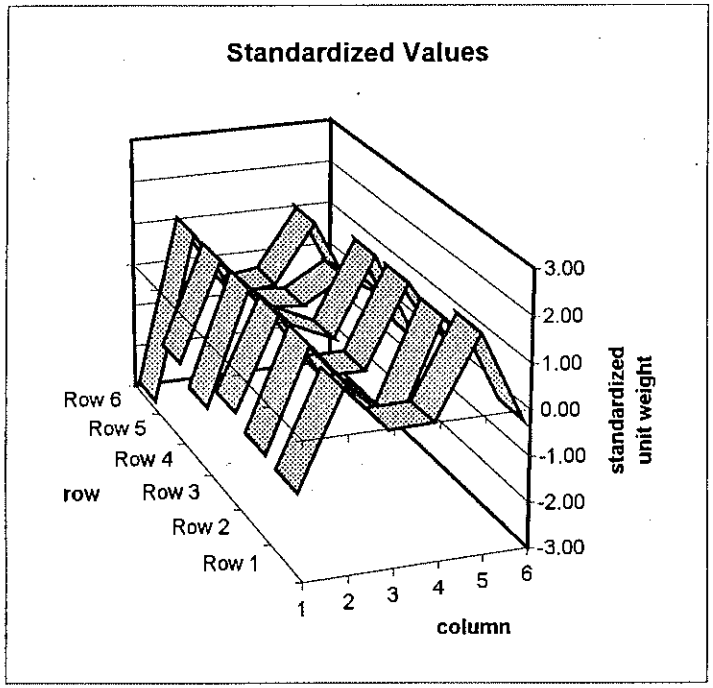
Color 1 *Color Above and Below Average*

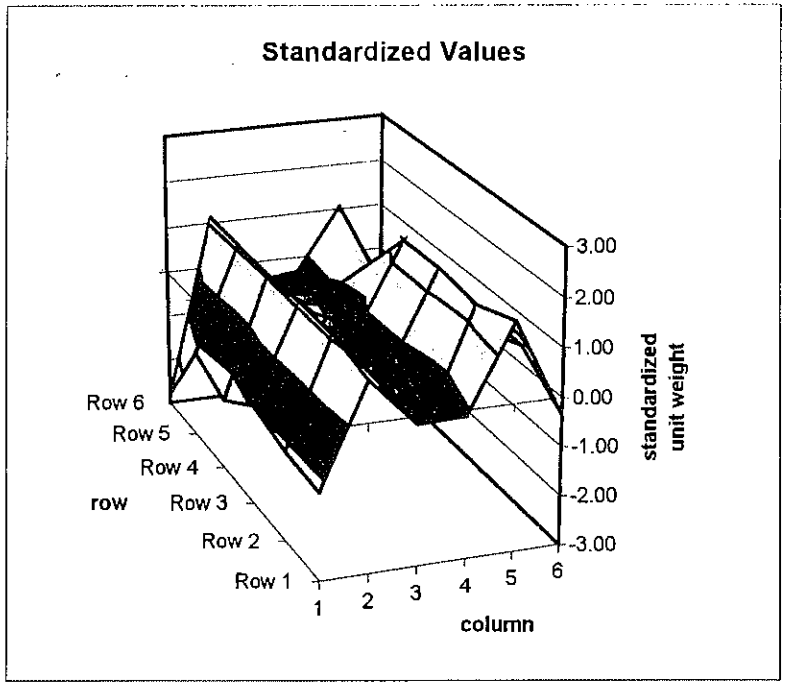
Clear Color

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	-2.80	1.12	-0.44	-0.32	1.06	-0.76	-0.36	1.436
5	-1.20	1.09	-0.10	-0.19	0.37	-0.19	-0.04	0.754
4	-1.54	1.06	0.12	-0.32	1.47	-0.60	0.03	1.106
3	-0.95	1.09	-0.38	-0.38	1.47	0.02	0.15	0.939
2	-1.17	1.09	-0.07	-0.89	1.34	0.37	0.11	1.020
1	-1.23	0.84	-0.16	-0.13	1.66	-0.35	0.10	1.006
Average	-1.48	1.05	-0.17	-0.37	1.23	-0.25	0.00	**0.00**	1.044
Std. Dev.	0.672	0.104	0.209	0.268	0.464	0.414	0.355		**1.00**

Location: *Sample Data -- from St. John's, samples xx1*
Date: *11/19/95*
Description: *Samples xx1, surface course unit weight in air*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	144.52	-2.95	8.674	1.338	1.791
2	149.56	2.09	4.375	0.207	0.043
3	147.12	-0.35	0.119	0.417	0.174
4	146.72	-0.74	0.548	0.534	0.285
5	149.90	2.44	5.956	0.923	0.851
6	146.96	-0.50	0.252	0.823	0.678
sum			19.923		3.822
all data	147.46			1.990316	3.9614

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	119.539456	5	23.908	**37.53576**	2.533554	4.92E-12
within columns:	19.1080933	30	0.637			
Total:	138.647549			**Different ?**	1	**YES!**

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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Tukey's paired comparison test

Difference of means

Columns	1	2	3	4	5	6
1		-5.04	-2.60	-2.21	-5.39	-2.44
2	-5.04		2.44	2.83	-0.35	2.59
3	-2.60	2.44		0.39	-2.79	0.16
4	-2.21	2.83	0.39		-3.18	-0.24
5	-5.39	-0.35	-2.79	-3.18		2.94
6	-2.44	2.59	0.16	-0.24	2.94	

Critical Values

Columns	1	2	3	4	5	6
1		1.84	1.91	1.96	2.21	2.14
2	1.84		0.63	0.78	1.29	1.16
3	1.91	0.63		0.92	1.38	1.26
4	1.96	0.78	0.92		1.45	1.34
5	2.21	1.29	1.38	1.45		1.68
6	2.14	1.16	1.26	1.34	1.68	

Critical ?

Columns	1	2	3	4	5	6
1		1	1	1	1	1
2	1		1	1	0	1
3	1	1		0	1	0
4	1	1	0		1	0
5	1	0	1	1		1
6	1	1	0	0	1	
Sum	**5**	**4**	**3**	**3**	**4**	**3**
Different?	**1**	**1**	**1**	**1**	**1**	**1**

t-tests

two sample, equal variance, homoscedastic

Row vs. Ro	1	2	3	4	5	6
1		0.9866	0.9428	0.9063	0.7897	0.5352
2			0.9570	0.8943	0.7770	0.5283
3				0.8499	0.7190	0.4908
4					0.9049	0.6133
5						0.6403
6						

t-tests

two sample, equal variance, homoscedastic

Col vs Col	1	2	3	4	5	6
1		0.0000	0.0011	0.0038	0.0000	0.0034
2	0.0000		0.0000	0.0000	0.3872	0.0000
3	0.0011	0.0000		0.1836	0.0001	0.6863
4	0.0038	0.0000	0.1836		0.0000	0.5651
5	0.0000	0.3872	0.0001	0.0000		0.0002
6	0.0034	0.0000	0.6863	0.5651	0.0002	

Fail t-test at 0.05 level?

Col vs Col	1	2	3	4	5	6	Sum	Diff ?
1		1	1	1	1	1	5	1
2	1		1	1	0	1	4	1
3	1	1		0	1	0	3	1
4	1	1	0		1	0	3	1
5	1	0	1	1		1	4	1
6	1	1	0	0	1		3	1

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

Above Average? 1= true, 0 = false

0	1	0	0	1	0
0	1	0	0	1	0
0	1	1	0	1	0
0	1	0	0	1	1
0	1	0	0	1	1
0	1	0	0	1	0
0	6	1	0	6	2

Pavement Segregation Analysis Spreadsheet
Michigan State University - Pavement Research Center of Excellence

T.F. Wolff
July 1996

Location: Sample Data -- from St. John's, samples xx2
Date: 11/19/95
Description: Samples xx2,. surface course unit weight in air

(updated 7/12/96)

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	148.5	148.9	146.5	147.0	148.6	143.5
5	146.1	148.3	146.5	147.0	150.0	146.3
4	145.7	149.9	147.3	147.3	149.9	148.1
3	145.0	149.3	147.5	146.1	149.1	147.0
2	146.3	149.0	147.3	147.0	150.8	148.0
1	145.6	149.1	146.9	147.5	150.5	147.0
Edge						
Tukey test	--	DIFF !	--	--	DIFF !	--
paired t tests	--	DIFF !	--	--	DIFF !	--
6 of 6 test	--	DIFF !	DIFF !	DIFF !	DIFF !	--

Clear *Clears everything for a new problem*
Enter data, or press a key below.

Example *Enters example segregated data*

Random *Enters a random sample*

YES ! <-- significant column differences?

Pavement Segregation Analysis Spreadsheet

Michigan State University - Pavement Research Center of Excellence

T. F. Wolff April 1996

Location: *Sample Data -- from St. John's, samples xx2*

Date: *4/22/96*

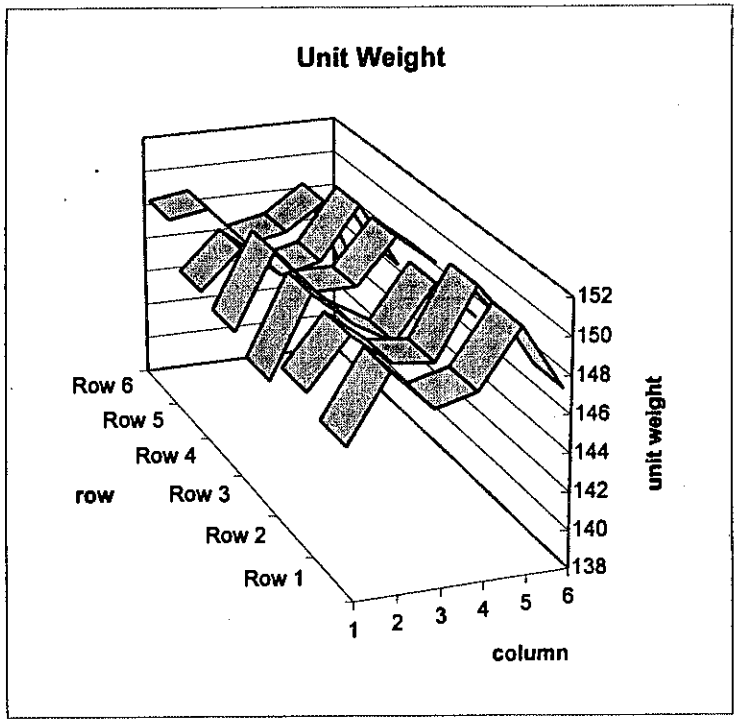
Description: *Samples xx2, Unit weight (Air Dry)*

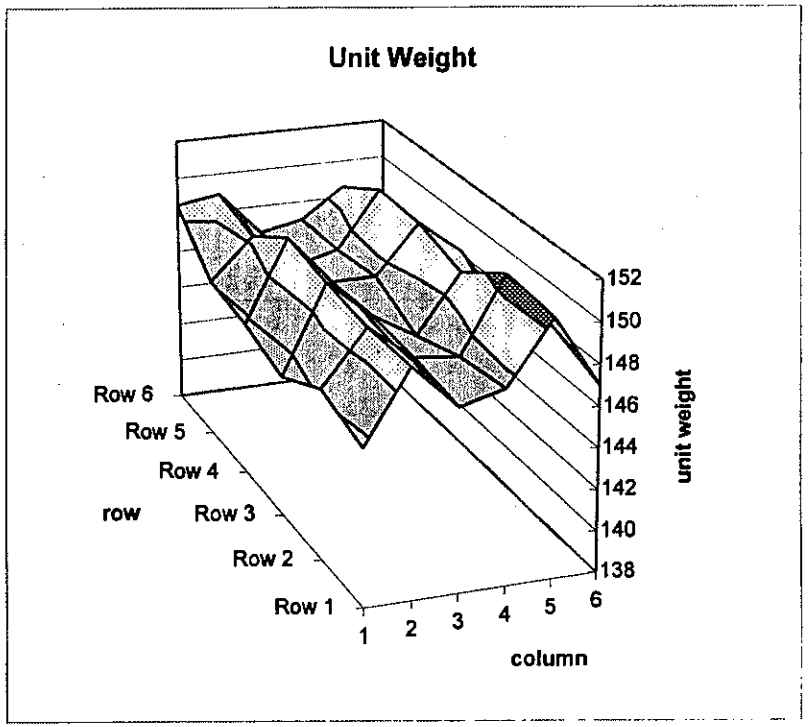
Clear Colors

Color Above and Below Average

Column	1	2	3	4	5	6	Average	Standard Deviation	Coeff of Variation
Row									
6	148.51	148.89	146.52	147.01	148.57	143.52	147.17	2.024	1.38%
5	146.08	148.26	146.45	147.01	150.01	146.27	147.35	1.524	1.03%
4	145.70	149.88	147.33	147.33	149.88	148.14	148.04	1.629	1.10%
3	144.96	149.32	147.45	146.14	149.07	146.95	147.32	1.684	1.14%
2	146.33	149.01	147.26	147.01	150.76	148.01	148.06	1.608	1.09%
1	145.58	149.07	146.89	147.45	150.51	147.01	147.75	1.758	1.19%
Average	146.19	149.07	146.98	146.99	149.80	146.65	147.62	**147.62**	1.704	1.15%
Std. Dev.	1.228	0.531	0.429	0.458	0.839	1.687	0.862		**1.625614**	
Coeff. of Var.	0.84%	0.36%	0.29%	0.31%	0.56%	1.15%	0.59%			**1.10%**

Location: *Sample Data -- from St. John's, samples xx2*
Date: *4/22/96*
Description: *Samples xx2, Unit weight (Air Dry)*





Pavement Segregation Analysis Spreadsheet

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Location: *Sample Data -- from St. John's, samples xx2*

Date: *4/22/96*

Description: *Samples xx2, Unit weight (Air Dry)*

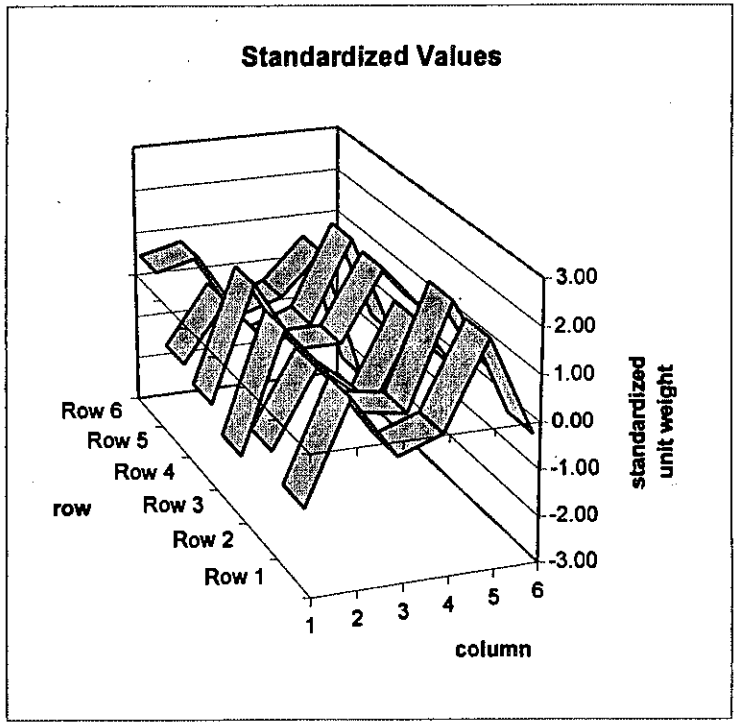
Clear Colors

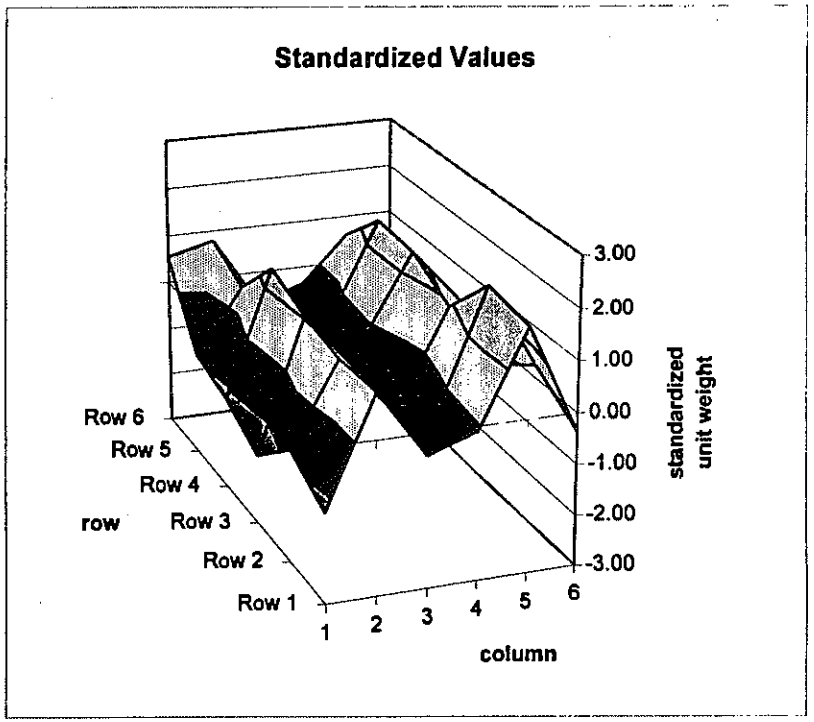
Color Above and Below Average

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	0.55	0.78	-0.67	-0.37	0.59	-2.52	-0.27	1.245
5	-0.94	0.40	-0.72	-0.37	1.47	-0.83	-0.17	0.937
4	-1.18	1.39	-0.18	-0.18	1.39	0.32	0.26	1.002
3	-1.63	1.05	-0.10	-0.91	0.90	-0.41	-0.18	1.036
2	-0.79	0.86	-0.22	-0.37	1.93	0.24	0.28	0.989
1	-1.25	0.90	-0.45	-0.10	1.78	-0.37	0.08	1.081
Average	-0.87	0.90	-0.39	-0.38	1.34	-0.59	0.00	**0.00**	1.048
Std. Dev.	0.755	0.327	0.264	0.282	0.516	1.038	0.530		**1.00**

Location: *Sample Data -- from St. John's, samples xx2*
Date: *4/22/96*
Description: *Samples xx2, Unit weight (Air Dry)*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	146.19	-1.42	2.021	1.228	1.508
2	149.07	1.46	2.122	0.531	0.282
3	146.98	-0.63	0.399	0.429	0.184
4	146.99	-0.62	0.389	0.458	0.210
5	149.80	2.19	4.774	0.839	0.704
6	146.65	-0.96	0.931	1.687	2.846
sum			10.636		5.735
all data	147.62			1.625614	2.6426

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	63.8160667	5	12.763	**13.35267**	2.533554	6.919E-07
within columns:	28.6756333	30	0.956			
Total:	92.4917			**Different ?**	1	**YES!**

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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Tukey's paired comparison test

Difference of means

Columns	1	2	3	4	5	6
1		-2.88	-0.79	-0.80	-3.61	-0.46
2	-2.88		2.09	2.08	-0.73	2.42
3	-0.79	2.09		-0.01	-2.82	0.33
4	-0.80	2.08	-0.01		-2.81	0.34
5	-3.61	-0.73	-2.82	-2.81		3.15
6	-0.46	2.42	0.33	0.34	3.15	

Critical Values

Columns	1	2	3	4	5	6
1		1.82	1.77	1.79	2.03	2.84
2	1.82		0.93	0.96	1.35	2.41
3	1.77	0.93		0.86	1.28	2.37
4	1.79	0.96	0.86		1.30	2.38
5	2.03	1.35	1.28	1.30		2.57
6	2.84	2.41	2.37	2.38	2.57	

Critical ?

Columns	1	2	3	4	5	6
1		1	0	0	1	0
2	1		1	1	0	1
3	0	1		0	1	0
4	0	1	0		1	0
5	1	0	1	1		1
6	0	1	0	0	1	
Sum	**2**	**4**	**2**	**2**	**4**	**2**
Different?	**0**	**1**	**0**	**0**	**1**	**0**

t-tests

two sample, equal variance, homoscedastic

Row vs. Ro	1	2	3	4	5	6
1		0.7552	0.6697	0.7717	0.6788	0.6067
2			0.4494	0.9833	0.4465	0.4171
3				0.4639	0.9734	0.8954
4					0.4619	0.4295
5						0.8678
6						

t-tests

two sample, equal variance, homoscedastic

Col vs Col	1	2	3	4	5	6
1		0.0004	0.1677	0.1666	0.0001	0.6036
2	0.0004		0.0000	0.0000	0.1027	0.0073
3	0.1677	0.0000		0.9747	0.0000	0.6491
4	0.1666	0.0000	0.9747		0.0000	0.6424
5	0.0001	0.1027	0.0000	0.0000		0.0022
6	0.6036	0.0073	0.6491	0.6424	0.0022	

Fail t-test at 0.05 level?

Col vs Col	1	2	3	4	5	6	Sum	Diff ?
1		1	0	0	1	0	2	0
2	1		1	1	0	1	4	1
3	0	1		0	1	0	2	0
4	0	1	0		1	0	2	0
5	1	0	1	1		1	4	1
6	0	1	0	0	1		2	0

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Above Average? 1= true, 0 = false

1	1	0	0	1	0
0	1	0	0	1	0
0	1	0	0	1	1
0	1	0	0	1	0
0	1	0	0	1	1
0	1	0	0	1	0
1	6	0	0	6	2

Pavement Segregation Analysis Spreadsheet
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T.F. Wolff
July 1996

Location: Sample Data -- from St. John's, samples xx3
Date: 11/19/95
Description: Samples xx3, surface course unit weight in air

(updated 7/12/96)

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	148.9	150.0	146.0	147.1	150.4	146.2
5	145.5	149.5	145.9	147.0	149.5	146.0
4	145.3	149.7	146.8	147.1	150.1	147.8
3	145.0	149.1	147.4	146.6	150.1	148.1
2	145.8	149.8	146.6	146.5	150.6	148.0
1	144.7	148.9	147.6	146.6	150.8	147.3
Edge						
Tukey test	--	DIFF !	--	--	DIFF !	--
paired t tests	--	DIFF !	--	--	DIFF !	--
6 of 6 test	--	DIFF !	DIFF !	DIFF !	DIFF !	--

Clear *Clears everything for a new problem*
Enter data, or press a key below.

Example *Enters example segregated data*

Random *Enters a random sample*

YES ! <-- significant column differences?

Edge

Pavement Segregation Analysis Spreadsheet T. F. Wolff April 1996

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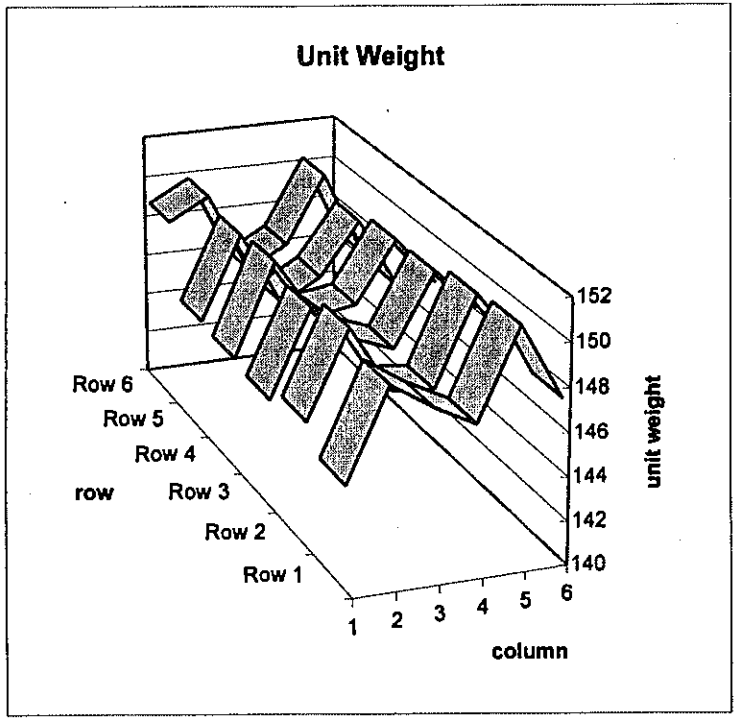
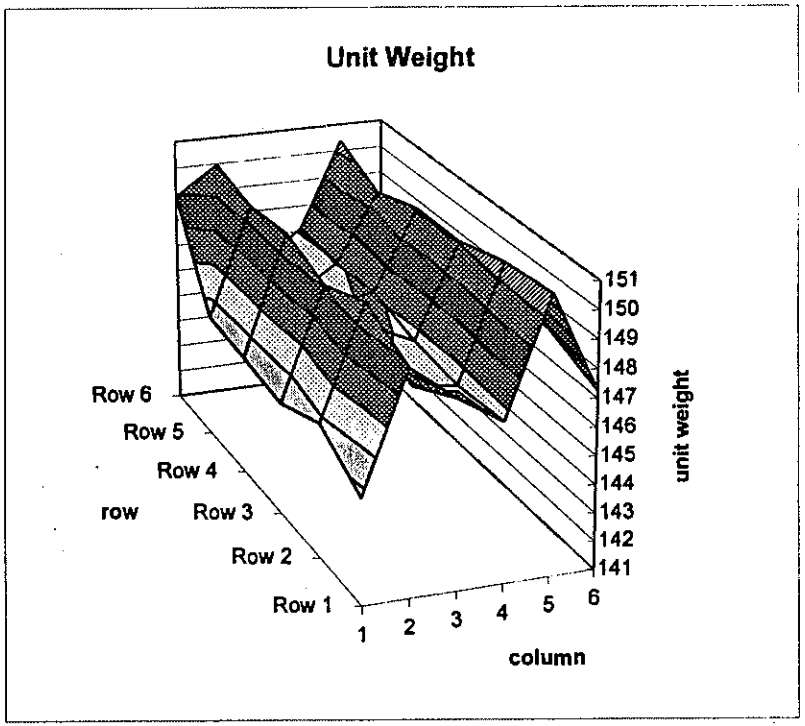
Location: *Sample Data -- from St. John's, samples xx3*
Date: *4/22/96*
Description: *Samples xx3, Unit weight (Air Dry)*

Clear Colors
Color Above and Below Average

Column	1	2	3	4	5	6	Average	Standard Deviation	Coeff of Variation
Row									
6	148.89	149.95	146.02	147.08	150.38	146.20	148.09	1.909	1.29%
5	145.45	149.51	145.89	146.95	149.51	146.02	147.22	1.839	1.25%
4	145.27	149.70	146.83	147.14	150.07	147.76	147.80	1.819	1.23%
3	145.02	149.07	147.39	146.64	150.07	148.08	147.71	1.791	1.21%
2	145.77	149.76	146.64	146.45	150.57	148.01	147.87	1.940	1.31%
1	144.71	148.89	147.64	146.64	150.76	147.26	147.65	2.051	1.39%
Average	145.85	149.48	146.74	146.82	150.23	147.22	147.72	**147.72**	1.891	1.28%
Std. Dev.	1.532	0.416	0.706	0.279	0.445	0.910	0.714		**1.773137**	
Coeff. of Var.	1.05%	0.28%	0.48%	0.19%	0.30%	0.62%	0.49%			**1.20%**

Location: *Sample Data -- from St. John's, samples xx3*
Date: *4/22/96*
Description: *Samples xx3, Unit weight (Air Dry)*





Pavement Segregation Analysis Spreadsheet

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T. F. Wolff April 1996

Location: *Sample Data -- from St. John's, samples xx3*

Date: *4/22/96*

Description: *Samples xx3, Unit weight (Air Dry)*

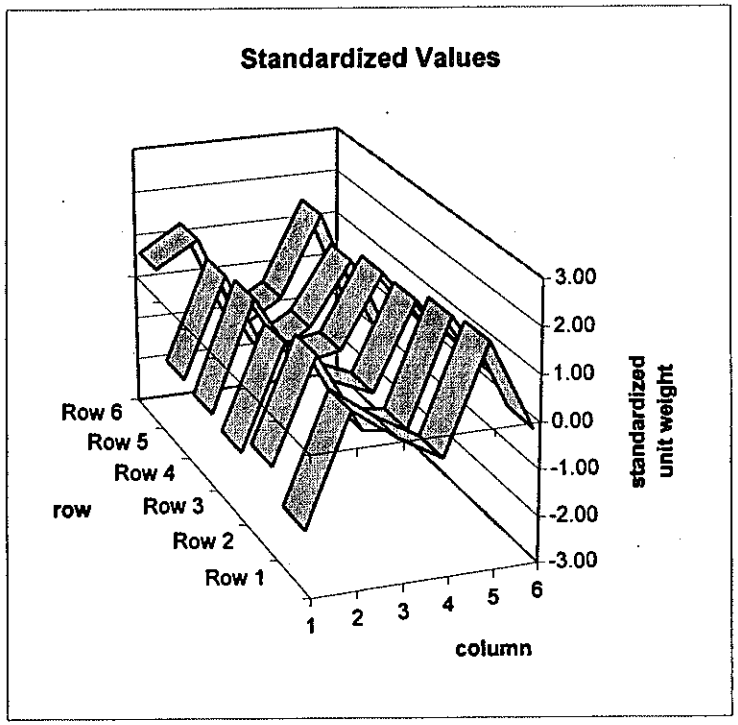
Clear Colors

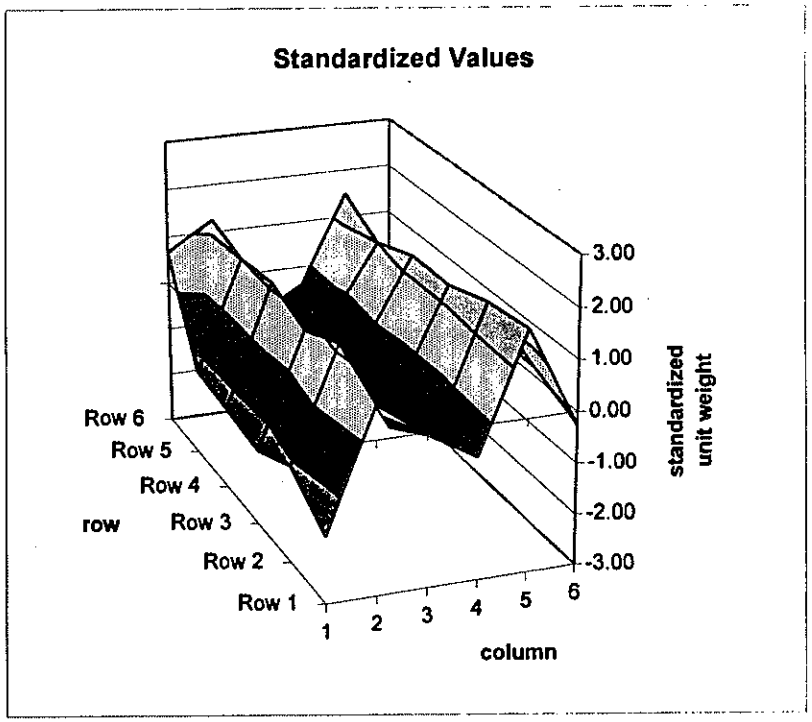
Color Above and Below Average

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	0.66	1.26	-0.96	-0.36	1.50	-0.86	0.21	1.077
5	-1.28	1.01	-1.03	-0.44	1.01	-0.96	-0.28	1.037
4	-1.38	1.12	-0.50	-0.33	1.32	0.02	0.04	1.026
3	-1.52	0.76	-0.19	-0.61	1.32	0.20	-0.01	1.010
2	-1.10	1.15	-0.61	-0.72	1.61	0.16	0.08	1.094
1	-1.70	0.66	-0.05	-0.61	1.71	-0.26	-0.04	1.157
Average	-1.05	0.99	-0.56	-0.51	1.41	-0.28	0.00	**0.00**	1.067
Std. Dev.	0.864	0.235	0.398	0.157	0.251	0.513	0.403		**1.00**

Location: *Sample Data -- from St. John's, samples xx3*
Date: *4/22/96*
Description: *Samples xx3, Unit weight (Air Dry)*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	145.85	-1.87	3.498	1.532	2.347
2	149.48	1.76	3.091	0.416	0.173
3	146.74	-0.99	0.974	0.706	0.498
4	146.82	-0.91	0.820	0.279	0.078
5	150.23	2.50	6.274	0.445	0.198
6	147.22	-0.50	0.250	0.910	0.827
sum			14.906		4.121
all data	147.72			1.773137	3.1440

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	89.4371806	5	17.887	**26.04539**	2.533554	4.494E-10
within columns:	20.6033833	30	0.687			
Total:	110.040564			**Different ?**	1	YES!

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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Tukey's paired comparison test

Difference of means

Columns	1	2	3	4	5	6
1		-3.63	-0.88	-0.97	-4.38	-1.37
2	-3.63		2.75	2.66	-0.75	2.26
3	-0.88	2.75		-0.08	-3.49	-0.49
4	-0.97	2.66	-0.08		-3.41	-0.41
5	-4.38	-0.75	-3.49	-3.41		3.01
6	-1.37	2.26	-0.49	-0.41	3.01	

Critical Values

Columns	1	2	3	4	5	6
1		2.16	2.30	2.12	2.17	2.43
2	2.16		1.12	0.68	0.83	1.36
3	2.30	1.12		1.03	1.14	1.57
4	2.12	0.68	1.03		0.72	1.30
5	2.17	0.83	1.14	0.72		1.38
6	2.43	1.36	1.57	1.30	1.38	

Critical ?

Columns	1	2	3	4	5	6
1		1	0	0	1	0
2	1		1	1	0	1
3	0	1		0	1	0
4	0	1	0		1	0
5	1	0	1	1		1
6	0	1	0	0	1	
Sum	**2**	**4**	**2**	**2**	**4**	**2**
Different?	**0**	**1**	**0**	**0**	**1**	**0**

t-tests

two sample, equal variance, homoscedastic

Row vs. Ro	1	2	3	4	5	6
1		0.8546	0.9568	0.8995	0.7112	0.7106
2			0.8885	0.9487	0.5676	0.8470
3				0.9378	0.6501	0.7329
4					0.5990	0.7919
5						0.4426
6						

t-tests

two sample, equal variance, homoscedastic

Col vs Col	1	2	3	4	5	6
1		0.0002	0.2285	0.1599	0.0001	0.0890
2	0.0002		0.0000	0.0000	0.0133	0.0003
3	0.2285	0.0000		0.7975	0.0000	0.3249
4	0.1599	0.0000	0.7975		0.0000	0.3216
5	0.0001	0.0133	0.0000	0.0000		0.0000
6	0.0890	0.0003	0.3249	0.3216	0.0000	

Fail t-test at 0.05 level?

Col vs Col	1	2	3	4	5	6	Sum	Diff ?
1		1	0	0	1	0	2	0
2	1		1	1	1	1	5	1
3	0	1		0	1	0	2	0
4	0	1	0		1	0	2	0
5	1	1	1	1		1	5	1
6	0	1	0	0	1		2	0

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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Above Average? 1= true, 0 = false

1	1	0	0	1	0
0	1	0	0	1	0
0	1	0	0	1	1
0	1	0	0	1	1
0	1	0	0	1	1
0	1	0	0	1	0
1	6	0	0	6	3

Pavement Segregation Analysis Spreadsheet
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T.F. Wolff
July 1996

Location: Sample Data -- from St. John's
Date: 11/19/95
Description: Average of 3 samples , surface course unit weight in air

(updated 7/12/96)

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	146.4	149.5	146.4	147.0	149.5	145.2
5	145.5	149.1	146.5	147.0	149.2	146.5
4	145.1	149.7	147.3	147.1	150.1	147.4
3	145.2	149.3	147.2	146.5	149.8	147.5
2	145.7	149.5	147.1	146.4	150.5	148.1
1	145.1	149.0	147.2	147.1	150.7	147.0
Edge						
Tukey test	DIFF !	DIFF !	DIFF !	DIFF !	DIFF !	--
paired t tests	DIFF !	DIFF !	DIFF !	DIFF !	DIFF !	DIFF !
6 of 6 test	DIFF !	DIFF !	DIFF !	DIFF !	DIFF !	--

Clear — *Clears everything for a new problem*
Enter data, or press a key below.

Example — *Enters example segregated data*

Random — *Enters a random sample*

YES ! <-- significant column differences?

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

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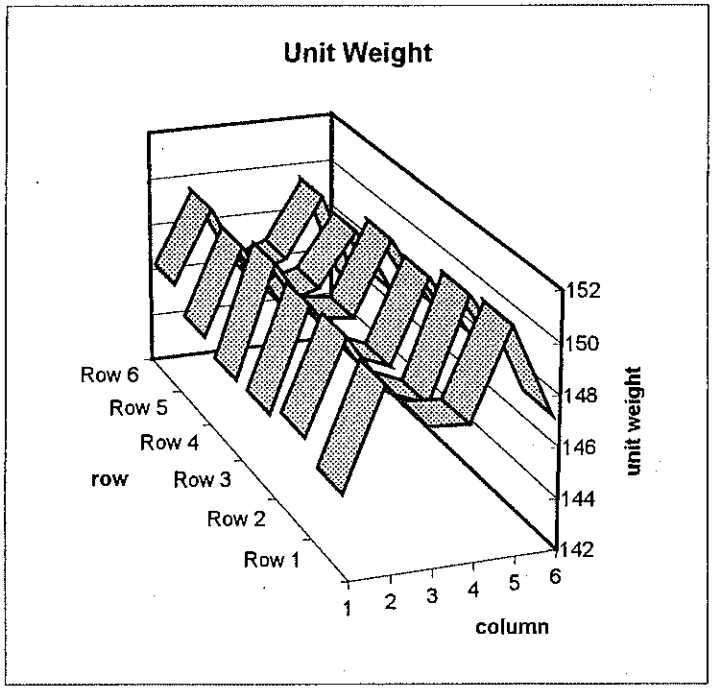
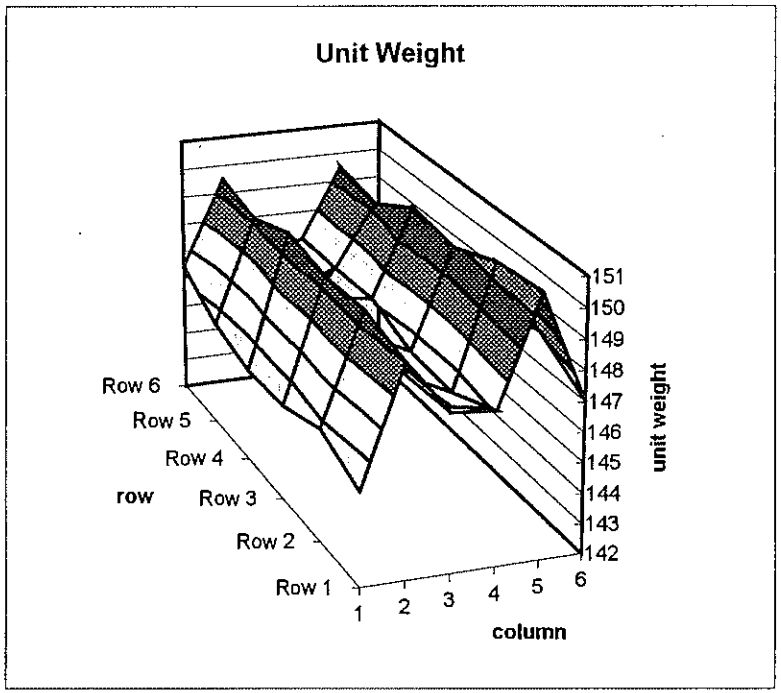
Location: *Sample Data -- from St. John's*
Date: *11/19/95*
Description: *Average of 3 samples , surface course unit weight in air*

Color 1 *Color Above and Below Average*
Clear Color

Column	1	2	3	4	5	6	Average	Standard Deviation	Coeff of Variation
Row									
6	146.4	149.5	146.4	147.0	149.5	145.2	147.34	1.777	1.21%
5	145.5	149.1	146.5	147.0	149.2	146.5	147.32	1.525	1.04%
4	145.1	149.7	147.3	147.1	150.1	147.4	147.79	1.850	1.25%
3	145.2	149.3	147.2	146.5	149.8	147.5	147.59	1.749	1.19%
2	145.7	149.5	147.1	146.4	150.5	148.1	147.87	1.832	1.24%
1	145.1	149.0	147.2	147.1	150.7	147.0	147.69	1.921	1.30%
Average	145.52	149.37	146.95	146.84	149.98	146.94	147.60	**147.60**	1.776	1.20%
Std. Dev.	0.516	0.253	0.391	0.318	0.557	1.000	0.506		**1.66176**	
Coeff. of Var.	0.35%	0.17%	0.27%	0.22%	0.37%	0.68%	0.34%			**1.13%**

Location: *Sample Data -- from St. John's*
Date: *11/19/95*
Description: *Average of 3 samples , surface course unit weight in air*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

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Location: *Sample Data -- from St. John's*

Date: *11/19/95*

Description: *Average of 3 samples , surface course unit weight in air*

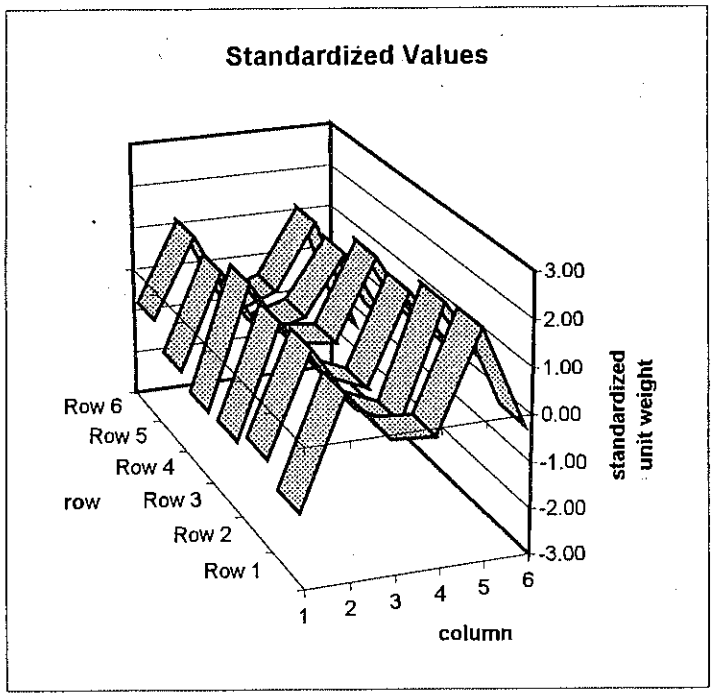
Color 1 *Color Above and Below Average*

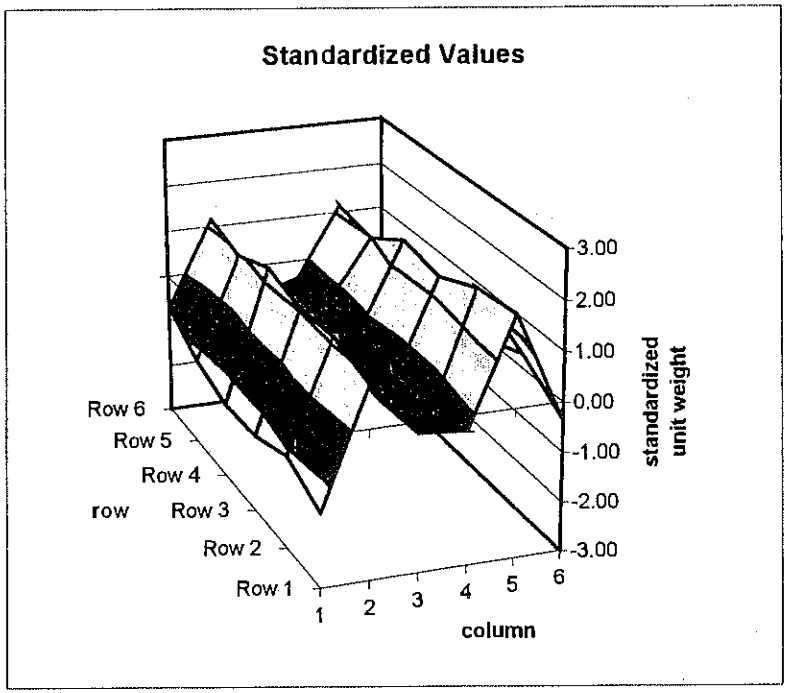
Clear Color

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	-0.70	1.15	-0.74	-0.38	1.15	-1.43	-0.16	1.069
5	-1.24	0.92	-0.64	-0.35	0.99	-0.69	-0.17	0.918
4	-1.49	1.27	-0.19	-0.30	1.51	-0.13	0.11	1.113
3	-1.45	1.05	-0.25	-0.67	1.35	-0.05	0.00	1.053
2	-1.12	1.13	-0.32	-0.73	1.74	0.28	0.16	1.103
1	-1.50	0.86	-0.23	-0.30	1.85	-0.36	0.05	1.156
Average	-1.25	1.06	-0.39	-0.46	1.43	-0.39	0.00	**0.00**	1.069
Std. Dev.	0.310	0.152	0.235	0.192	0.335	0.602	0.304		**1.00**

Location: *Sample Data -- from St. John's*
Date: *11/19/95*
Description: *Average of 3 samples , surface course unit weight in air*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	145.52	-2.08	4.322	0.516	0.266
2	149.37	1.77	3.129	0.253	0.064
3	146.95	-0.65	0.428	0.391	0.153
4	146.84	-0.76	0.572	0.318	0.101
5	149.98	2.38	5.649	0.557	0.310
6	146.94	-0.66	0.430	1.000	1.000
sum			14.530		1.894
all data	147.60			1.661764	2.7615

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	87.1806134	5	17.436	**55.23318**	2.533554	3.142E-14
within columns:	9.47046111	30	0.316			
Total:	96.6510745			**Different ?**	1	YES!

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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Tukey's paired comparison test

Difference of means

Columns	1	2	3	4	5	6
1		-3.85	-1.42	-1.32	-4.46	-1.42
2	-3.85		2.42	2.53	-0.61	2.42
3	-1.42	2.42		0.10	-3.03	0.00
4	-1.32	2.53	0.10		-3.13	-0.10
5	-4.46	-0.61	-3.03	-3.13		3.03
6	-1.42	2.42	0.00	-0.10	3.03	

Critical Values

Columns	1	2	3	4	5	6
1		0.78	0.88	0.83	1.03	1.53
2	0.78		0.63	0.55	0.83	1.41
3	0.88	0.63		0.69	0.93	1.46
4	0.83	0.55	0.69		0.87	1.43
5	1.03	0.83	0.93	0.87		1.56
6	1.53	1.41	1.46	1.43	1.56	

Critical ?

Columns	1	2	3	4	5	6
1		1	1	1	1	0
2	1		1	1	0	1
3	1	1		0	1	0
4	1	1	0		1	0
5	1	0	1	1		1
6	0	1	0	0	1	
Sum	**4**	**4**	**3**	**3**	**4**	**2**
Different?	**1**	**1**	**1**	**1**	**1**	**0**

t-tests

two sample, equal variance, homoscedastic

Row vs. Ro	1	2	3	4	5	6
1		0.8694	0.9285	0.9310	0.7186	0.7477
2			0.7918	0.9370	0.5818	0.6181
3				0.8555	0.7786	0.8067
4					0.6430	0.6765
5						0.9855
6						

t-tests

two sample, equal variance, homoscedastic

Col vs Col	1	2	3	4	5	6
1		0.0000	0.0003	0.0003	0.0000	0.0113
2	0.0000		0.0000	0.0000	0.0351	0.0002
3	0.0003	0.0000		0.6319	0.0000	0.9980
4	0.0003	0.0000	0.6319		0.0000	0.8192
5	0.0000	0.0351	0.0000	0.0000		0.0001
6	0.0113	0.0002	0.9980	0.8192	0.0001	

Fail t-test at 0.05 level?

Col vs Col	1	2	3	4	5	6	Sum	Diff ?
1		1	1	1	1	1	5	1
2	1		1	1	1	1	5	1
3	1	1		0	1	0	3	1
4	1	1	0		1	0	3	1
5	1	1	1	1		1	5	1
6	1	1	0	0	1		3	1

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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Above Average? 1= true, 0 = false

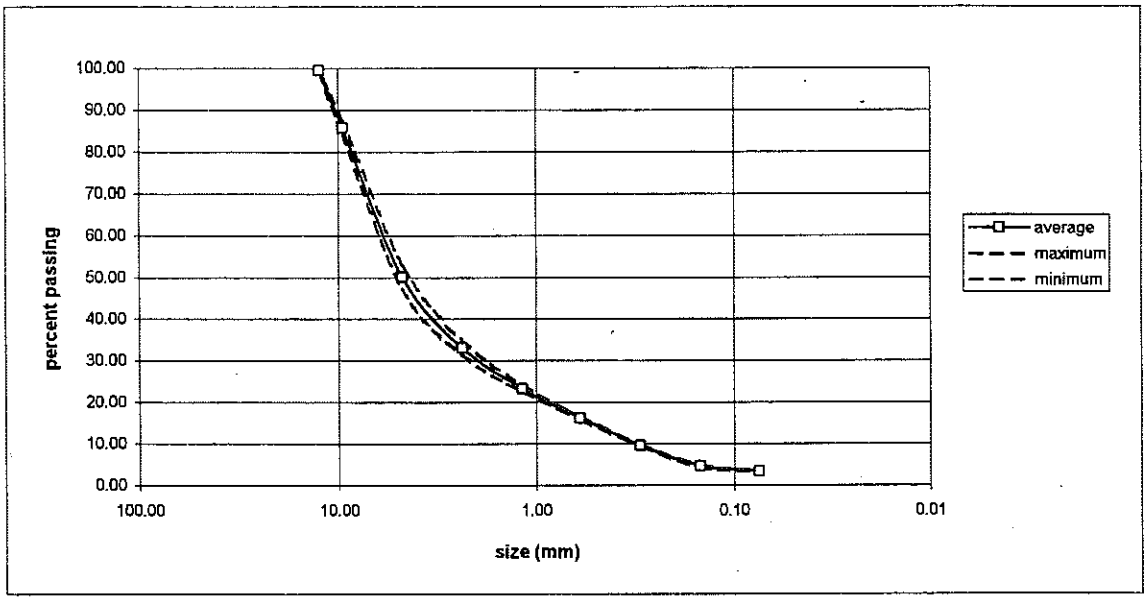
0	1	0	0	1	0
0	1	0	0	1	0
0	1	0	0	1	0
0	1	0	0	1	0
0	1	0	0	1	1
0	1	0	0	1	0
0	6	0	0	6	1

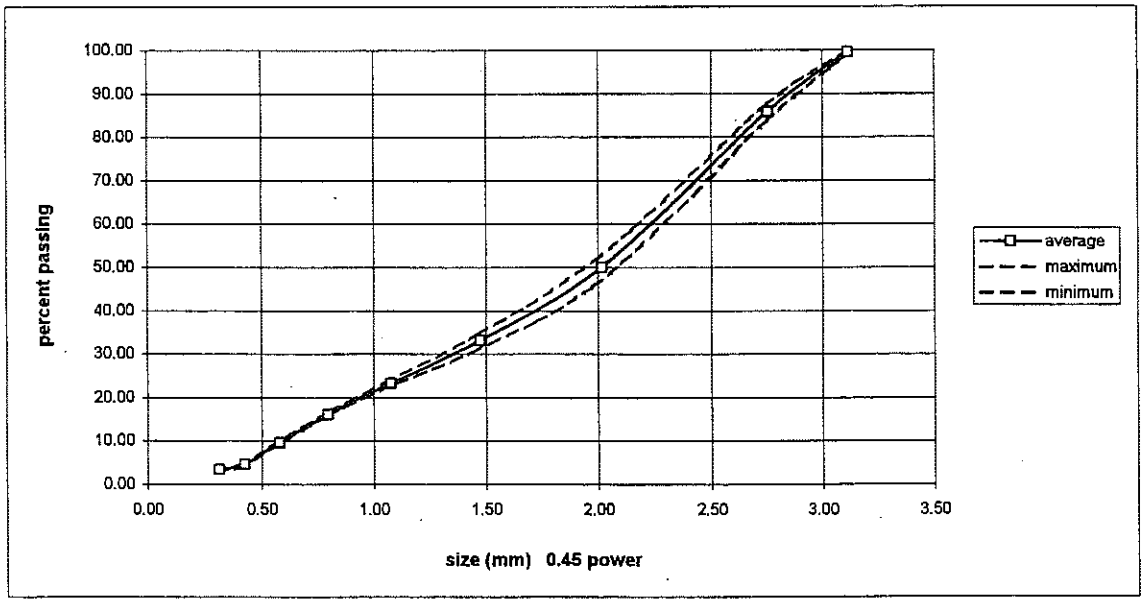
Gradation Plot for Rows and Columns

St. John's Gradation Data

file:sjcurv1.xls

Row 1			Percent passing										
Sieve size	Sieve opening (mm)	^.45	Sample 11x	12x	13x	14x	15x	16x	Avg	Std Dev	Max	Min	Diff
3/4 inch	19.00	3.76	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00	100.00	100.00	0.00
1/2 inch	12.50	3.12	98.92	99.50	99.42	99.88	99.91	99.80	99.57	0.35	99.91	98.92	1.00
3/8 inch	9.50	2.75	84.14	83.77	85.64	87.41	87.57	86.32	85.81	1.47	87.57	83.77	3.80
No. 4	4.75	2.02	47.69	47.01	47.49	52.67	52.37	52.79	50.00	2.62	52.79	47.01	5.78
No. 8	2.37	1.47	31.73	31.42	31.71	34.02	34.65	34.89	33.07	1.48	34.89	31.42	3.47
No. 16	1.18	1.08	22.68	22.60	22.69	23.32	24.18	23.98	23.24	0.64	24.18	22.60	1.58
No. 30	0.60	0.79	15.84	15.84	15.94	16.00	16.68	16.36	16.11	0.31	16.68	15.84	0.84
No. 50	0.30	0.58	9.85	9.45	9.37	9.57	9.75	9.78	9.63	0.18	9.85	9.37	0.48
No. 100	0.15	0.43	4.28	4.48	4.54	4.80	4.84	4.92	4.64	0.23	4.92	4.28	0.64
No. 200	0.08	0.31	3.26	3.42	3.39	3.59	3.48	3.54	3.45	0.11	3.59	3.26	0.34

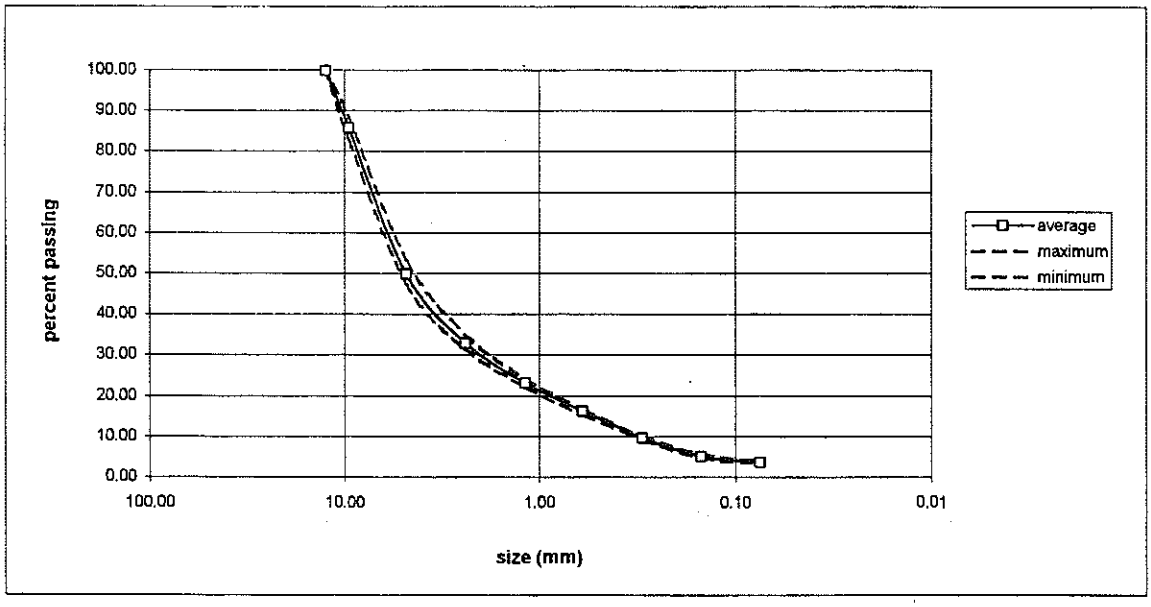


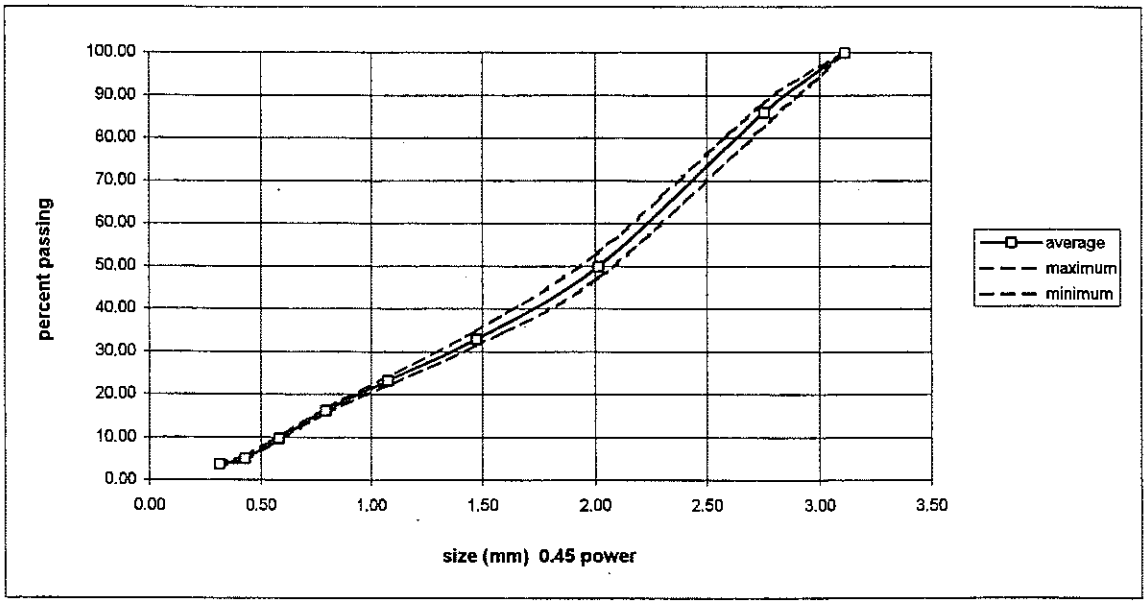


St. John's Gradation Data

file:sjcurv2.xls

Row 2			Percent passing										
Sieve size	Sieve opening (mm)	^.45	Sample 21x	22x	23x	24x	25x	26x	Avg	Std Dev	Max	Min	Diff
3/4 inch	19.00	3.76	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00	100.00	100.00	0.00
1/2 inch	12.50	3.12	99.81	99.91	99.71	99.75	99.73	100.00	99.82	0.10	100.00	99.71	0.29
3/8 inch	9.50	2.75	86.34	82.58	86.54	84.04	88.15	87.30	85.82	1.92	88.15	82.58	5.57
No. 4	4.75	2.02	49.58	47.11	48.23	47.52	53.11	53.03	49.76	2.46	53.11	47.11	5.99
No. 8	2.37	1.47	32.60	31.48	31.77	31.44	34.83	34.92	32.84	1.49	34.92	31.44	3.47
No. 16	1.18	1.08	22.98	22.60	22.70	22.17	24.22	24.02	23.12	0.75	24.22	22.17	2.05
No. 30	0.60	0.79	16.04	15.86	15.94	15.42	16.72	16.48	16.08	0.42	16.72	15.42	1.30
No. 50	0.30	0.58	9.59	9.62	9.55	9.21	9.90	10.20	9.68	0.31	10.20	9.21	0.99
No. 100	0.15	0.43	4.78	4.93	4.87	4.69	5.04	5.66	4.99	0.32	5.66	4.69	0.97
No. 200	0.08	0.31	3.49	3.54	3.43	3.35	3.64	3.93	3.56	0.19	3.93	3.35	0.58
			3E-14	0	1E-14	-1E-14	0	0					

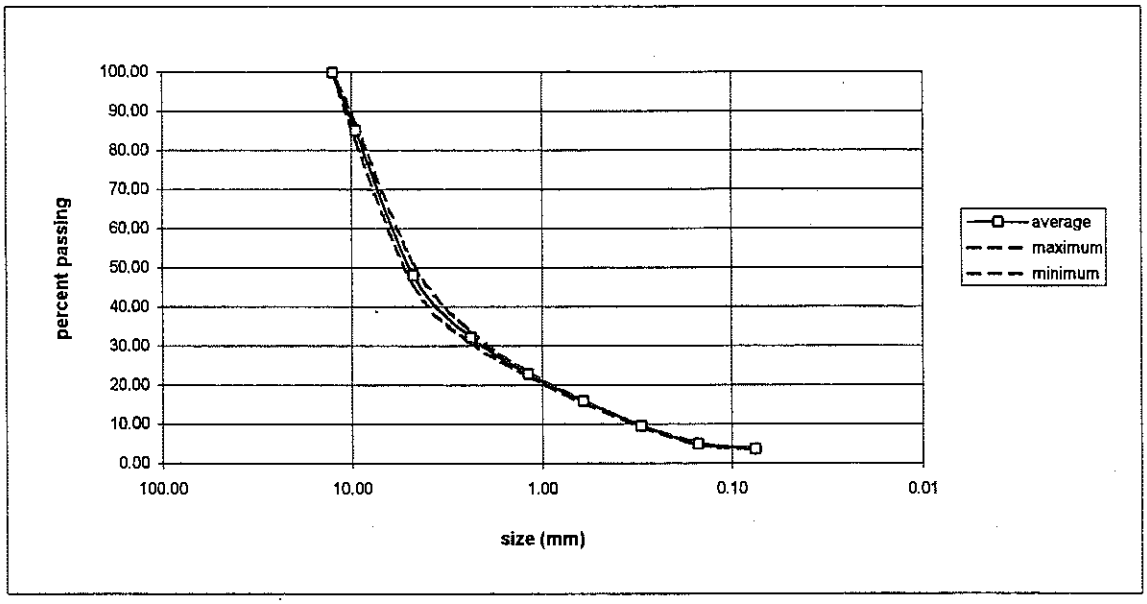


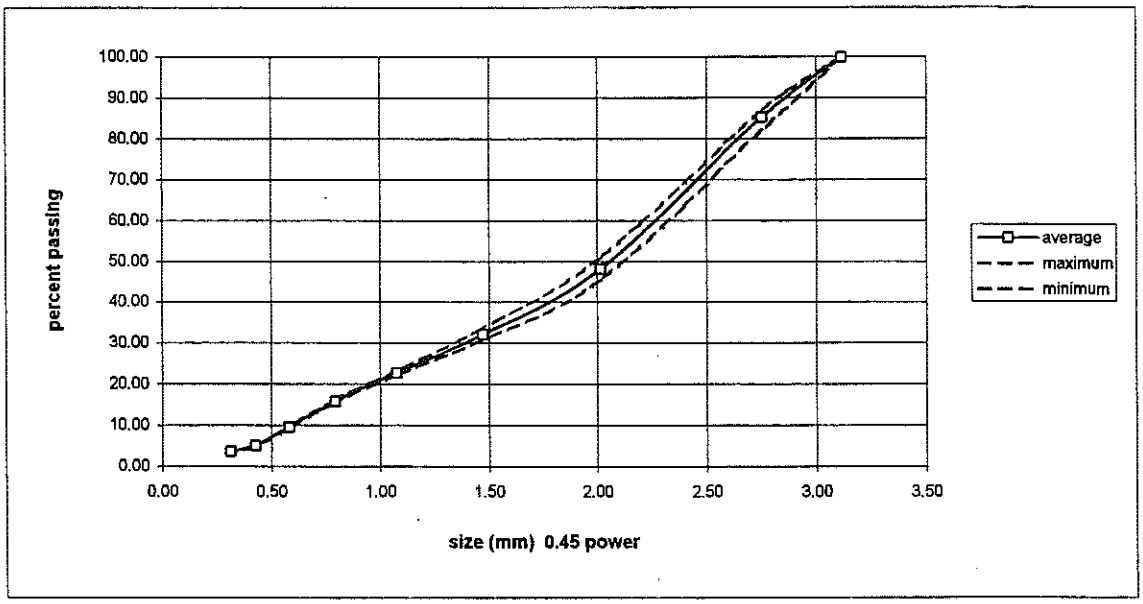


St. John's Gradation Data

file:sjcurv3.xls

Row 3			Percent passing										
Sieve size	Sieve opening (mm)	^.45	Sample 31x	32x	33x	34x	35x	36x	Avg	Std Dev	Max	Min	Diff
3/4 inch	19.00	3.76	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00	100.00	100.00	0.00
1/2 inch	12.50	3.12	99.83	99.84	99.65	99.86	100.00	100.00	99.86	0.12	100.00	99.65	0.35
3/8 inch	9.50	2.75	86.47	81.92	85.59	83.73	86.38	86.73	85.14	1.75	86.73	81.92	4.81
No. 4	4.75	2.02	48.15	45.33	47.22	47.95	49.04	50.87	48.09	1.68	50.87	45.33	5.54
No. 8	2.37	1.47	31.84	30.80	31.74	31.68	32.91	33.67	32.11	0.93	33.67	30.80	2.86
No. 16	1.18	1.08	22.58	22.23	22.72	22.25	23.26	23.28	22.72	0.43	23.28	22.23	1.05
No. 30	0.60	0.79	15.77	15.69	15.95	15.46	16.25	16.03	15.86	0.25	16.25	15.46	0.79
No. 50	0.30	0.58	9.59	9.52	9.60	9.30	9.75	9.62	9.56	0.14	9.75	9.30	0.45
No. 100	0.15	0.43	4.82	5.09	4.84	4.78	5.20	5.03	4.96	0.15	5.20	4.78	0.42
No. 200	0.08	0.31	3.48	3.56	3.48	3.51	3.71	3.60	3.56	0.08	3.71	3.48	0.24
			-1E-14	0	-3E-14	1E-14	0	1E-14					

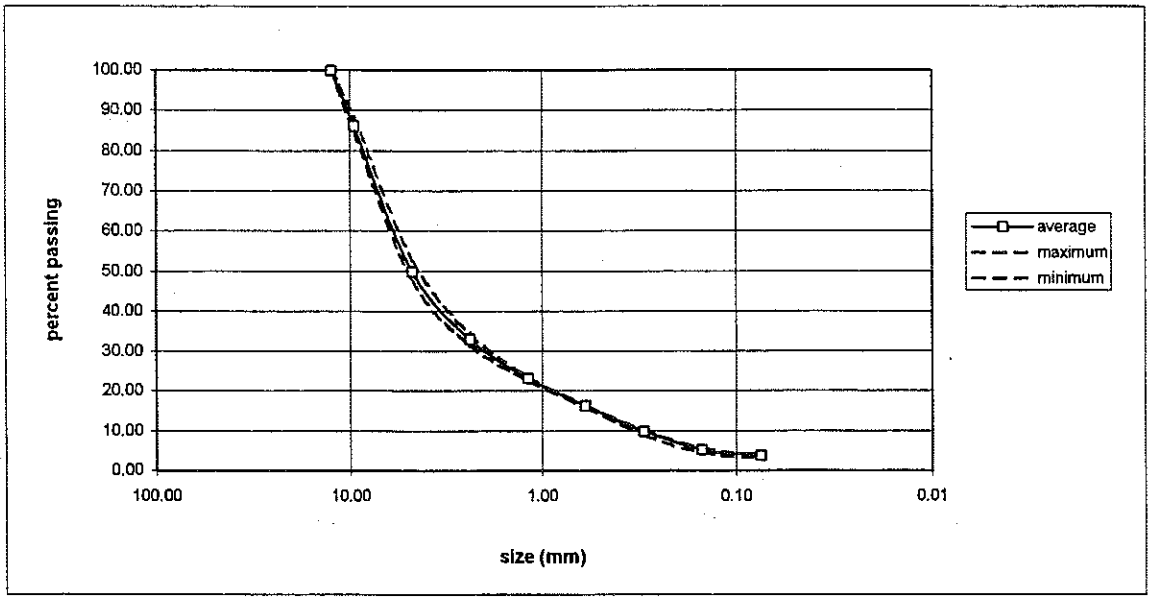


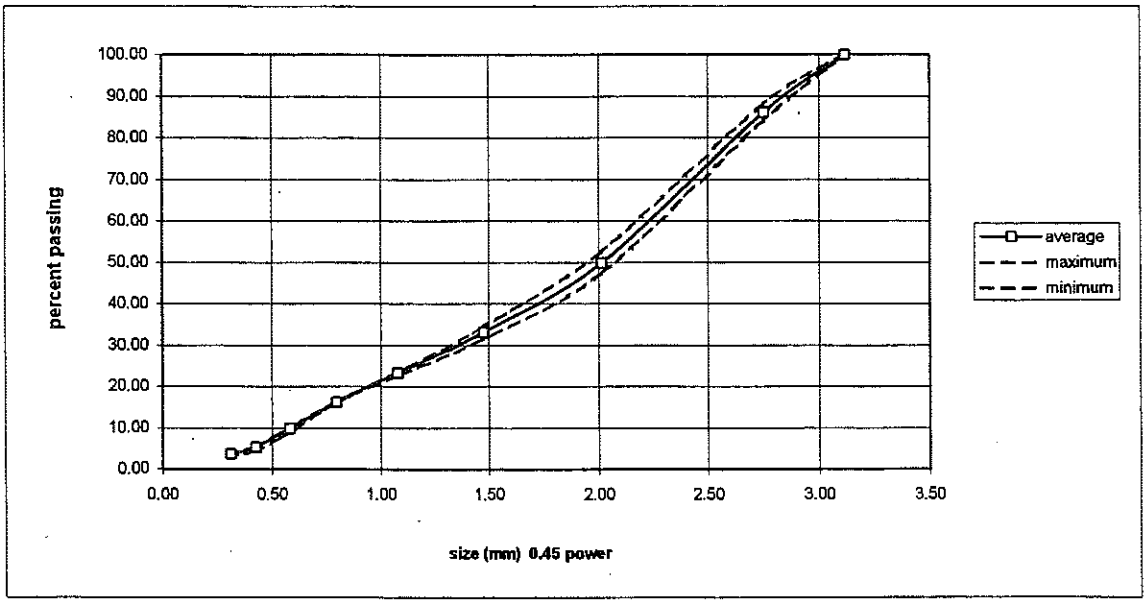


St. John's Gradation Data

file:sjcurv4.xls

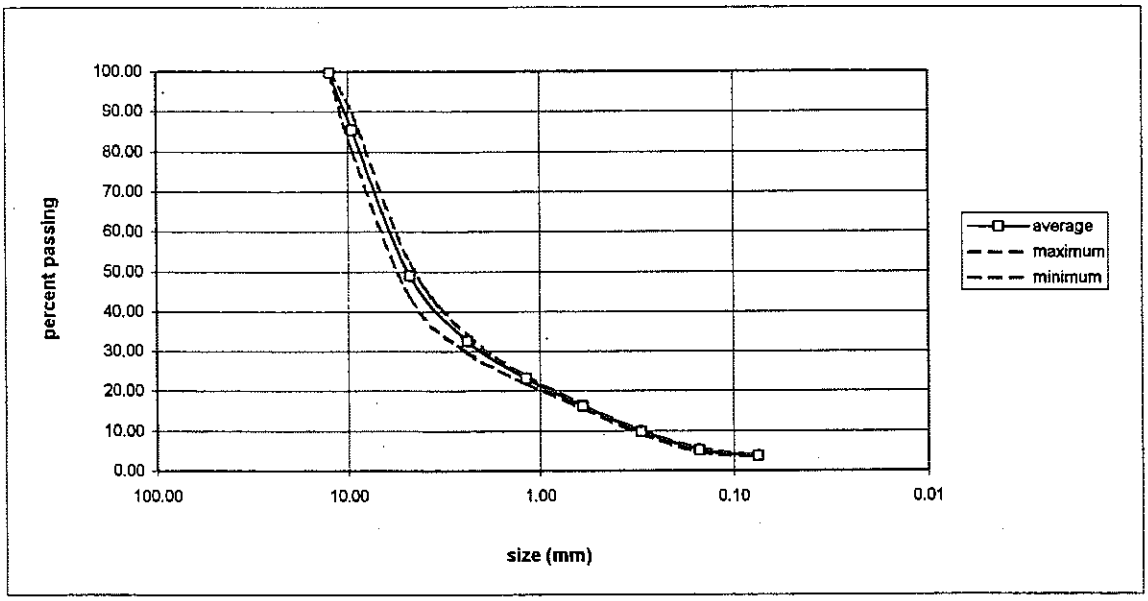
Row 4			Percent passing										
Sieve size	Sieve opening (mm)	^.45	Sample 41x	42x	43x	44x	45x	46x	Avg	Std Dev	Max	Min	Diff
3/4 inch	19.00	3.76	100.00	100.00	100.00	100.00	100.00	100.00	**100.00**	**0.00**	100.00	100.00	**0.00**
1/2 inch	12.50	3.12	99.83	99.82	99.92	99.66	100.00	99.86	**99.85**	**0.10**	100.00	99.66	**0.34**
3/8 inch	9.50	2.75	85.41	84.06	88.12	87.05	86.56	84.72	**85.99**	**1.39**	88.12	84.06	**4.06**
No. 4	4.75	2.02	48.29	47.32	50.28	52.49	50.65	49.63	**49.78**	**1.67**	52.49	47.32	**5.17**
No. 8	2.37	1.47	32.16	31.48	33.14	34.43	33.35	33.15	**32.95**	**0.93**	34.43	31.48	**2.94**
No. 16	1.18	1.08	22.75	22.60	23.45	23.62	23.41	23.27	**23.18**	**0.37**	23.62	22.60	**1.02**
No. 30	0.60	0.79	15.93	15.96	16.47	16.30	16.31	16.15	**16.19**	**0.19**	16.47	15.93	**0.53**
No. 50	0.30	0.58	9.68	9.87	9.92	9.95	10.06	8.81	**9.71**	**0.42**	10.06	8.81	**1.25**
No. 100	0.15	0.43	5.27	5.52	5.08	5.34	5.57	4.52	**5.22**	**0.35**	5.57	4.52	**1.04**
No. 200	0.08	0.31	3.61	3.80	3.61	3.75	3.91	3.07	**3.63**	**0.27**	3.91	3.07	**0.84**
			1E-14	-3E-14	0	-1E-14	1E-14	-1E-14					

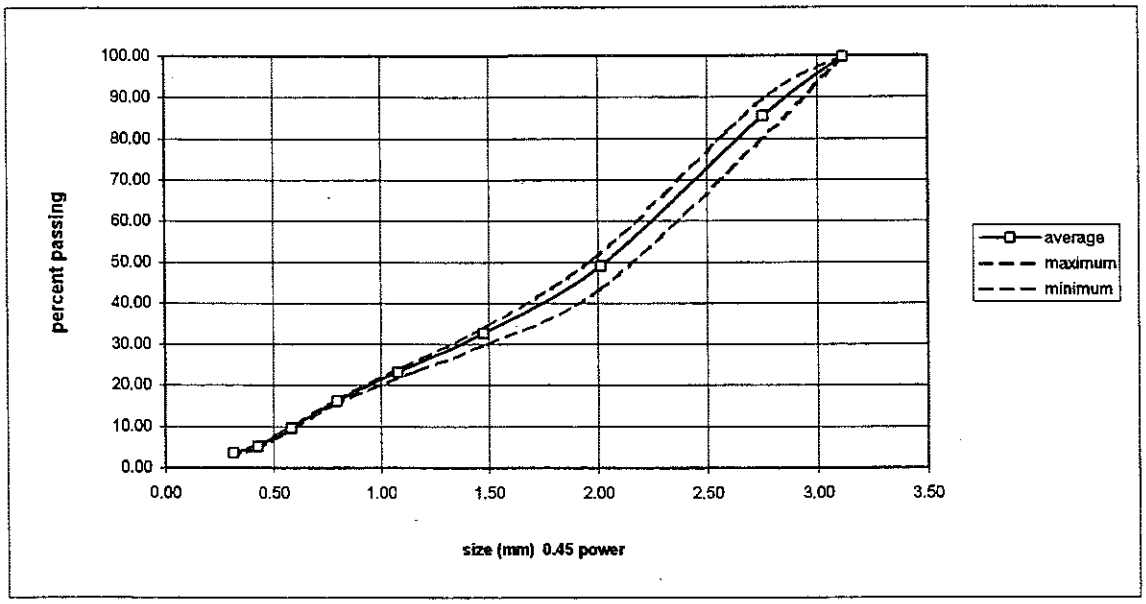




St. John's Gradation Data file:sjcurv5.xls

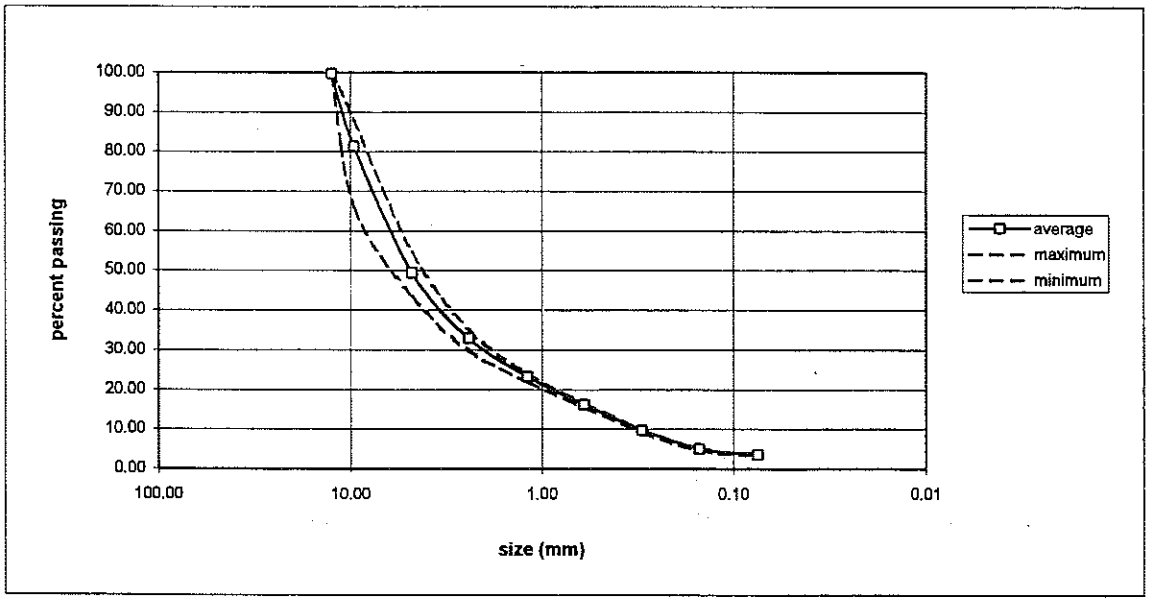
Row 5			Percent passing										
Sieve size	Sieve opening (mm)	^.45	Sample 51x	52x	53x	54x	55x	56x	Avg	Std Dev	Max	Min	Diff
3/4 inch	19.00	3.76	100.00	100.00	100.00	100.00	100.00	100.00	**100.00**	**0.00**	100.00	100.00	**0.00**
1/2 inch	12.50	3.12	99.86	99.82	99.72	99.78	99.58	99.71	**99.74**	**0.09**	99.86	99.58	**0.28**
3/8 inch	9.50	2.75	83.57	79.94	86.21	89.43	87.14	86.34	**85.44**	**3.00**	89.43	79.94	**9.49**
No. 4	4.75	2.02	47.55	43.35	50.33	52.08	50.81	49.73	**48.98**	**2.86**	52.08	43.35	**8.72**
No. 8	2.37	1.47	31.80	29.77	33.12	33.98	33.83	33.35	**32.64**	**1.47**	33.98	29.77	**4.21**
No. 16	1.18	1.08	22.72	21.80	23.24	23.51	23.89	23.62	**23.13**	**0.69**	23.89	21.80	**2.09**
No. 30	0.60	0.79	15.92	15.52	16.20	16.25	16.58	16.50	**16.16**	**0.36**	16.58	15.52	**1.06**
No. 50	0.30	0.58	9.61	9.36	9.16	9.86	10.12	10.17	**9.71**	**0.37**	10.17	9.16	**1.00**
No. 100	0.15	0.43	5.09	4.77	4.64	5.49	5.37	5.56	**5.15**	**0.35**	5.56	4.64	**0.92**
No. 200	0.08	0.31	3.62	3.36	3.30	3.71	3.77	3.92	**3.61**	**0.22**	3.92	3.30	**0.62**
			0	0	0	0	0	0					

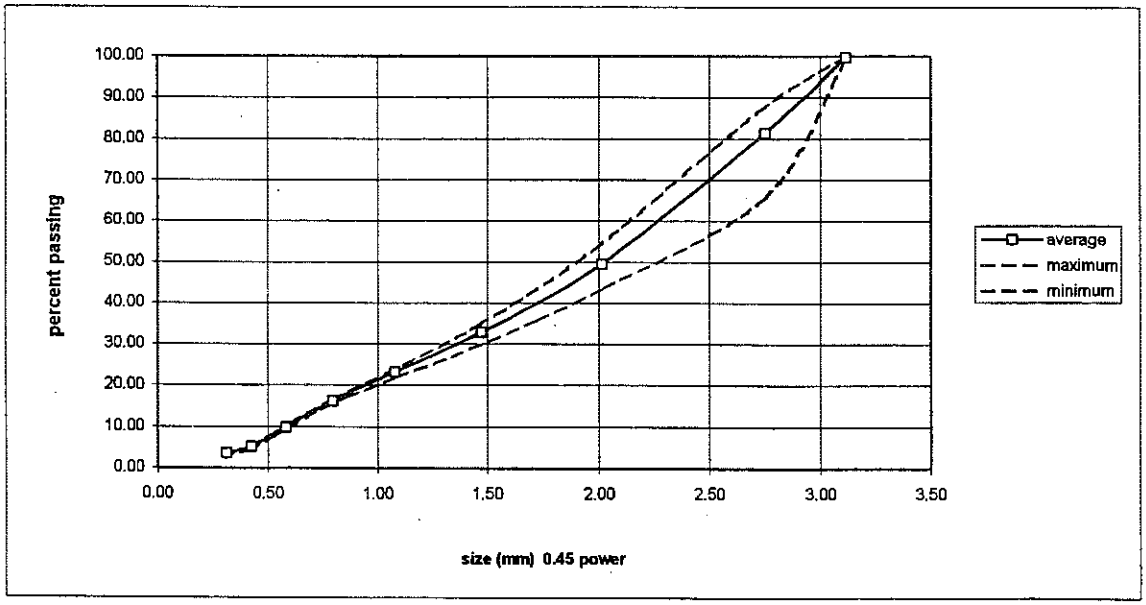




St. John's Gradation Data file:sjcurv6.xls

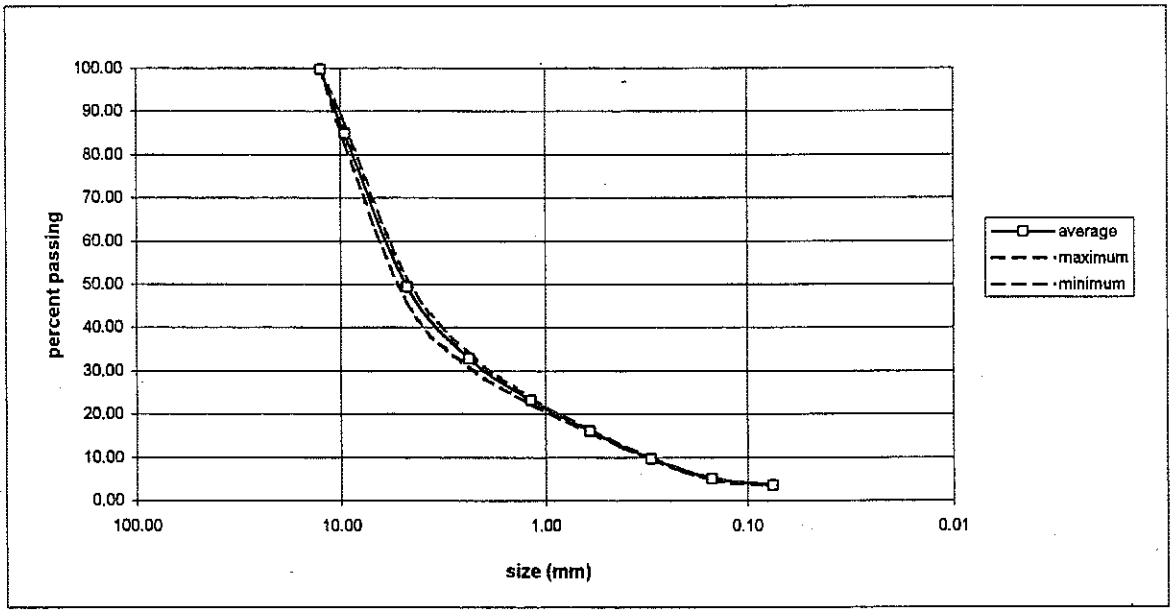
Row 6			Percent passing										
Sieve size	Sieve opening (mm)	^.45	Sample 61x	62x	63x	64x	65x	66x	Avg	Std Dev	Max	Min	Diff
3/4 inch	19.00	3.76	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00	100.00	100.00	0.00
1/2 inch	12.50	3.12	99.33	99.42	99.93	100.00	99.11	99.90	99.62	0.34	100.00	99.11	0.89
3/8 inch	9.50	2.75	82.43	80.90	87.74	65.69	85.34	85.92	81.33	7.35	87.74	65.69	22.05
No. 4	4.75	2.02	46.53	43.42	51.12	54.42	50.19	51.40	49.51	3.58	54.42	43.42	11.00
No. 8	2.37	1.47	31.17	29.81	33.50	34.97	33.67	33.96	32.85	1.77	34.97	29.81	5.16
No. 16	1.18	1.08	22.25	21.84	23.45	23.96	23.79	23.67	23.16	0.81	23.96	21.84	2.12
No. 30	0.60	0.79	15.65	15.56	16.36	16.47	16.63	16.39	16.18	0.41	16.63	15.56	1.07
No. 50	0.30	0.58	9.65	9.59	9.18	9.89	10.06	9.99	9.73	0.30	10.06	9.18	0.88
No. 100	0.15	0.43	5.16	5.22	4.70	5.08	5.20	5.26	5.10	0.19	5.26	4.70	0.55
No. 200	0.08	0.31	3.66	3.60	3.31	3.57	3.70	3.69	3.59	0.13	3.70	3.31	0.39
			-1E-14	1E-14	0	-1E-14	-1E-14	-1E-14					

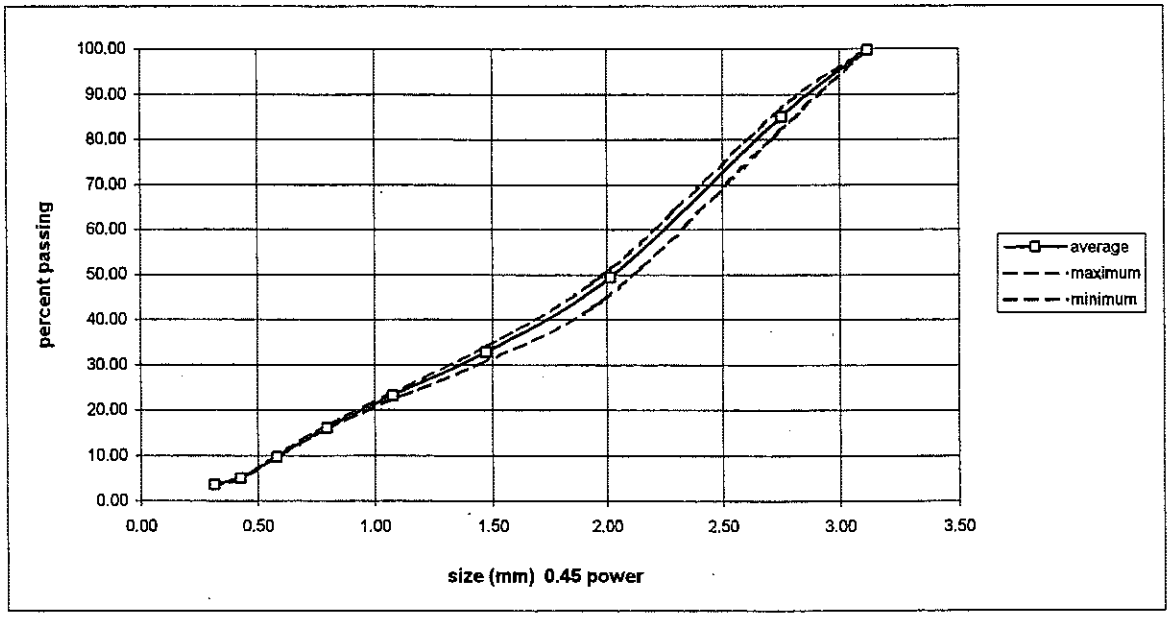




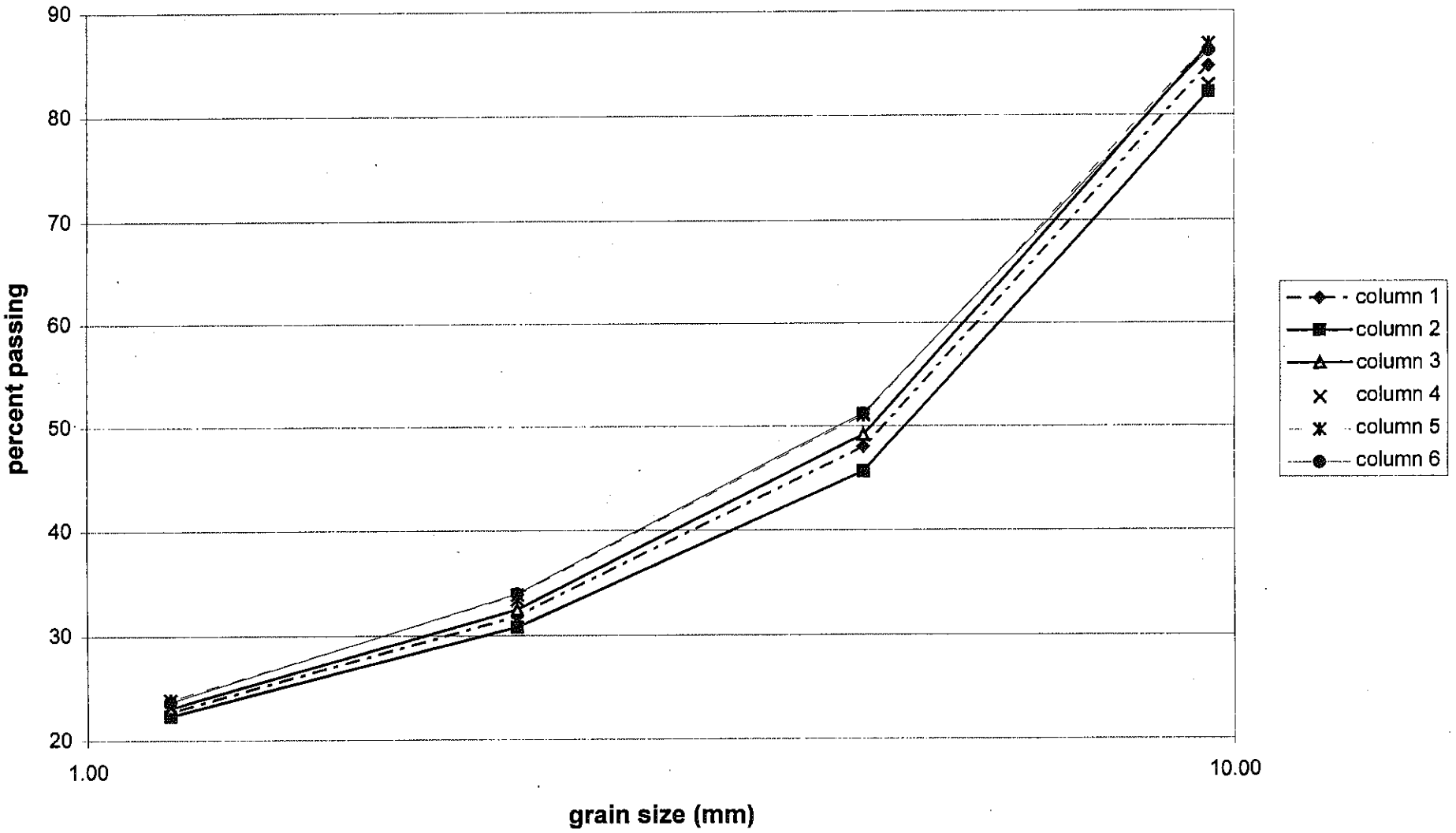
St. John's Gradation Data for Each Column file:sjcolumn-curve.xls

Sieve size	Sieve opening (mm)	^.45	Percent passing column 1	column 2	column 3	column 4	column 5	column 6	Avg	Std Dev	Max	Min	Diff
3/4 inch	19.00	3.76	100.00	100.00	100.00	100.00	100.00	100.00	**100.00**	**0.00**	100.00	100.00	**0.00**
1/2 inch	12.50	3.12	99.60	99.72	99.72	99.82	99.72	99.88	**99.74**	**0.09**	99.88	99.60	**0.28**
3/8 inch	9.50	2.75	84.72	82.19	86.64	82.89	86.86	86.22	**84.92**	**1.82**	86.86	82.19	**4.66**
No. 4	4.75	2.02	47.96	45.59	49.11	51.19	51.03	51.24	**49.35**	**2.08**	51.24	45.59	**5.65**
No. 8	2.37	1.47	31.88	30.80	32.50	33.42	33.87	33.99	**32.74**	**1.15**	33.99	30.80	**3.20**
No. 16	1.18	1.08	22.66	22.28	23.04	23.14	23.79	23.64	**23.09**	**0.52**	23.79	22.28	**1.51**
No. 30	0.60	0.79	15.86	15.74	16.14	15.98	16.53	16.32	**16.09**	**0.27**	16.53	15.74	**0.79**
No. 50	0.30	0.58	9.66	9.57	9.46	9.63	9.94	9.76	**9.67**	**0.15**	9.94	9.46	**0.47**
No. 100	0.15	0.43	4.90	5.00	4.78	5.03	5.20	5.16	**5.01**	**0.14**	5.20	4.78	**0.42**
No. 200	0.08	0.31	3.52	3.55	3.42	3.58	3.70	3.62	**3.57**	**0.09**	3.70	3.42	**0.28**

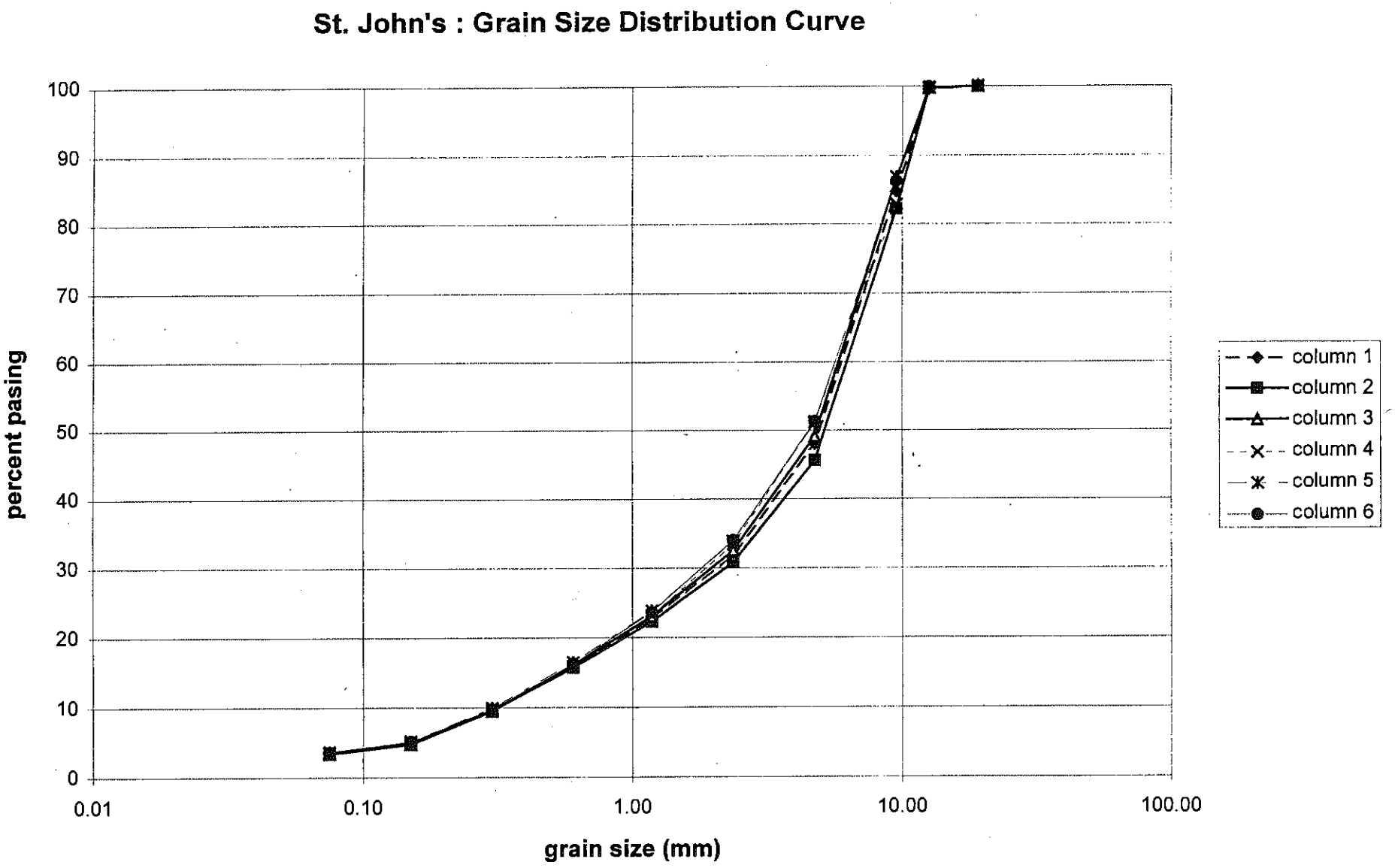




St. John's : Grain Size Distribution Curve (sieve 3/8" ~ no. 16)



Curve Plot (2)


St. John's : Grain Size Distribution Curve
percent pasing
100
90
80
70
60
50
40
30
20
10
0
0.01
0.10
1.00
10.00
100.00
grain size (mm)
column 1
column 2
column 3
column 4
column 5
column 6

Curve Plot

Gradation Grid Analysis

Pavement Segregation Analysis Spreadsheet
Michigan State University - Pavement Research Center of Excellence

T.F. Wolff
July 1996

Location:	St. John's
Date:	5/26/96
Description:	% passing 3/8 sieve

(updated 7/12/96)

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	82.43	80.90	87.74	65.69	85.34	85.92
5	83.57	79.94	86.21	89.43	87.14	86.34
4	85.41	84.06	88.12	87.05	86.56	84.72
3	86.47	81.92	85.59	83.73	86.38	86.73
2	86.34	82.58	86.54	84.04	88.15	87.30
1	84.14	83.77	85.64	87.41	87.57	86.32
Edge						
Tukey test	--	**DIFF !**	--	--	--	--
paired t tests	**DIFF !**	**DIFF !**	--	--	--	--
6 of 6 test	--	**DIFF !**	**DIFF !**	--	**DIFF !**	--

Clear *Clears everything for a new problem*
Enter data, or press a key below.

Example *Enters example segregated data*

Random *Enters a random sample*

no <-- significant column differences?

Edge

Pavement Segregation Analysis Spreadsheet T. F. Wolff April 1996

Michigan State University - Pavement Research Center of Excellence

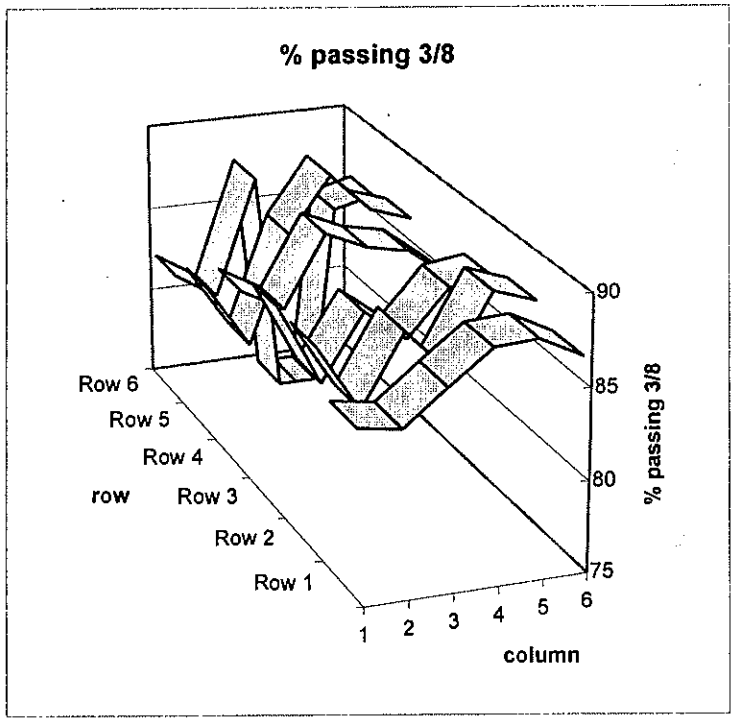
Location: *St. John's*
Date: *5/26/96*
Description: *% passing 3/8 sieve*

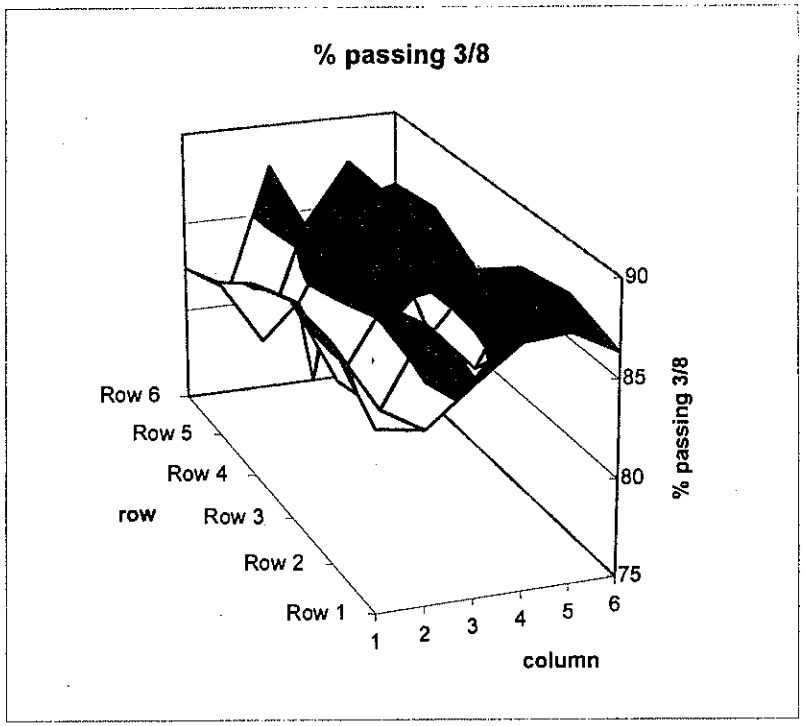
Clear Colors
Color Above and Below Average

Column	1	2	3	4	5	6	Average	Standard Deviation	Coeff of Variation
Row									
6	82.4	80.9	87.7	65.7	85.3	85.9	81.34	8.053	9.90%
5	83.6	79.9	86.2	89.4	87.1	86.3	85.44	3.285	3.85%
4	85.4	84.1	88.1	87.1	86.6	84.7	85.99	1.527	1.78%
3	86.5	81.9	85.6	83.7	86.4	86.7	85.14	1.918	2.25%
2	86.3	82.6	86.5	84.0	88.2	87.3	85.83	2.101	2.45%
1	84.1	83.8	85.6	87.4	87.6	86.3	85.81	1.606	1.87%
Average	84.73	82.20	86.64	82.89	86.86	86.22	84.92	**84.92**	3.082	3.68%
Std. Dev.	1.617	1.609	1.068	8.699	0.988	0.871	2.475		**3.922956**	
Coeff. of Var.	1.91%	1.96%	1.23%	10.49%	1.14%	1.01%	2.96%			**4.62%**

Stats

Location: *St. John's*
Date: *5/26/96*
Description: *% passing 3/8 sieve*





Graph

Pavement Segregation Analysis Spreadsheet

T. F. Wolff April 1996

Michigan State University - Pavement Research Center of Excellence

Location: *St. John's*

Date: *5/26/96*

Description: *% passing 3/8 sieve*

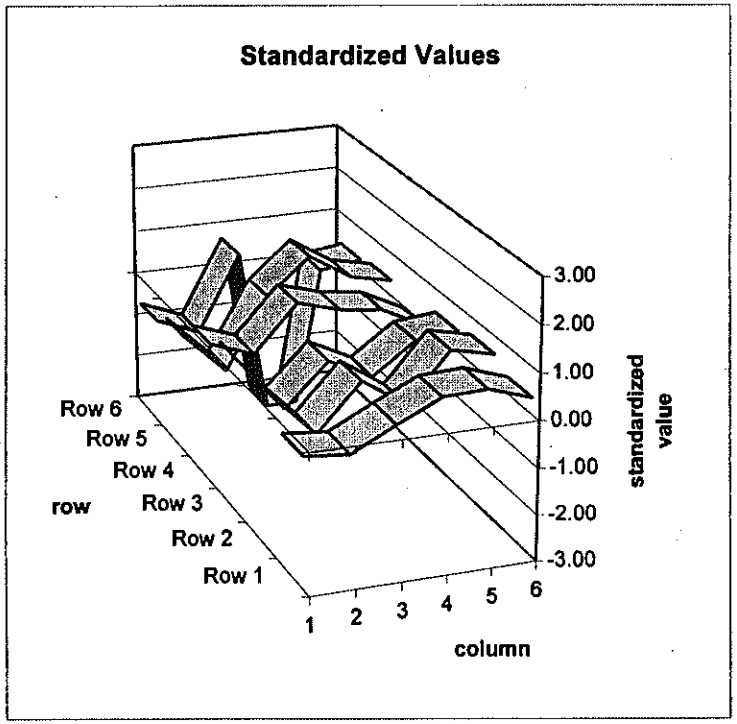
Clear Colors

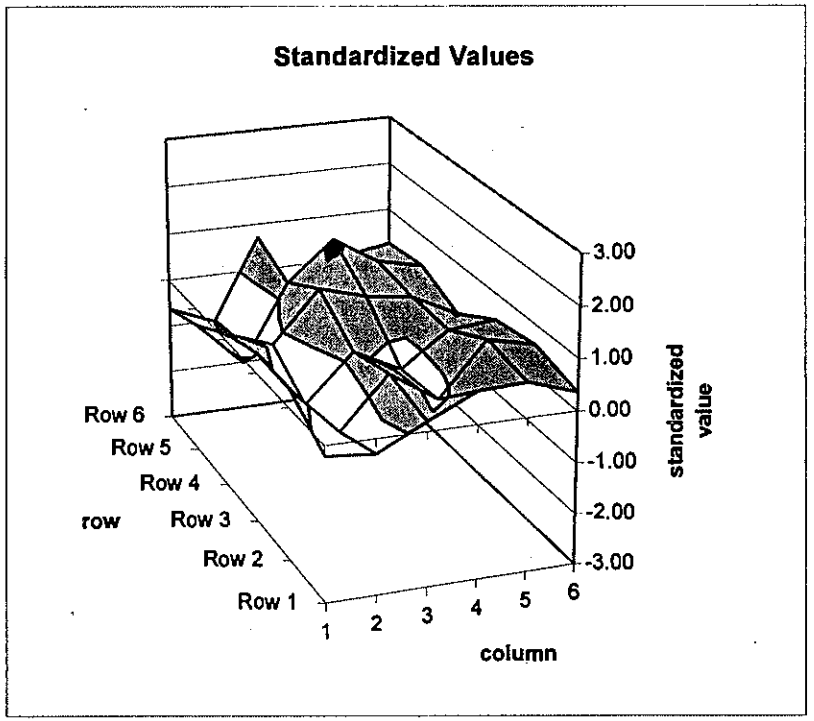
Color Above and Below Average

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	-0.64	-1.03	0.72	-4.90	0.11	0.25	-0.91	2.053
5	-0.34	-1.27	0.33	1.15	0.57	0.36	0.13	0.837
4	0.12	-0.22	0.82	0.54	0.42	-0.05	0.27	0.389
3	0.39	-0.77	0.17	-0.30	0.37	0.46	0.05	0.489
2	0.36	-0.60	0.41	-0.22	0.82	0.61	0.23	0.536
1	-0.20	-0.29	0.18	0.63	0.68	0.36	0.23	0.409
Average	-0.05	-0.70	0.44	-0.52	0.49	0.33	0.00	**0.00**	0.786
Std. Dev.	0.412	0.410	0.272	2.217	0.252	0.222	0.631		**1.00**

Location: *St. John's*
Date: *5/26/96*
Description: *% passing 3/8 sieve*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	84.73	-0.20	0.038	1.617	2.613
2	82.20	-2.73	7.436	1.609	2.589
3	86.64	1.72	2.952	1.068	1.140
4	82.89	-2.03	4.122	8.699	75.675
5	86.86	1.93	3.743	0.988	0.975
6	86.22	1.30	1.689	0.871	0.758
sum			19.981		83.750
all data	84.92			3.922956	15.3896

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	119.883181	5	23.977	**1.71772**	2.533554	0.1609536
within columns:	418.752183	30	13.958			
Total:	538.635364			**Different ?**	**0**	**no**

ANOVA

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

Tukey's paired comparison test

Difference of means

Columns	1	2	3	4	5	6
1		2.53	-1.91	1.84	-2.13	-1.50
2	2.53		-4.45	-0.70	-4.66	-4.03
3	-1.91	-4.45		3.75	-0.22	0.42
4	1.84	-0.70	3.75		-3.97	-3.33
5	-2.13	-4.66	-0.22	-3.97		0.64
6	-1.50	-4.03	0.42	-3.33	0.64	

Critical Values

Columns	1	2	3	4	5	6
1		3.11	2.64	12.06	2.58	2.50
2	3.11		2.63	12.05	2.57	2.49
3	2.64	2.63		11.94	1.98	1.88
4	12.06	12.05	11.94		11.93	11.91
5	2.58	2.57	1.98	11.93		1.79
6	2.50	2.49	1.88	11.91	1.79	

Critical ?

Columns	1	2	3	4	5	6
1		0	0	0	0	0
2	0		1	0	1	1
3	0	1		0	0	0
4	0	0	0		0	0
5	0	1	0	0		0
6	0	1	0	0	0	
Sum	**0**	**3**	**1**	**0**	**1**	**1**
Different?	**0**	**1**	**0**	**0**	**0**	**0**

t-tests

two sample, equal variance, homoscedastic

Row vs. Ro	1	2	3	4	5	6
1		0.9880	0.5256	0.8477	0.8093	0.2118
2			0.5666	0.8819	0.8130	0.2159
3				0.4156	0.8499	0.2871
4					0.7186	0.1948
5						0.2749
6						

t-tests

two sample, equal variance, homoscedastic

Col vs Col	1	2	3	4	5	6
1		0.0216	0.0361	0.6225	0.0203	0.0741
2	0.0216		0.0002	0.8509	0.0001	0.0003
3	0.0361	0.0002		0.3195	0.7228	0.4741
4	0.6225	0.8509	0.3195		0.2933	0.3728
5	0.0203	0.0001	0.7228	0.2933		0.2648
6	0.0741	0.0003	0.4741	0.3728	0.2648	

Fail t-test at 0.05 level?

Col vs Col	1	2	3	4	5	6	Sum	Diff ?
1		1	1	0	1	0	3	1
2	1		1	0	1	1	4	1
3	1	1		0	0	0	2	0
4	0	0	0		0	0	0	0
5	1	1	0	0		0	2	0
6	0	1	0	0	0		1	0

Pavement Segregation Analysis Spreadsheet
Michigan State University - Pavement Research Center of Excellence

T.F. Wolff
July 1996

Location: St. John's
Date: 5/26/96
Description: % passing No. 4 sieve

(updated 7/12/96)

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	46.53	43.42	51.12	54.42	50.19	51.40
5	47.55	43.35	50.33	52.08	50.81	49.73
4	48.29	47.32	50.28	52.49	50.65	49.63
3	48.15	45.33	47.22	47.95	49.04	50.87
2	49.58	47.11	48.23	47.52	53.11	53.03
1	47.69	47.01	47.49	52.67	52.37	52.79
Edge						
Tukey test	--	**DIFF !**	--	--	--	--
paired t tests	**DIFF !**	**DIFF !**	--	--	--	**DIFF !**
6 of 6 test	--	**DIFF !**	--	--	--	**DIFF !**

Clear *Clears everything for a new problem*
Enter data, or press a key below.

Example *Enters example segregated data*

Random *Enters a random sample*

YES ! <-- significant column differences?

Edge

Pavement Segregation Analysis Spreadsheet

Michigan State University - Pavement Research Center of Excellence

T. F. Wolff April 1996

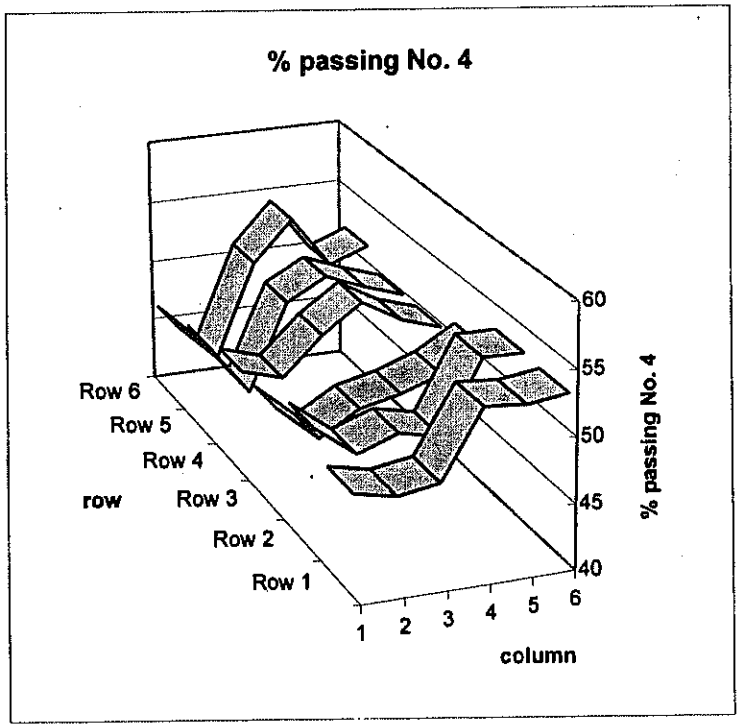
Location: *St. John's*
Date: *5/26/96*
Description: *% passing No. 4 sieve*

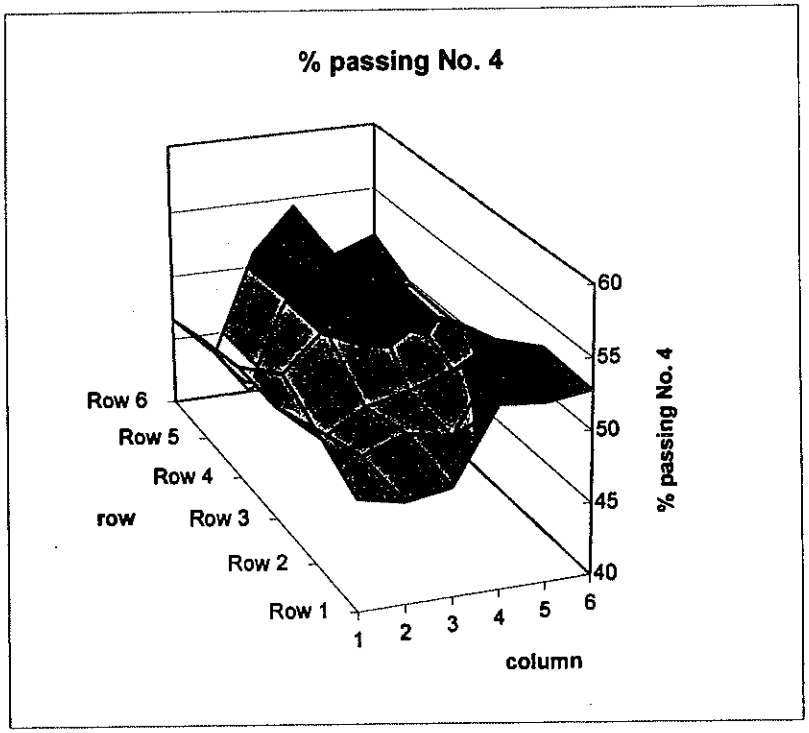
Clear Colors
Color Above and Below Average

Column	1	2	3	4	5	6	Average	Standard Deviation	Coeff of Variation
Row									
6	46.5	43.4	51.1	54.4	50.2	51.4	49.51	3.917	7.91%
5	47.6	43.4	50.3	52.1	50.8	49.7	48.98	3.133	6.40%
4	48.3	47.3	50.3	52.5	50.7	49.6	49.78	1.825	3.67%
3	48.2	45.3	47.2	48.0	49.0	50.9	48.09	1.846	3.84%
2	49.6	47.1	48.2	47.5	53.1	53.0	49.76	2.696	5.42%
1	47.7	47.0	47.5	52.7	52.4	52.8	50.00	2.867	5.73%
Average	47.97	45.59	49.11	51.19	51.03	51.24	49.35	**49.35**	2.714	5.49%
Std. Dev.	1.005	1.850	1.665	2.795	1.481	1.459	1.709		**2.683555**	
Coeff. of Var.	2.10%	4.06%	3.39%	5.46%	2.90%	2.85%	3.46%			**5.44%**

Stats

Location: *St. John's*
Date: *5/26/96*
Description: *% passing No. 4 sieve*





Graph

Pavement Segregation Analysis Spreadsheet T. F. Wolff April 1996

Michigan State University - Pavement Research Center of Excellence

Location: *St. John's*

Date: *5/26/96*

Description: *% passing No. 4 sieve*

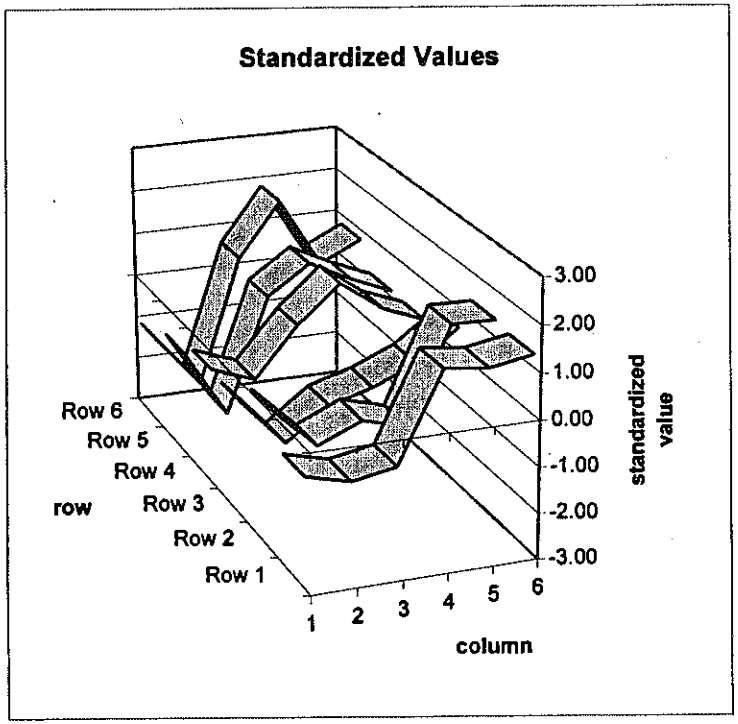
Clear Colors

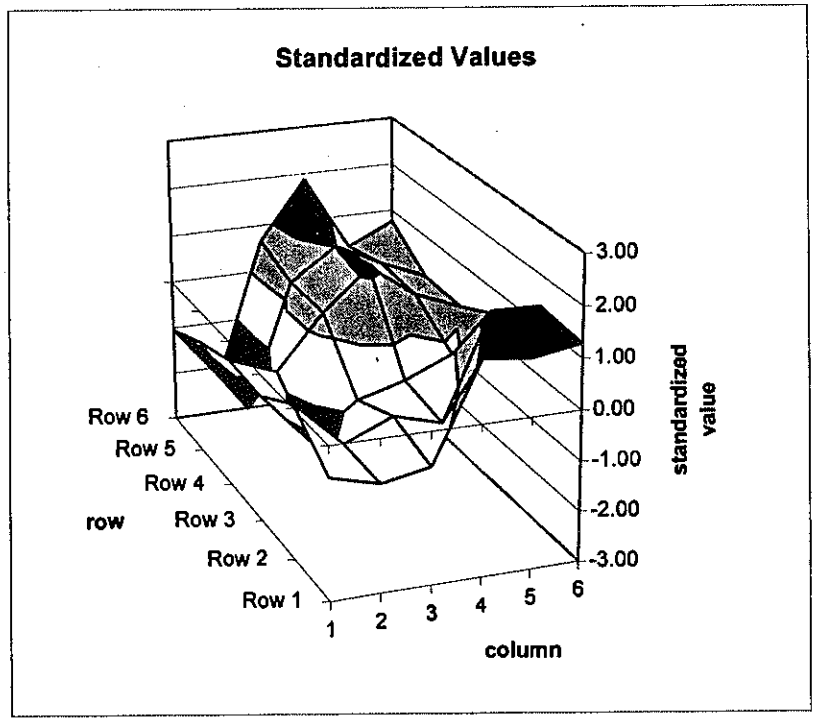
Color Above and Below Average

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	-1.05	-2.21	0.66	1.89	0.31	0.76	0.06	1.460
5	-0.67	-2.24	0.36	1.02	0.54	0.14	-0.14	1.168
4	-0.40	0.76	0.34	1.17	0.48	0.10	0.16	0.680
3	-0.45	-1.50	-0.80	-0.52	-0.12	0.56	-0.47	0.688
2	0.08	0.84	-0.42	-0.68	1.40	1.37	0.15	1.004
1	-0.62	0.87	-0.69	1.24	1.12	1.28	0.24	1.068
Average	-0.52	-1.40	-0.09	0.68	0.62	0.70	0.00	**0.00**	1.011
Std. Dev.	0.375	0.689	0.621	1.042	0.552	0.544	0.637		**1.00**

Location: *St. John's*
Date: *5/26/96*
Description: *% passing No. 4 sieve*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	47.97	-1.39	1.930	1.005	1.011
2	45.59	-3.76	14.170	1.850	3.423
3	49.11	-0.24	0.059	1.665	2.774
4	51.19	1.83	3.364	2.795	7.814
5	51.03	1.67	2.805	1.481	2.193
6	51.24	1.89	3.562	1.459	2.128
sum			25.890		19.343
all data	49.35			2.683555	7.2015

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	155.337927	5	31.068	**9.63701**	2.533554	1.453E-05
within columns:	96.7134021	30	3.224			
Total:	252.051329			**Different ?**	**1**	**YES!**

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

Tukey's paired comparison test

Difference of means

Columns	1	2	3	4	5	6
1		2.38	-1.15	-3.22	-3.06	-3.28
2	2.38		-3.52	-5.60	-5.44	-5.65
3	-1.15	-3.52		-2.08	-1.92	-2.13
4	-3.22	-5.60	-2.08		0.16	-0.05
5	-3.06	-5.44	-1.92	0.16		-0.21
6	-3.28	-5.65	-2.13	-0.05	-0.21	

Critical Values

Columns	1	2	3	4	5	6
1		2.87	2.65	4.05	2.44	2.41
2	2.87		3.39	4.57	3.23	3.21
3	2.65	3.39		4.43	3.04	3.02
4	4.05	4.57	4.43		4.31	4.30
5	2.44	3.23	3.04	4.31		2.83
6	2.41	3.21	3.02	4.30	2.83	

Critical ?

Columns	1	2	3	4	5	6
1		0	0	0	1	1
2	0		1	1	1	1
3	0	1		0	0	0
4	0	1	0		0	0
5	1	1	0	0		0
6	1	1	0	0	0	
Sum	**2**	**4**	**1**	**1**	**2**	**2**
Different?	**0**	**1**	**0**	**0**	**0**	**0**

t-tests

two sample, equal variance, homoscedastic

Row vs. Ro	1	2	3	4	5	6
1		0.8842	0.2002	0.8735	0.5663	0.8097
2			0.2392	0.9922	0.6504	0.9001
3				0.1434	0.5661	0.4407
4					0.6000	0.8843
5						0.7980
6						

t-tests

two sample, equal variance, homoscedastic

Col vs Col	1	2	3	4	5	6
1		0.0200	0.1794	0.0240	0.0018	0.0011
2	0.0200		0.0061	0.0022	0.0002	0.0002
3	0.1794	0.0061		0.1491	0.0613	0.0402
4	0.0240	0.0022	0.1491		0.9043	0.9678
5	0.0018	0.0002	0.0613	0.9043		0.8073
6	0.0011	0.0002	0.0402	0.9678	0.8073	

Fail t-test at 0.05 level?

Col vs Col	1	2	3	4	5	6	Sum	Diff ?
1		1	0	1	1	1	4	1
2	1		1	1	1	1	5	1
3	0	1		0	0	1	2	0
4	1	1	0		0	0	2	0
5	1	1	0	0		0	2	0
6	1	1	1	0	0		3	1

Pavement Segregation Analysis Spreadsheet
Michigan State University - Pavement Research Center of Excellence

T.F. Wolff
July 1996

(updated 7/12/96)

Location: St. John's
Date: 5/26/96
Description: % passing No. 8 sieve

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	31.17	29.81	33.50	34.97	33.67	33.96
5	31.80	29.77	33.12	33.98	33.83	33.35
4	32.16	31.48	33.14	34.43	33.35	33.15
3	31.84	30.80	31.74	31.68	32.91	33.67
2	32.60	31.48	31.77	31.44	34.83	34.92
1	31.73	31.42	31.71	34.02	34.65	34.89
Edge						
Tukey test	--	DIFF !	--	--	--	--
paired t tests	DIFF !	DIFF !	DIFF !	--	DIFF !	DIFF !
6 of 6 test	DIFF !	DIFF !	--	--	DIFF !	DIFF !

Clear *Clears everything for a new problem*
Enter data, or press a key below.

Example *Enters example segregated data*

Random *Enters a random sample*

YES ! <-- significant column differences?

Edge

Pavement Segregation Analysis Spreadsheet

Michigan State University - Pavement Research Center of Excellence

T. F. Wolff June 1996

Location: *St. John's*
Date: *5/26/96*
Description: *% passing No. 8 sieve*

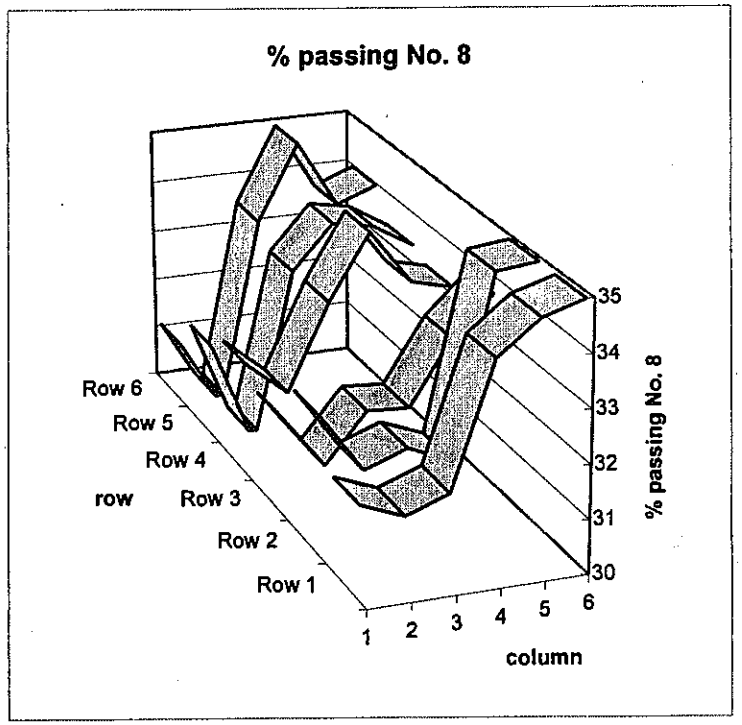
Color 1 *Color Above and Below Average*

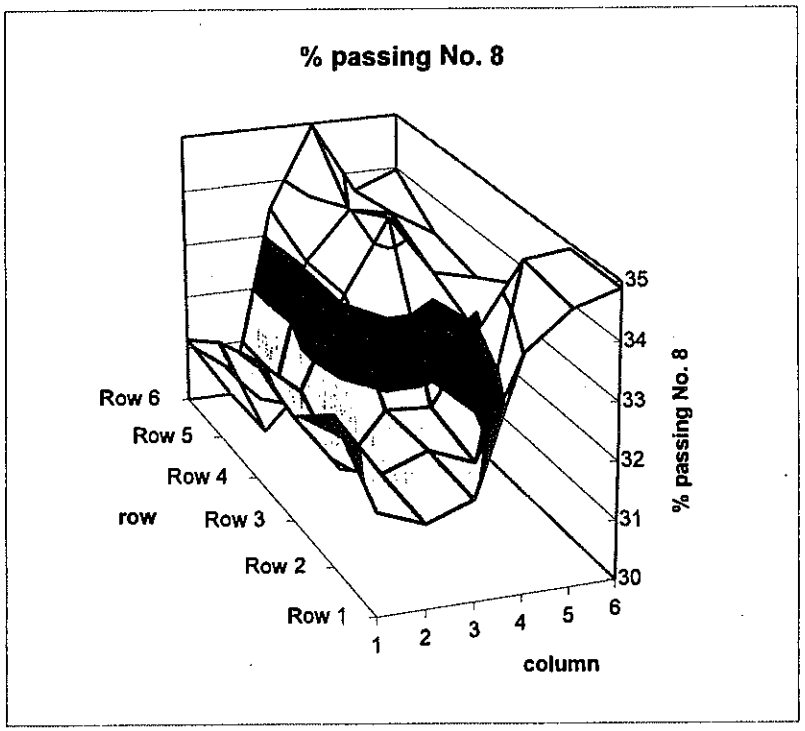
Clear Color

Column	1	2	3	4	5	6	Average	Standard Deviation	Coeff of Variation
Row									
6	31.2	29.8	33.5	35.0	33.7	34.0	32.85	1.944	5.92%
5	31.8	29.8	33.1	34.0	33.8	33.4	32.64	1.606	4.92%
4	32.2	31.5	33.1	34.4	33.4	33.2	32.95	1.019	3.09%
3	31.8	30.8	31.7	31.7	32.9	33.7	32.11	1.017	3.17%
2	32.6	31.5	31.8	31.4	34.8	34.9	32.84	1.630	4.96%
1	31.7	31.4	31.7	34.0	34.6	34.9	33.07	1.617	4.89%
Average	31.88	30.80	32.50	33.42	33.87	33.99	32.74	**32.74**	1.472	4.49%
Std. Dev.	0.476	0.817	0.843	1.484	0.742	0.758	0.853		**1.434276**	
Coeff. of Var.	1.49%	2.65%	2.59%	4.44%	2.19%	2.23%	2.60%			**4.38%**

Stats

Location: *St. John's*
Date: *5/26/96*
Description: *% passing No. 8 sieve*





Graph

Pavement Segregation Analysis Spreadsheet

T. F. Wolff June 1996

Michigan State University - Pavement Research Center of Excellence

Location:	*St. John's*
Date:	*5/26/96*
Description:	*% passing No. 8 sieve*

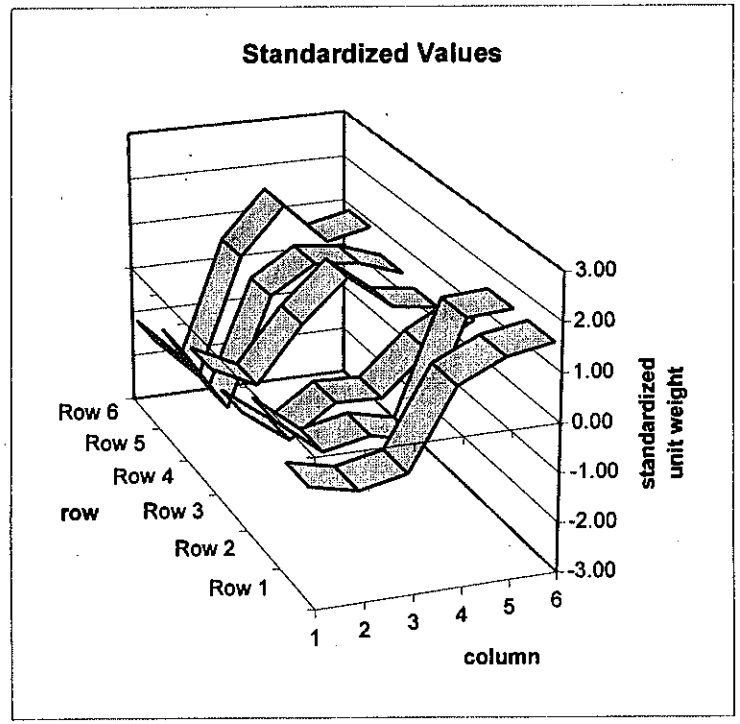
Color 1 *Color Above and Below Average*

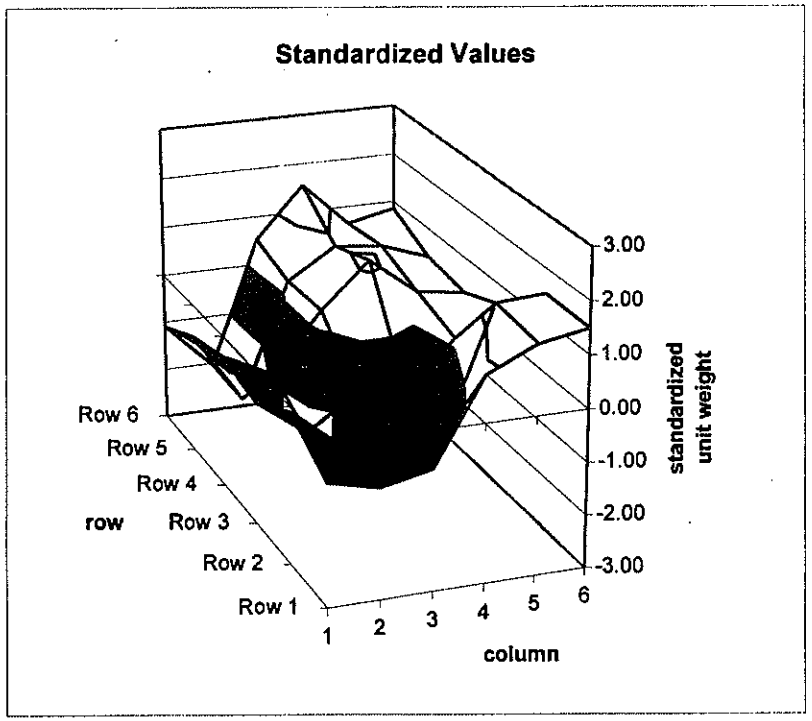
Clear Color

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	-1.10	-2.04	0.53	1.55	0.64	0.85	0.07	1.355
5	-0.66	-2.07	0.26	0.86	0.76	0.43	-0.07	1.120
4	-0.41	-0.88	0.28	1.17	0.42	0.29	0.15	0.711
3	-0.63	-1.35	-0.70	-0.74	0.12	0.65	-0.44	0.709
2	-0.10	-0.88	-0.68	-0.91	1.45	1.52	0.07	1.136
1	-0.70	-0.92	-0.72	0.89	1.33	1.49	0.23	1.127
Average	-0.60	-1.36	-0.17	0.47	0.79	0.87	0.00	**0.00**	1.026
Std. Dev.	0.332	0.570	0.588	1.035	0.517	0.528	0.595		**1.00**

Location: *St. John's*
Date: *5/26/96*
Description: *% passing No. 8 sieve*





Std Graph

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	31.88	-0.86	0.740	0.476	0.227
2	30.80	-1.95	3.794	0.817	0.668
3	32.50	-0.25	0.061	0.843	0.710
4	33.42	0.68	0.460	1.484	2.203
5	33.87	1.13	1.276	0.742	0.550
6	33.99	1.25	1.557	0.758	0.575
sum			7.889		4.933
all data	32.74			1.434276	2.0571

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	47.334819	5	9.467	**11.51447**	2.533554	2.895E-06
within columns:	24.665389	30	0.822			
Total:	72.000208			**Different ?**	1	YES!

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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Tukey's paired comparison test

Difference of means

Columns	1	2	3	4	5	6
1		1.09	-0.61	-1.54	-1.99	-2.11
2	1.09		-1.70	-2.63	-3.08	-3.20
3	-0.61	-1.70		-0.93	-1.38	-1.50
4	-1.54	-2.63	-0.93		-0.45	-0.57
5	-1.99	-3.08	-1.38	-0.45		-0.12
6	-2.11	-3.20	-1.50	-0.57	-0.12	

Critical Values

Columns	1	2	3	4	5	6
1		1.29	1.32	2.12	1.20	1.22
2	1.29		1.60	2.31	1.50	1.52
3	1.32	1.60		2.33	1.53	1.54
4	2.12	2.31	2.33		2.26	2.27
5	1.20	1.50	1.53	2.26		1.45
6	1.22	1.52	1.54	2.27	1.45	

Critical ?

Columns	1	2	3	4	5	6
1		0	0	0	1	1
2	0		1	1	1	1
3	0	1		0	0	0
4	0	1	0		0	0
5	1	1	0	0		0
6	1	1	0	0	0	
Sum	**2**	**4**	**1**	**1**	**2**	**2**
Different?	**0**	**1**	**0**	**0**	**0**	**0**

t-tests

two sample, equal variance, homoscedastic

Row vs. Ro	1	2	3	4	5	6
1		0.8116	0.2461	0.8851	0.6562	0.8340
2			0.3730	0.8877	0.8368	0.9945
3				0.1811	0.5070	0.4286
4					0.6971	0.9079
5						0.8462
6						

t-tests

two sample, equal variance, homoscedastic

Col vs Col	1	2	3	4	5	6
1		0.0183	0.1522	0.0362	0.0003	0.0002
2	0.0183		0.0053	0.0035	0.0000	0.0000
3	0.1522	0.0053		0.2133	0.0132	0.0090
4	0.0362	0.0035	0.2133		0.5204	0.4223
5	0.0003	0.0000	0.0132	0.5204		0.7907
6	0.0002	0.0000	0.0090	0.4223	0.7907	

Fail t-test at 0.05 level?

Col vs Col	1	2	3	4	5	6	Sum	Diff ?
1		1	0	1	1	1	4	1
2	1		1	1	1	1	5	1
3	0	1		0	1	1	3	1
4	1	1	0		0	0	2	0
5	1	1	1	0		0	3	1
6	1	1	1	0	0		3	1

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
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Above Average? 1= true, 0 = false

0	0	1	1	1	1
0	0	1	1	1	1
0	0	1	1	1	1
0	0	0	0	1	1
0	0	0	0	1	1
0	0	0	1	1	1
0	0	3	4	6	6

Sieve Analysis

Sieve analysis - St. John by Pass

Weight of bags & soil	2472.5
Weight of soil	2456.9

Weight of empty bags	15.6

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weight 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
111	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
112	1/2 inch	12.500	3.116	26.60	1.08	1.08	98.92
113	3/8 inch	9.500	2.754	363.70	14.78	15.86	84.14
	No. 4	4.750	2.016	897.00	36.45	52.31	47.69
	No. 8	2.370	1.474	392.50	15.95	68.27	31.73
	No. 16	1.180	1.077	222.70	9.05	77.32	22.68
	No. 30	0.600	0.795	168.50	6.85	84.16	15.84
	No. 50	0.300	0.582	147.40	5.99	90.15	9.85
	No. 100	0.150	0.426	136.90	5.56	95.72	4.28
	No. 200	0.075	0.312	25.30	1.03	96.74	3.26
	Pan			80.10	3.26	100.00	0.00
			Total weight	2460.70	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3503.60
Date	11-Feb-96	Weight of tear	1042.50
Remarks		Weight of soil	2461.10

Sieve analysis - St. John by pass

Weight of bags & soil	3172.5
Weight of soil	3156.8

Weight of empty bags	15.7

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weight 1607: Weight retained	Percent retained	Cum. % retained	Percent passing
121	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
122	1/2 inch	12.500	3.116	15.70	0.50	0.50	99.50
123	3/8 inch	9.500	2.754	496.50	15.74	16.23	83.77
	No. 4	4.750	2.016	1159.60	36.75	52.99	47.01
	No. 8	2.370	1.474	492.00	15.59	68.58	31.42
	No. 16	1.180	1.077	278.10	8.81	77.40	22.60
	No. 30	0.600	0.795	213.30	6.76	84.16	15.84
	No. 50	0.300	0.582	201.60	6.39	90.55	9.45
	No. 100	0.150	0.426	157.00	4.98	95.52	4.48
	No. 200	0.075	0.312	33.40	1.06	96.58	3.42
	Pan			107.80	3.42	100.00	0.00
			Total weight	3155.00	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	4198.00
Date	11-Feb-96	Weight of tear	1042.70
Remarks		Weight of soil	3155.30

Sieve analysis - St. John by pass

Weight of bags & soil	2664.3
Weight of soil	2648.6

Weight of empty bag	15.7

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weight 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
131	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
132	1/2 inch	12.500	3.116	15.40	0.58	0.58	99.42
133	3/8 inch	9.500	2.754	364.60	13.78	14.36	85.64
	No. 4	4.750	2.016	1009.20	38.15	52.51	47.49
	No. 8	2.370	1.474	417.60	15.78	68.29	31.71
	No. 16	1.180	1.077	238.40	9.01	77.31	22.69
	No. 30	0.600	0.795	178.80	6.76	84.06	15.94
	No. 50	0.300	0.582	173.80	6.57	90.63	9.37
	No. 100	0.150	0.426	127.60	4.82	95.46	4.54
	No. 200	0.075	0.312	30.40	1.15	96.61	3.39
	Pan			89.80	3.39	100.00	0.00
			Total weight	2645.60	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3688.70
Date	11-Feb-96	Weight of tear	1042.60
Remarks		Weight of soil	2646.10

Sieve analysis - St. John by pass

Weight of bags & soil	2714.4
Weight of soil	2698.5

Weight of empty bags	7.6

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weight 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
141	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
142	1/2 inch	12.500	3.116	3.20	0.12	0.12	99.88
143	3/8 inch	9.500	2.754	336.30	12.47	12.59	87.41
	No. 4	4.750	2.016	936.90	34.74	47.33	52.67
	No. 8	2.370	1.474	503.00	18.65	65.98	34.02
	No. 16	1.180	1.077	288.70	10.70	76.68	23.32
	No. 30	0.600	0.795	197.20	7.31	84.00	16.00
	No. 50	0.300	0.582	173.50	6.43	90.43	9.57
	No. 100	0.150	0.426	128.60	4.77	95.20	4.80
	No. 200	0.075	0.312	32.60	1.21	96.41	3.59
	Pan			96.90	3.59	100.00	0.00
			Total weight	2696.90	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	4194.60
Date	14-Feb-96	Weight of tear	1042.70
Remarks		Weight of soil	3151.90

Sieve analysis - St. John by pass

Weight of bags & soil	3169
Weight of soil	3153.8

Weight of empty bags	7.7

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weight 1607: Weight retained	Percent retained	Cum. % retained	Percent passing
151	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
152	1/2 inch	12.500	3.116	2.70	0.09	0.09	99.91
153	3/8 inch	9.500	2.754	389.20	12.35	12.43	87.57
	No. 4	4.750	2.016	1109.50	35.20	47.63	52.37
	No. 8	2.370	1.474	558.50	17.72	65.35	34.65
	No. 16	1.180	1.077	329.80	10.46	75.82	24.18
	No. 30	0.600	0.795	236.50	7.50	83.32	16.68
	No. 50	0.300	0.582	218.60	6.94	90.25	9.75
	No. 100	0.150	0.426	154.60	4.90	95.16	4.84
	No. 200	0.075	0.312	42.80	1.36	96.52	3.48
	Pan			109.80	3.48	100.00	0.00
			Total weight	3152.00	100.00		

Operator	Nazar Elwazir
Date	14-Feb-96
Remarks	

Weight of tear & soi	4194.60
Weight of tear	1042.70
Weight of soil	3151.90

Sieve analysis - St. John by pass

Weight of bags & soil	
Weight of soil	

Weight of empty bags

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weight: Weight retained	Percent retained	Cum. % retained	1607 Percent passing
161	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
162	1/2 inch	12.500	3.116	5.50	0.20	0.20	99.80
163	3/8 inch	9.500	2.754	372.90	13.48	13.68	86.32
	No. 4	4.750	2.016	927.60	33.53	47.21	52.79
	No. 8	2.370	1.474	495.30	17.90	65.11	34.89
	No. 16	1.180	1.077	301.70	10.91	76.02	23.98
	No. 30	0.600	0.795	210.90	7.62	83.64	16.36
	No. 50	0.300	0.582	182.00	6.58	90.22	9.78
	No. 100	0.150	0.426	134.40	4.86	95.08	4.92
	No. 200	0.075	0.312	38.20	1.38	96.46	3.54
	Pan			97.90	3.54	100.00	0.00
			Total weight	2766.40	100.00		

Operator	Nazar Elwazir
Date	4-Mar-96
Remarks	

Weight of tear & soi	3801.60
Weight of tear	1034.60
Weight of soil	2766.90

Sieve analysis - St. John by pass

Weight of bags & soil	2591.9
Weight of soil	2583.9

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
211	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
212	1/2 inch	12.500	3.116	4.80	0.19	0.19	99.81
213	3/8 inch	9.500	2.754	348.10	13.48	13.66	86.34
	No. 4	4.750	2.016	949.30	36.76	50.42	49.58
	No. 8	2.370	1.474	438.50	16.98	67.40	32.60
	No. 16	1.180	1.077	248.30	9.61	77.02	22.98
	No. 30	0.600	0.795	179.30	6.94	83.96	16.04
	No. 50	0.300	0.582	166.50	6.45	90.41	9.59
	No. 100	0.150	0.426	124.40	4.82	95.22	4.78
	No. 200	0.075	0.312	33.30	1.29	96.51	3.49
	Pan			90.10	3.49	100.00	0.00
			Total weight	2582.60	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3617.80
Date	9-Mar-96	Weight of tear	1034.60
Remarks		Weight of soil	2583.20

Sieve analysis - St. John by pass

Weight of bags & soil	2775
Weight of soil	2767

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
221	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
222	1/2 inch	12.500	3.116	2.60	0.09	0.09	99.91
223	3/8 inch	9.500	2.754	479.20	17.33	17.42	82.58
	No. 4	4.750	2.016	981.00	35.47	52.89	47.11
	No. 8	2.370	1.474	432.40	15.63	68.52	31.48
	No. 16	1.180	1.077	245.50	8.88	77.40	22.60
	No. 30	0.600	0.795	186.40	6.74	84.14	15.86
	No. 50	0.300	0.582	172.70	6.24	90.38	9.62
	No. 100	0.150	0.426	129.80	4.69	95.07	4.93
	No. 200	0.075	0.312	38.50	1.39	96.46	3.54
	Pan			97.80	3.54	100.00	0.00
			Total weight	2765.90	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3800.70
Date	5-Mar-96	Weight of tear	1034.70
Remarks		Weight of soil	2768.00

Sieve analysis - St. John by pass

Weight of bags & soil	2902.5
Weight of soil	2894.5

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
231	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
232	1/2 inch	12.500	3.116	8.40	0.29	0.29	99.71
233	3/8 inch	9.500	2.754	381.10	13.17	13.46	86.54
	No. 4	4.750	2.016	1108.40	38.31	51.77	48.23
	No. 8	2.370	1.474	476.30	16.46	68.23	31.77
	No. 16	1.180	1.077	262.40	9.07	77.30	22.70
	No. 30	0.600	0.795	195.50	6.76	84.06	15.94
	No. 50	0.300	0.582	185.00	6.39	90.45	9.55
	No. 100	0.150	0.426	135.30	4.68	95.13	4.87
	No. 200	0.075	0.312	41.60	1.44	96.57	3.43
	Pan			99.30	3.43	100.00	0.00
			Total weight	2893.30	100.00		

Operator	Nazar Elwazir
Date	5-Mar-96
Remarks	

Weight of tear & soi	3927.20
Weight of tear	1034.70
Weight of soil	2892.50

Sieve analysis - St. John by pass

Weight of bags & soil	2991.5
Weight of soil	2983.5

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
241	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
242	1/2 inch	12.500	3.116	7.50	0.25	0.25	99.75
243	3/8 inch	9.500	2.754	468.30	15.70	15.96	84.04
	No. 4	4.750	2.016	1089.10	36.52	52.48	47.52
	No. 8	2.370	1.474	479.50	16.08	68.56	31.44
	No. 16	1.180	1.077	276.70	9.28	77.83	22.17
	No. 30	0.600	0.795	201.20	6.75	84.58	15.42
	No. 50	0.300	0.582	185.10	6.21	90.79	9.21
	No. 100	0.150	0.426	134.70	4.52	95.31	4.69
	No. 200	0.075	0.312	40.10	1.34	96.65	3.35
	Pan			99.90	3.35	100.00	0.00
			Total weight	2982.10	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	4016.90
Date	5-Mar-96	Weight of tear	1034.60
Remarks		Weight of soil	2982.30

Sieve analysis - St. John by pass

Weight of bags & soil	2932.1
Weight of soil	2924.2

Weight of empty bags	7.9

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
251	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
252	1/2 inch	12.500	3.116	7.90	0.27	0.27	99.73
253	3/8 inch	9.500	2.754	337.80	11.58	11.85	88.15
	No. 4	4.750	2.016	1022.30	35.04	46.89	53.11
	No. 8	2.370	1.474	533.20	18.28	65.17	34.83
	No. 16	1.180	1.077	309.50	10.61	75.78	24.22
	No. 30	0.600	0.795	218.70	7.50	83.28	16.72
	No. 50	0.300	0.582	199.10	6.83	90.10	9.90
	No. 100	0.150	0.426	141.80	4.86	94.96	5.04
	No. 200	0.075	0.312	40.80	1.40	96.36	3.64
	Pan			106.10	3.64	100.00	0.00
			Total weight	2917.20	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3952.10
Date	5-Mar-96	Weight of tear	1034.80
Remarks		Weight of soil	2917.30

Sieve analysis - St. John by pass

Weight of bags & soil	2669.2
Weight of soil	2661.2

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
261	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
262	1/2 inch	12.500	3.116	0.00	0.00	0.00	100.00
263	3/8 inch	9.500	2.754	338.10	12.70	12.70	87.30
	No. 4	4.750	2.016	912.50	34.27	46.97	53.03
	No. 8	2.370	1.474	482.20	18.11	65.08	34.92
	No. 16	1.180	1.077	290.10	10.90	75.98	24.02
	No. 30	0.600	0.795	200.90	7.55	83.52	16.48
	No. 50	0.300	0.582	167.10	6.28	89.80	10.20
	No. 100	0.150	0.426	120.90	4.54	94.34	5.66
	No. 200	0.075	0.312	46.00	1.73	96.07	3.93
	Pan			104.70	3.93	100.00	0.00
			Total weight	2662.50	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3695.80
Date	5-Mar-96	Weight of tear	1034.80
Remarks		Weight of soil	2661.00

Sieve analysis - St. John by pass

Weight of bags & soil	2537.7
Weight of soil	2529.8

Weight of empty bags	7.9

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
311	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
312	1/2 inch	12.500	3.116	4.40	0.17	0.17	99.83
313	3/8 inch	9.500	2.754	337.80	13.36	13.53	86.47
	No. 4	4.750	2.016	969.00	38.32	51.85	48.15
	No. 8	2.370	1.474	412.40	16.31	68.16	31.84
	No. 16	1.180	1.077	234.10	9.26	77.42	22.58
	No. 30	0.600	0.795	172.40	6.82	84.23	15.77
	No. 50	0.300	0.582	156.10	6.17	90.41	9.59
	No. 100	0.150	0.426	120.80	4.78	95.18	4.82
	No. 200	0.075	0.312	33.70	1.33	96.52	3.48
	Pan			88.10	3.48	100.00	0.00
			Total weight	2528.80	100.00		

Operator	Nazar Elwazir
Date	5-Mar-96
Remarks	

Weight of tear & soi	3563.70
Weight of tear	1034.50
Weight of soil	2529.20

Sieve analysis - St. John by pass

Weight of bags & soil	2727.9
Weight of soil	2720

Weight of empty bags	7.9

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
321	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
322	1/2 inch	12.500	3.116	4.40	0.16	0.16	99.84
323	3/8 inch	9.500	2.754	487.30	17.92	18.08	81.92
	No. 4	4.750	2.016	995.10	36.59	54.67	45.33
	No. 8	2.370	1.474	394.90	14.52	69.20	30.80
	No. 16	1.180	1.077	233.30	8.58	77.77	22.23
	No. 30	0.600	0.795	177.60	6.53	84.31	15.69
	No. 50	0.300	0.582	168.00	6.18	90.48	9.52
	No. 100	0.150	0.426	120.40	4.43	94.91	5.09
	No. 200	0.075	0.312	41.50	1.53	96.44	3.56
	Pan			96.90	3.56	100.00	0.00
			Total weight	2719.40	100.00		

Operator	Nazar Elwazir
Date	5-Mar-96
Remarks	

Weight of tear & soi	3753.70
Weight of tear	1034.70
Weight of soil	2719.00

Sieve analysis - St. John by pass

Weight of bags & soil	2911.7
Weight of soil	2903.7

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
331	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
332	1/2 inch	12.500	3.116	10.10	0.35	0.35	99.65
333	3/8 inch	9.500	2.754	408.00	14.06	14.41	85.59
	No. 4	4.750	2.016	1113.90	38.38	52.78	47.22
	No. 8	2.370	1.474	449.30	15.48	68.26	31.74
	No. 16	1.180	1.077	261.60	9.01	77.28	22.72
	No. 30	0.600	0.795	196.70	6.78	84.05	15.95
	No. 50	0.300	0.582	184.10	6.34	90.40	9.60
	No. 100	0.150	0.426	138.10	4.76	95.16	4.84
	No. 200	0.075	0.312	39.70	1.37	96.52	3.48
	Pan			100.90	3.48	100.00	0.00
			Total weight	2902.40	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3937.50
Date	5-Mar-96	Weight of tear	1034.80
Remarks		Weight of soil	2902.70

Sieve analysis - St. John by pass

Weight of bags & soil	2984.5
Weight of soil	2976.5

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
341	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
342	1/2 inch	12.500	3.116	4.30	0.14	0.14	99.86
343	3/8 inch	9.500	2.754	479.80	16.12	16.27	83.73
	No. 4	4.750	2.016	1064.80	35.78	52.05	47.95
	No. 8	2.370	1.474	484.00	16.27	68.32	31.68
	No. 16	1.180	1.077	280.80	9.44	77.75	22.25
	No. 30	0.600	0.795	202.10	6.79	84.54	15.46
	No. 50	0.300	0.582	183.30	6.16	90.70	9.30
	No. 100	0.150	0.426	134.30	4.51	95.22	4.78
	No. 200	0.075	0.312	37.80	1.27	96.49	3.51
	Pan			104.50	3.51	100.00	0.00
			Total weight	2975.70	100.00		

Operator	Nazar Elwazir
Date	6-Mar-96
Remarks	

Weight of tear & soi	4010.40
Weight of tear	1034.70
Weight of soil	2975.70

Sieve analysis - St. John by pass

Weight of bags & soil	2780.3
Weight of soil	2772.3

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
351	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
352	1/2 inch	12.500	3.116	0.00	0.00	0.00	100.00
353	3/8 inch	9.500	2.754	377.30	13.62	13.62	86.38
	No. 4	4.750	2.016	1034.60	37.34	50.96	49.04
	No. 8	2.370	1.474	446.80	16.13	67.09	32.91
	No. 16	1.180	1.077	267.40	9.65	76.74	23.26
	No. 30	0.600	0.795	194.40	7.02	83.75	16.25
	No. 50	0.300	0.582	180.10	6.50	90.25	9.75
	No. 100	0.150	0.426	126.00	4.55	94.80	5.20
	No. 200	0.075	0.312	41.10	1.48	96.29	3.71
	Pan			102.90	3.71	100.00	0.00
			Total weight	2770.60	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3805.80
Date	6-Mar-96	Weight of tear	1034.70
Remarks		Weight of soil	2771.10

Sieve analysis - St. John by pass

Weight of bags & soil	2673.7
Weight of soil	2665.7

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
361	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
362	1/2 inch	12.500	3.116	0.00	0.00	0.00	100.00
363	3/8 inch	9.500	2.754	353.60	13.27	13.27	86.73
	No. 4	4.750	2.016	955.60	35.86	49.13	50.87
	No. 8	2.370	1.474	458.20	17.20	66.33	33.67
	No. 16	1.180	1.077	276.90	10.39	76.72	23.28
	No. 30	0.600	0.795	193.00	7.24	83.97	16.03
	No. 50	0.300	0.582	170.80	6.41	90.38	9.62
	No. 100	0.150	0.426	122.50	4.60	94.97	5.03
	No. 200	0.075	0.312	38.10	1.43	96.40	3.60
	Pan			95.80	3.60	100.00	0.00
			Total weight	2664.50	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3699.10
Date	6-Mar-96	Weight of tear	1034.60
Remarks		Weight of soil	2664.50

Sieve analysis - St. John by pass

Weight of bags & soil	2391.2
Weight of soil	2383.2

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
411	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
412	1/2 inch	12.500	3.116	4.00	0.17	0.17	99.83
413	3/8 inch	9.500	2.754	343.30	14.42	14.59	85.41
	No. 4	4.750	2.016	883.60	37.12	51.71	48.29
	No. 8	2.370	1.474	384.00	16.13	67.84	32.16
	No. 16	1.180	1.077	223.90	9.41	77.25	22.75
	No. 30	0.600	0.795	162.30	6.82	84.07	15.93
	No. 50	0.300	0.582	148.90	6.26	90.32	9.68
	No. 100	0.150	0.426	104.90	4.41	94.73	5.27
	No. 200	0.075	0.312	39.50	1.66	96.39	3.61
	Pan			86.00	3.61	100.00	0.00
			Total weight	2380.40	100.00		

Operator	Nazar Elwazir
Date	6-Mar-96
Remarks	

Weight of tear & soi	3414.70
Weight of tear	1034.60
Weight of soil	2380.10

Sieve analysis - St. John by pass

Weight of bags & soil	2538
Weight of soil	2530

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
421	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
422	1/2 inch	12.500	3.116	4.50	0.18	0.18	99.82
423	3/8 inch	9.500	2.754	398.40	15.76	15.94	84.06
	No. 4	4.750	2.016	928.90	36.74	52.68	47.32
	No. 8	2.370	1.474	400.50	15.84	68.52	31.48
	No. 16	1.180	1.077	224.60	8.88	77.40	22.60
	No. 30	0.600	0.795	168.00	6.64	84.04	15.96
	No. 50	0.300	0.582	153.80	6.08	90.13	9.87
	No. 100	0.150	0.426	110.10	4.35	94.48	5.52
	No. 200	0.075	0.312	43.40	1.72	96.20	3.80
	Pan			96.10	3.80	100.00	0.00
			Total weight	2528.30	100.00		

Operator	Nazar Elwazir
Date	6-Mar-96
Remarks	

Weight of tear & soi	3563.50
Weight of tear	1034.80
Weight of soil	2528.70

Sieve analysis - St. John by pass

Weight of bags & soil	3175.8
Weight of soil	3167.8

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
431	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
432	1/2 inch	12.500	3.116	2.60	0.08	0.08	99.92
433	3/8 inch	9.500	2.754	373.40	11.79	11.88	88.12
	No. 4	4.750	2.016	1198.10	37.85	49.72	50.28
	No. 8	2.370	1.474	542.40	17.13	66.86	33.14
	No. 16	1.180	1.077	307.00	9.70	76.55	23.45
	No. 30	0.600	0.795	221.00	6.98	83.53	16.47
	No. 50	0.300	0.582	207.20	6.54	90.08	9.92
	No. 100	0.150	0.426	153.20	4.84	94.92	5.08
	No. 200	0.075	0.312	46.50	1.47	96.39	3.61
	Pan			114.40	3.61	100.00	0.00
			Total weight	3165.80	100.00		

Operator	Nazar Elwazir
Date	6-Mar-96
Remarks	

Weight of tear & soi	4200.70
Weight of tear	1034.70
Weight of soil	3166.00

Sieve analysis - St. John by pass

Weight of bags & soil	2682.6
Weight of soil	2674.6

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
441	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
442	1/2 inch	12.500	3.116	9.00	0.34	0.34	99.66
443	3/8 inch	9.500	2.754	337.00	12.61	12.95	87.05
	No. 4	4.750	2.016	923.60	34.56	47.51	52.49
	No. 8	2.370	1.474	482.80	18.07	65.57	34.43
	No. 16	1.180	1.077	288.90	10.81	76.38	23.62
	No. 30	0.600	0.795	195.60	7.32	83.70	16.30
	No. 50	0.300	0.582	169.60	6.35	90.05	9.95
	No. 100	0.150	0.426	123.30	4.61	94.66	5.34
	No. 200	0.075	0.312	42.50	1.59	96.25	3.75
	Pan			100.10	3.75	100.00	0.00
			Total weight	2672.40	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3707.10
Date	6-Mar-96	Weight of tear	1034.90
Remarks		Weight of soil	2672.20

Sieve analysis - St. John by pass

Weight of bags & soil	2602.9
Weight of soil	2594.9

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
451	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
452	1/2 inch	12.500	3.116	0.00	0.00	0.00	100.00
453	3/8 inch	9.500	2.754	348.60	13.44	13.44	86.56
	No. 4	4.750	2.016	931.60	35.91	49.35	50.65
	No. 8	2.370	1.474	448.90	17.30	66.65	33.35
	No. 16	1.180	1.077	258.00	9.94	76.59	23.41
	No. 30	0.600	0.795	184.00	7.09	83.69	16.31
	No. 50	0.300	0.582	162.30	6.26	89.94	10.06
	No. 100	0.150	0.426	116.50	4.49	94.43	5.57
	No. 200	0.075	0.312	43.00	1.66	96.09	3.91
	Pan			101.40	3.91	100.00	0.00
			Total weight	2594.30	100.00		

Operator	Nazar Elwazir
Date	6-Mar-96
Remarks	

Weight of tear & soi	3628.80
Weight of tear	1034.70
Weight of soil	2594.10

Sieve analysis - St. John by pass

Weight of bags & soil	2660.5
Weight of soil	2652.5

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
461	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
462	1/2 inch	12.500	3.116	3.60	0.14	0.14	99.86
463	3/8 inch	9.500	2.754	401.60	15.15	15.28	84.72
	No. 4	4.750	2.016	930.10	35.08	50.37	49.63
	No. 8	2.370	1.474	436.90	16.48	66.85	33.15
	No. 16	1.180	1.077	262.10	9.89	76.73	23.27
	No. 30	0.600	0.795	188.70	7.12	83.85	16.15
	No. 50	0.300	0.582	194.70	7.34	91.19	8.81
	No. 100	0.150	0.426	113.60	4.28	95.48	4.52
	No. 200	0.075	0.312	38.50	1.45	96.93	3.07
	Pan			81.40	3.07	100.00	0.00
			Total weight	2651.20	100.00		

Operator	Nazar Elwazir
Date	6-Mar-96
Remarks	

Weight of tear & soi	3685.60
Weight of tear	1034.80
Weight of soil	2650.80

Sieve analysis - St. John by pass

Weight of bags & soil	2684.7
Weight of soil	2676.9

Weight of empty bags	7.8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
511	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
512	1/2 inch	12.500	3.116	3.80	0.14	0.14	99.86
513	3/8 inch	9.500	2.754	435.90	16.29	16.43	83.57
	No. 4	4.750	2.016	963.90	36.02	52.45	47.55
	No. 8	2.370	1.474	421.60	15.75	68.20	31.80
	No. 16	1.180	1.077	242.80	9.07	77.28	22.72
	No. 30	0.600	0.795	182.00	6.80	84.08	15.92
	No. 50	0.300	0.582	169.00	6.32	90.39	9.61
	No. 100	0.150	0.426	121.00	4.52	94.91	5.09
	No. 200	0.075	0.312	39.20	1.46	96.38	3.62
	Pan			96.90	3.62	100.00	0.00
			Total weight	2676.10	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3710.90
Date	11-Mar-96	Weight of tear	1034.70
Remarks		Weight of soil	2676.20

Sieve analysis - St. John by pass

Weight of bags & soil	2914.6
Weight of soil	2906.7

Weight of empty bags	7.9

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
521	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
522	1/2 inch	12.500	3.116	5.10	0.18	0.18	99.82
523	3/8 inch	9.500	2.754	577.60	19.89	20.06	79.94
	No. 4	4.750	2.016	1062.50	36.58	56.65	43.35
	No. 8	2.370	1.474	394.50	13.58	70.23	29.77
	No. 16	1.180	1.077	231.40	7.97	78.20	21.80
	No. 30	0.600	0.795	182.50	6.28	84.48	15.52
	No. 50	0.300	0.582	179.00	6.16	90.64	9.36
	No. 100	0.150	0.426	133.30	4.59	95.23	4.77
	No. 200	0.075	0.312	40.90	1.41	96.64	3.36
	Pan			97.60	3.36	100.00	0.00
			Total weight	2904.40	100.00		

Operator	Nazar Elwazir
Date	11-Mar-96
Remarks	

Weight of tear & soi	3939.40
Weight of tear	1034.60
Weight of soil	2904.80

Sieve analysis - St. John by pass

Weight of bags & soil	3008.5
Weight of soil	2996.2

Weight of empty bags	12.3

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
531	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
532	1/2 inch	12.500	3.116	8.50	0.28	0.28	99.72
533	3/8 inch	9.500	2.754	404.40	13.51	13.79	86.21
	No. 4	4.750	2.016	1074.10	35.88	49.67	50.33
	No. 8	2.370	1.474	515.50	17.22	66.88	33.12
	No. 16	1.180	1.077	295.70	9.88	76.76	23.24
	No. 30	0.600	0.795	210.90	7.04	83.80	16.20
	No. 50	0.300	0.582	210.60	7.03	90.84	9.16
	No. 100	0.150	0.426	135.40	4.52	95.36	4.64
	No. 200	0.075	0.312	40.10	1.34	96.70	3.30
	Pan			98.80	3.30	100.00	0.00
			Total weight	2994.00	100.00		

Operator	Nazar Elwazir
Date	11-Mar-96
Remarks	

Weight of tear & soi	4028.80
Weight of tear	1034.60
Weight of soil	2994.20

Sieve analysis - St. John by pass

Weight of bags & soil	2899.5
Weight of soil	2891.6

Weight of empty bags	7.9

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
541	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
542	1/2 inch	12.500	3.116	6.40	0.22	0.22	99.78
543	3/8 inch	9.500	2.754	299.30	10.35	10.57	89.43
	No. 4	4.750	2.016	1079.80	37.35	47.92	52.08
	No. 8	2.370	1.474	523.20	18.10	66.02	33.98
	No. 16	1.180	1.077	302.90	10.48	76.49	23.51
	No. 30	0.600	0.795	209.90	7.26	83.75	16.25
	No. 50	0.300	0.582	184.50	6.38	90.14	9.86
	No. 100	0.150	0.426	126.40	4.37	94.51	5.49
	No. 200	0.075	0.312	51.50	1.78	96.29	3.71
	Pan			107.30	3.71	100.00	0.00
			Total weight	2891.20	100.00		

Operator	Nazar Elwazir
Date	12-Mar-96
Remarks	

Weight of tear & soi	3925.80
Weight of tear	1034.80
Weight of soil	2891.00

Sieve analysis - St. John by pass

Weight of bags & soil	2899.5
Weight of soil	2891.6

Weight of empty bags	7.9

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
541	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
542	1/2 inch	12.500	3.116	6.40	0.22	200.22	-100.22
543	3/8 inch	9.500	2.754	299.30	10.35	210.57	-110.57
	No. 4	4.750	2.016	1079.80	37.35	247.92	-147.92
	No. 8	2.370	1.474	523.20	18.10	266.02	-166.02
	No. 16	1.180	1.077	302.90	10.48	276.49	-176.49
	No. 30	0.600	0.795	209.90	7.26	283.75	-183.75
	No. 50	0.300	0.582	184.50	6.38	290.14	-190.14
	No. 100	0.150	0.426	126.40	4.37	294.51	-194.51
	No. 200	0.075	0.312	51.50	1.78	296.29	-196.29
	Pan			107.30	3.71	300.00	-200.00
			Total weight	2891.20	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3925.80
Date	12-Mar-96	Weight of tear	1034.80
Remarks		Weight of soil	2891.00

Sieve analysis - St. John by pass

Weight of bags & soil	2702.9
Weight of soil	2694.9

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
561	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
562	1/2 inch	12.500	3.116	7.80	0.29	0.29	99.71
563	3/8 inch	9.500	2.754	360.20	13.37	13.66	86.34
	No. 4	4.750	2.016	986.30	36.61	50.27	49.73
	No. 8	2.370	1.474	441.30	16.38	66.65	33.35
	No. 16	1.180	1.077	262.30	9.74	76.38	23.62
	No. 30	0.600	0.795	191.80	7.12	83.50	16.50
	No. 50	0.300	0.582	170.60	6.33	89.83	10.17
	No. 100	0.150	0.426	124.10	4.61	94.44	5.56
	No. 200	0.075	0.312	44.20	1.64	96.08	3.92
	Pan			105.60	3.92	100.00	0.00
			Total weight	2694.20	100.00		

Operator	Nazar Elwazir
Date	12-Mar-96
Remarks	

Weight of tear & soi	3729.20
Weight of tear	1034.50
Weight of soil	2694.70

Sieve analysis - St. John by pass

Weight of bags & soil	2592.1
Weight of soil	2579.4

Weight of empty bags	12.7

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
611	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
612	1/2 inch	12.500	3.116	17.30	0.67	0.67	99.33
613	3/8 inch	9.500	2.754	436.30	16.90	17.57	82.43
	No. 4	4.750	2.016	926.70	35.90	53.47	46.53
	No. 8	2.370	1.474	396.60	15.36	68.83	31.17
	No. 16	1.180	1.077	230.10	8.91	77.75	22.25
	No. 30	0.600	0.795	170.30	6.60	84.35	15.65
	No. 50	0.300	0.582	155.00	6.00	90.35	9.65
	No. 100	0.150	0.426	115.90	4.49	94.84	5.16
	No. 200	0.075	0.312	38.60	1.50	96.34	3.66
	Pan			94.60	3.66	100.00	0.00
			Total weight	2581.40	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3615.60
Date	13-Mar-96	Weight of tear	1034.70
Remarks		Weight of soil	2580.90

Sieve analysis - St. John by pass

Weight of bags & soil	2912.7
Weight of soil	2904.8

Weight of empty bags	7.9

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
621	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
622	1/2 inch	12.500	3.116	16.70	0.58	0.58	99.42
623	3/8 inch	9.500	2.754	537.80	18.53	19.10	80.90
	No. 4	4.750	2.016	1087.90	37.48	56.58	43.42
	No. 8	2.370	1.474	394.90	13.60	70.19	29.81
	No. 16	1.180	1.077	231.40	7.97	78.16	21.84
	No. 30	0.600	0.795	182.20	6.28	84.44	15.56
	No. 50	0.300	0.582	173.30	5.97	90.41	9.59
	No. 100	0.150	0.426	127.10	4.38	94.78	5.22
	No. 200	0.075	0.312	46.80	1.61	96.40	3.60
	Pan			104.60	3.60	100.00	0.00
			Total weight	2902.70	100.00		

Operator	Nazar Elwazir
Date	13-Mar-96
Remarks	

Weight of tear & soi	3937.40
Weight of tear	1034.60
Weight of soil	2902.80

Sieve analysis - St. John by pass

Weight of bags & soil	2845.6
Weight of soil	2837.6

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
631	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
632	1/2 inch	12.500	3.116	1.90	0.07	0.07	99.93
633	3/8 inch	9.500	2.754	345.80	12.19	12.26	87.74
	No. 4	4.750	2.016	1038.90	36.62	48.88	51.12
	No. 8	2.370	1.474	499.70	17.62	66.50	33.50
	No. 16	1.180	1.077	285.10	10.05	76.55	23.45
	No. 30	0.600	0.795	201.00	7.09	83.64	16.36
	No. 50	0.300	0.582	203.90	7.19	90.82	9.18
	No. 100	0.150	0.426	126.90	4.47	95.30	4.70
	No. 200	0.075	0.312	39.40	1.39	96.69	3.31
	Pan			94.00	3.31	100.00	0.00
			Total weight	2836.60	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3871.50
Date	13-Mar-96	Weight of tear	1034.70
Remarks		Weight of soil	2836.80

Sieve analysis - St. John by pass

Weight of bags & soil	2944.6
Weight of soil	2936.6

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
641	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
642	1/2 inch	12.500	3.116	0.00	0.00	0.00	100.00
643	3/8 inch	9.500	2.754	1006.70	34.31	34.31	65.69
	No. 4	4.750	2.016	330.80	11.27	45.58	54.42
	No. 8	2.370	1.474	570.50	19.44	65.03	34.97
	No. 16	1.180	1.077	323.00	11.01	76.04	23.96
	No. 30	0.600	0.795	219.90	7.49	83.53	16.47
	No. 50	0.300	0.582	193.10	6.58	90.11	9.89
	No. 100	0.150	0.426	141.10	4.81	94.92	5.08
	No. 200	0.075	0.312	44.30	1.51	96.43	3.57
	Pan			104.70	3.57	100.00	0.00
			Total weight	2934.10	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3968.60
Date	13-Mar-96	Weight of tear	1034.50
Remarks		Weight of soil	2934.10

Sieve analysis - St. John by pass

Weight of bags & soil	2937.4
Weight of soil	2929.2

Weight of empty bags	8.2

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
651	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
652	1/2 inch	12.500	3.116	26.10	0.89	0.89	99.11
653	3/8 inch	9.500	2.754	403.40	13.77	14.66	85.34
	No. 4	4.750	2.016	1029.40	35.15	49.81	50.19
	No. 8	2.370	1.474	483.90	16.52	66.33	33.67
	No. 16	1.180	1.077	289.30	9.88	76.21	23.79
	No. 30	0.600	0.795	209.60	7.16	83.37	16.63
	No. 50	0.300	0.582	192.50	6.57	89.94	10.06
	No. 100	0.150	0.426	142.20	4.86	94.80	5.20
	No. 200	0.075	0.312	44.00	1.50	96.30	3.70
	Pan			108.40	3.70	100.00	0.00
			Total weight	2928.80	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3980.60
Date	23-Mar-96	Weight of tear	1052.60
Remarks	tare was used	Weight of soil	2928.00

Sieve analysis - St. John by pass

Weight of bags & soil	2695.4
Weight of soil	2687.4

Weight of empty bags	8

Sample number	Sieve size	Sieve opening (mm)	Sieve opening .45 power	Field data - total weigh 1607 Weight retained	Percent retained	Cum. % retained	Percent passing
661	3/4 inch	19.000	3.762	0.00	0.00	0.00	100.00
662	1/2 inch	12.500	3.116	2.60	0.10	0.10	99.90
663	3/8 inch	9.500	2.754	375.70	13.99	14.08	85.92
	No. 4	4.750	2.016	927.10	34.51	48.60	51.40
	No. 8	2.370	1.474	468.50	17.44	66.04	33.96
	No. 16	1.180	1.077	276.60	10.30	76.33	23.67
	No. 30	0.600	0.795	195.50	7.28	83.61	16.39
	No. 50	0.300	0.582	171.90	6.40	90.01	9.99
	No. 100	0.150	0.426	127.10	4.73	94.74	5.26
	No. 200	0.075	0.312	42.00	1.56	96.31	3.69
	Pan			99.20	3.69	100.00	0.00
			Total weight	2686.20	100.00		

Operator	Nazar Elwazir	Weight of tear & soi	3739.40
Date	23-Mar-96	Weight of tear	1052.90
Remarks		Weight of soil	2686.50

Asphalt Content Grid Analysis

Pavement Segregation Analysis Spreadsheet
Michigan State University - Pavement Research Center of Excellence

T.F. Wolff
July 1996

Location: St. John's, samples xx1
Date: 2/21/97
Description: Samples xx1, Moisture Content

(updated 11/15/96)

Enter measured unit values in grid below

Column / Row	1	2	3	4	5	6
6	6.0	6.0	6.1	5.9	6.1	6.1
5	6.3	5.6	6.1	5.8	6.4	6.4
4	6.1	6.3	6.0	5.8	6.1	5.6
3	6.2	5.9	6.1	5.8	5.9	5.8
2	6.3	5.9	6.1	5.9	6.2	5.9
1	6.3	5.8	6.1	5.9	6.1	5.6
Edge						
Tukey test	--	--	--	DIFF !	--	--
paired t tests	--	--	--	DIFF !	--	--
6 of 6 test	--	--	--	DIFF !	--	--

Clear — *Clears everything for a new problem*
Enter data, or press a key below.

Example — *Enters example segregated data*

Random — *Enters a random sample*

YES ! <-- significant column differences?

11/15/96 F statistic

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

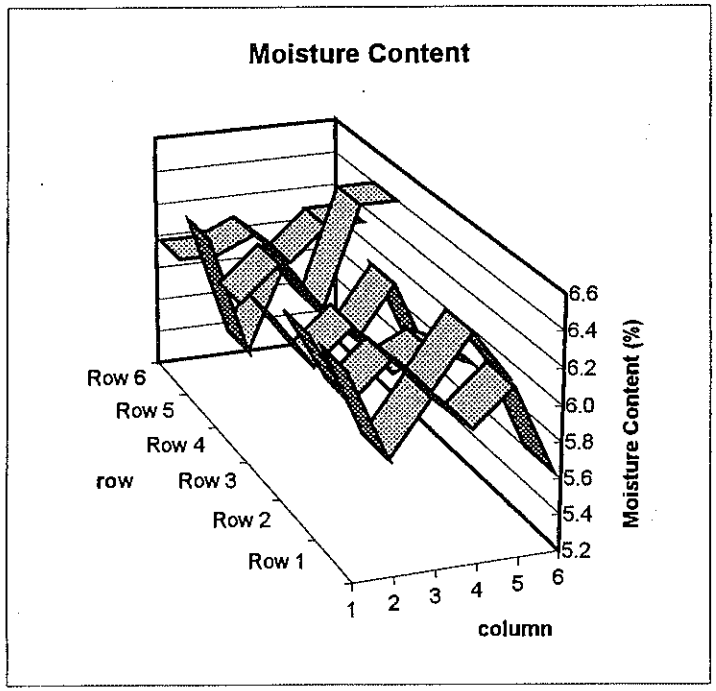
Michigan State University - Pavement Research Center of Excellence

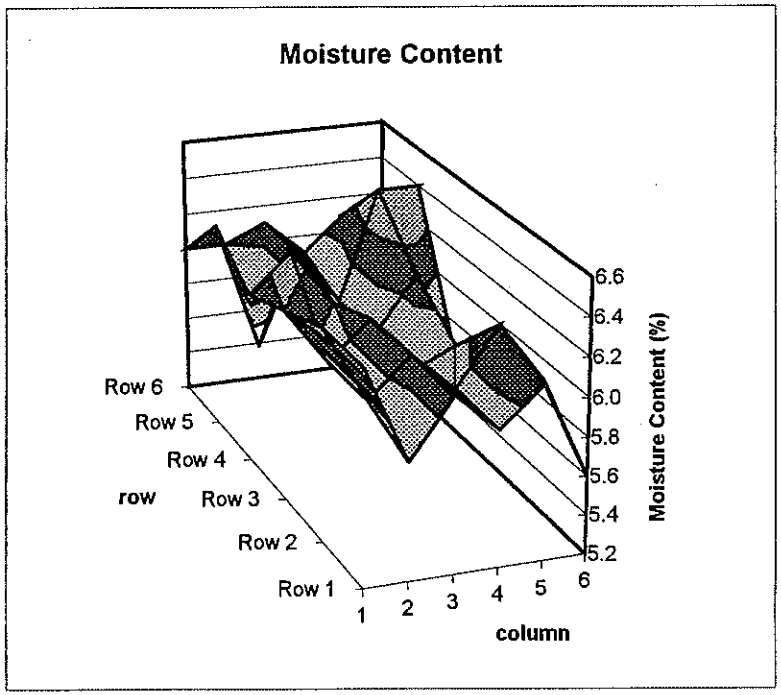
Location: *St. John's, samples xx1*
Date: *2/22/97*
Description: *Samples xx1, Moisture Content*

Color 1 *Color Above and Below Average*
Clear Color

Column	1	2	3	4	5	6	Average	Standard Deviation	Coeff of Variation
Row									
6	6.0	6.0	6.1	5.9	6.1	6.1	6.03	0.082	1.35%
5	6.3	5.6	6.1	5.8	6.4	6.4	6.10	0.335	5.49%
4	6.1	6.3	6.0	5.8	6.1	5.6	5.98	0.248	4.15%
3	6.2	5.9	6.1	5.8	5.9	5.8	5.95	0.164	2.76%
2	6.3	5.9	6.1	5.9	6.2	5.9	6.05	0.176	2.91%
1	6.3	5.8	6.1	5.9	6.1	5.6	5.97	0.250	4.20%
Average	6.20	5.92	6.08	5.85	6.13	5.90	6.01	**6.01**	0.209	3.48%
Std. Dev.	0.126	0.232	0.041	0.055	0.163	0.310	0.154		**0.21401**	
Coeff. of Var.	2.04%	3.92%	0.67%	0.94%	2.66%	5.25%	2.58%			**3.56%**

Location: *St. John's, samples xx1*
Date: *2/22/97*
Description: *Samples xx1, Moisture Content*





Moisture Graph

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

Michigan State University - Pavement Research Center of Excellence

Location: *St. John's, samples xx1*
Date: *2/22/97*
Description: *Samples xx1, Moisture Content*

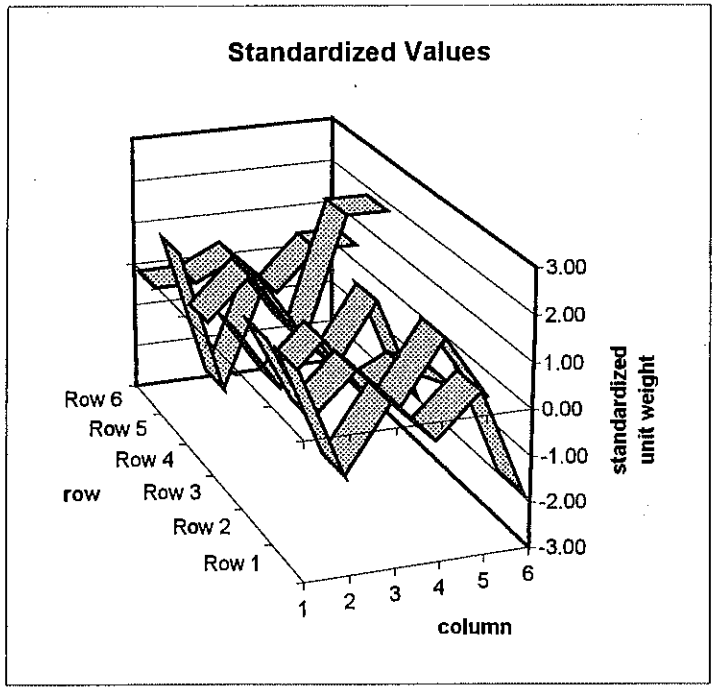
Color 1 *Color Above and Below Average*

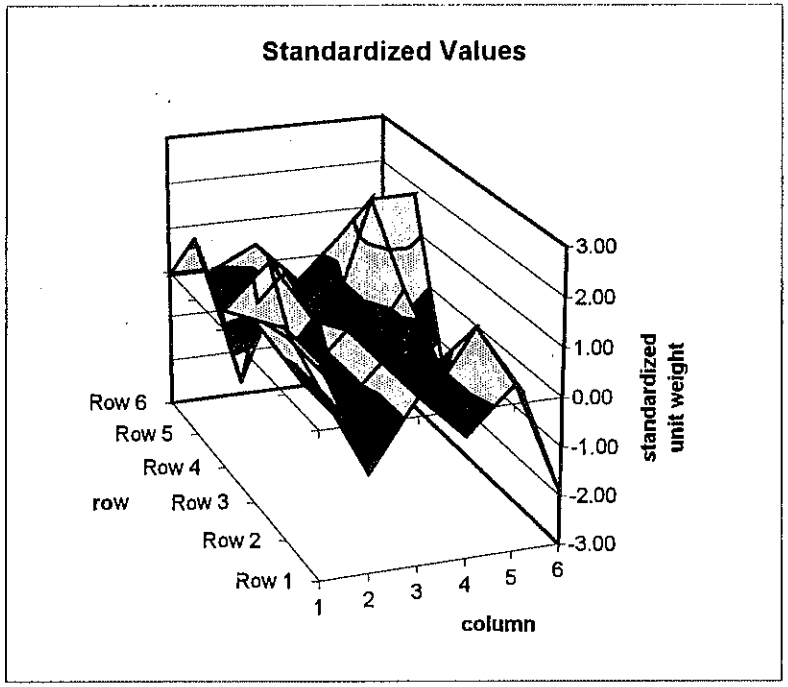
Clear Color

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	-0.06	-0.06	0.40	-0.53	0.40	0.40	0.09	0.382
5	1.34	-1.93	0.40	-1.00	1.80	1.80	0.40	1.564
4	0.40	1.34	-0.06	-1.00	0.40	-1.93	-0.14	1.160
3	0.87	-0.53	0.40	-1.00	-0.53	-1.00	-0.30	0.768
2	1.34	-0.53	0.40	-0.53	0.87	-0.53	0.17	0.823
1	1.34	-1.00	0.40	-0.53	0.40	-1.93	-0.22	1.170
Average	0.87	-0.45	0.32	-0.77	0.56	-0.53	0.00	**0.00**	0.978
Std. Dev.	0.591	1.082	0.191	0.256	0.763	1.448	0.722		**1.00**

Location: *St. John's, samples xx1*
Date: *2/22/97*
Description: *Samples xx1, Moisture Content*



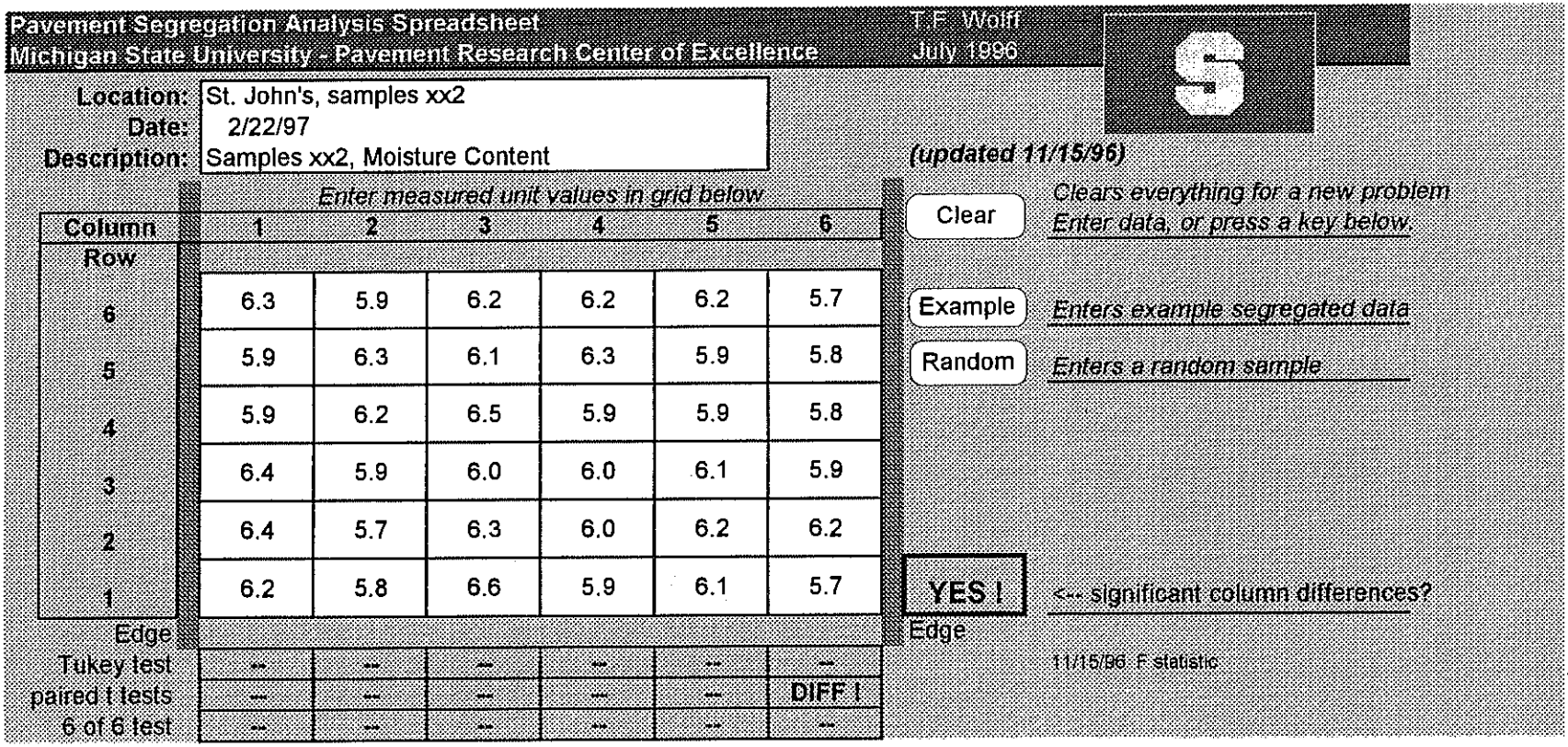


Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	6.20	0.19	0.035	0.126	0.016
2	5.92	-0.10	0.009	0.232	0.054
3	6.08	0.07	0.005	0.041	0.002
4	5.85	-0.16	0.027	0.055	0.003
5	6.13	0.12	0.014	0.163	0.027
6	5.90	-0.11	0.013	0.310	0.096
sum			0.103		0.197
all data	6.01			0.214013	0.0458

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	0.61805556	5	0.124	**3.76481**	2.533554	0.0091613
within columns:	0.985	30	0.033			
Total:	1.60305556			**Different ?**	1	YES!



Pavement Segregation Analysis Spreadsheet
Michigan State University - Pavement Research Center of Excellence
T. F. Wolff
July 1996

Location: St. John's, samples xx2
Date: 2/22/97
Description: Samples xx2, Moisture Content

(updated 11/15/96)

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	6.3	5.9	6.2	6.2	6.2	5.7
5	5.9	6.3	6.1	6.3	5.9	5.8
4	5.9	6.2	6.5	5.9	5.9	5.8
3	6.4	5.9	6.0	6.0	6.1	5.9
2	6.4	5.7	6.3	6.0	6.2	6.2
1	6.2	5.8	6.6	5.9	6.1	5.7
Edge						
Tukey test	--	--	--	--	--	--
paired t tests	--	--	--	--	--	DIFF !
6 of 6 test	--	--	--	--	--	--

Clear — Clears everything for a new problem. Enter data, or press a key below.

Example — Enters example segregated data

Random — Enters a random sample

YES ! — <-- significant column differences?

Edge

11/15/96 F statistic

DATA ENTRY

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

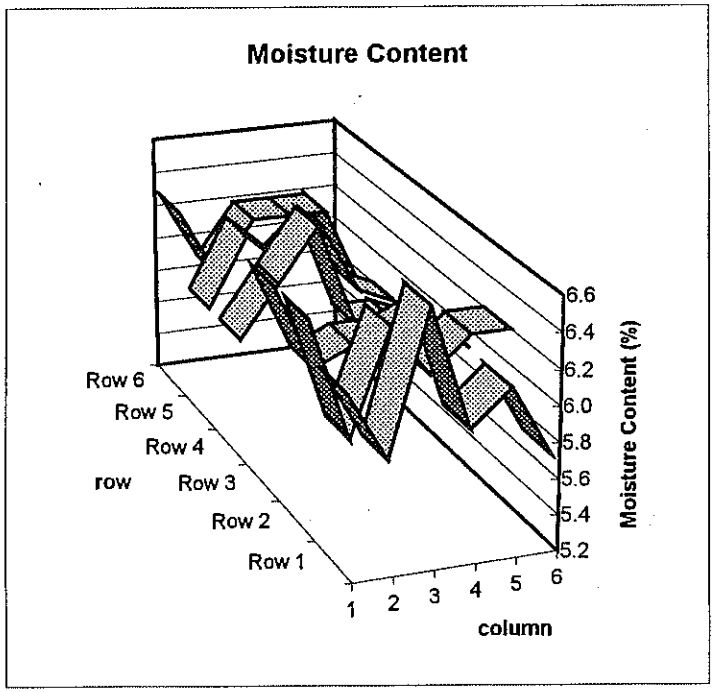
Michigan State University - Pavement Research Center of Excellence

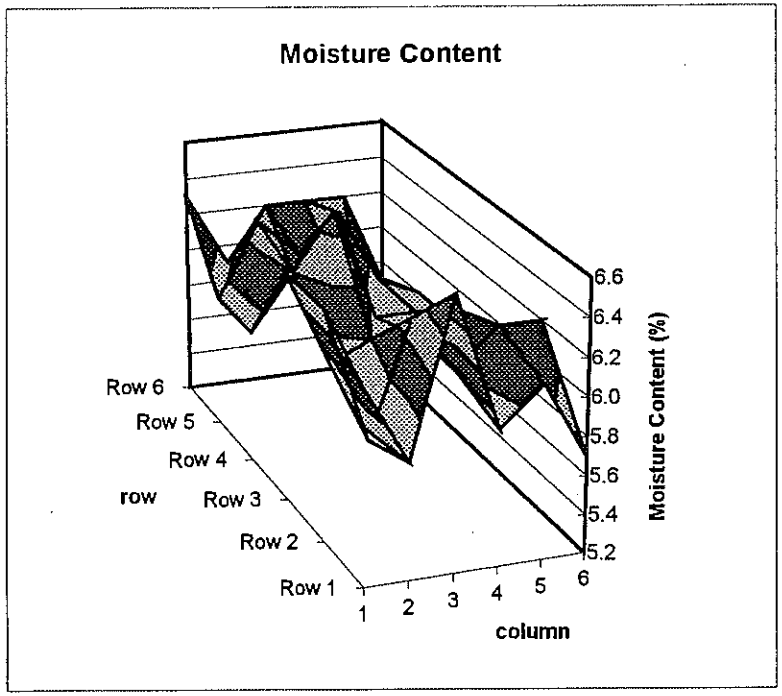
Location: *St. John's, samples xx2*
Date: *2/22/97*
Description: *Samples xx2, Moisture Content*

Color 1 *Color Above and Below Average*
Clear Color

Column	1	2	3	4	5	6	Average	Standard Deviation	Coeff of Variation
Row									
6	6.3	5.9	6.2	6.2	6.2	5.7	6.08	0.232	3.81%
5	5.9	6.3	6.1	6.3	5.9	5.8	6.05	0.217	3.58%
4	5.9	6.2	6.5	5.9	5.9	5.8	6.03	0.266	4.41%
3	6.4	5.9	6.0	6.0	6.1	5.9	6.05	0.187	3.09%
2	6.4	5.7	6.3	6.0	6.2	6.2	6.13	0.250	4.08%
1	6.2	5.8	6.6	5.9	6.1	5.7	6.05	0.327	5.41%
Average	6.18	5.97	6.28	6.05	6.07	5.85	6.07	**6.07**	0.246	4.06%
Std. Dev.	0.232	0.234	0.232	0.164	0.137	0.187	0.198		**0.23422**	
Coeff. of Var.	3.75%	3.92%	3.69%	2.72%	2.25%	3.20%	3.25%			**3.86%**

Location: *St. John's, samples xx2*
Date: *2/22/97*
Description: *Samples xx2, Moisture Content*





Moisture Graph

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

Michigan State University - Pavement Research Center of Excellence

Location: *St. John's, samples xx2*
Date: *2/22/97*
Description: *Samples xx2, Moisture Content*

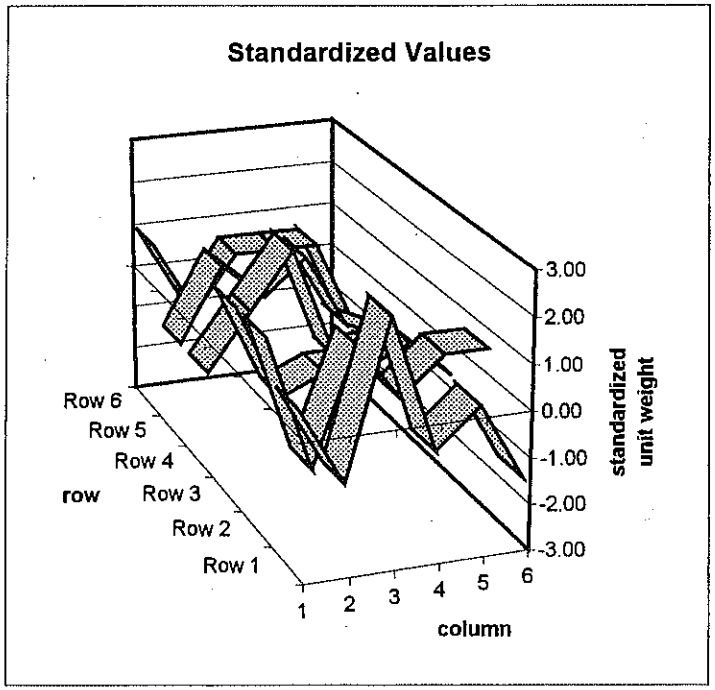
Color 1 *Color Above and Below Average*

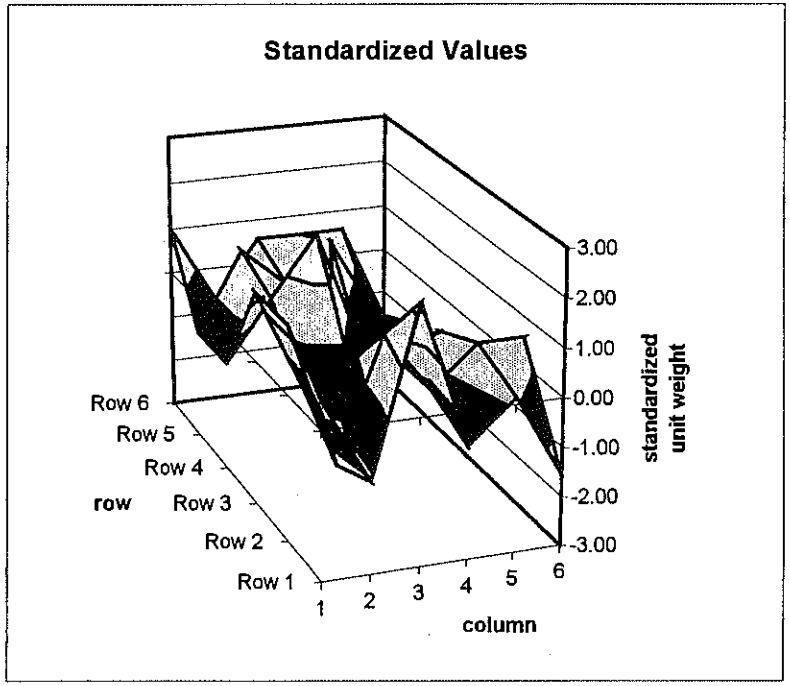
Clear Color

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	1.00	-0.71	0.57	0.57	0.57	-1.57	0.07	0.989
5	-0.71	1.00	0.14	1.00	-0.71	-1.14	-0.07	0.926
4	-0.71	0.57	1.85	-0.71	-0.71	-1.14	-0.14	1.135
3	1.42	-0.71	-0.28	-0.28	0.14	-0.71	-0.07	0.799
2	1.42	-1.57	1.00	-0.28	0.57	0.57	0.28	1.069
1	0.57	-1.14	2.28	-0.71	0.14	-1.57	-0.07	1.397
Average	0.50	-0.43	0.93	-0.07	0.00	-0.93	0.00	**0.00**	1.052
Std. Dev.	0.989	0.998	0.989	0.702	0.583	0.799	0.843		**1.00**

Location: *St. John's, samples xx2*
Date: *2/22/97*
Description: *Samples xx2, Moisture Content*





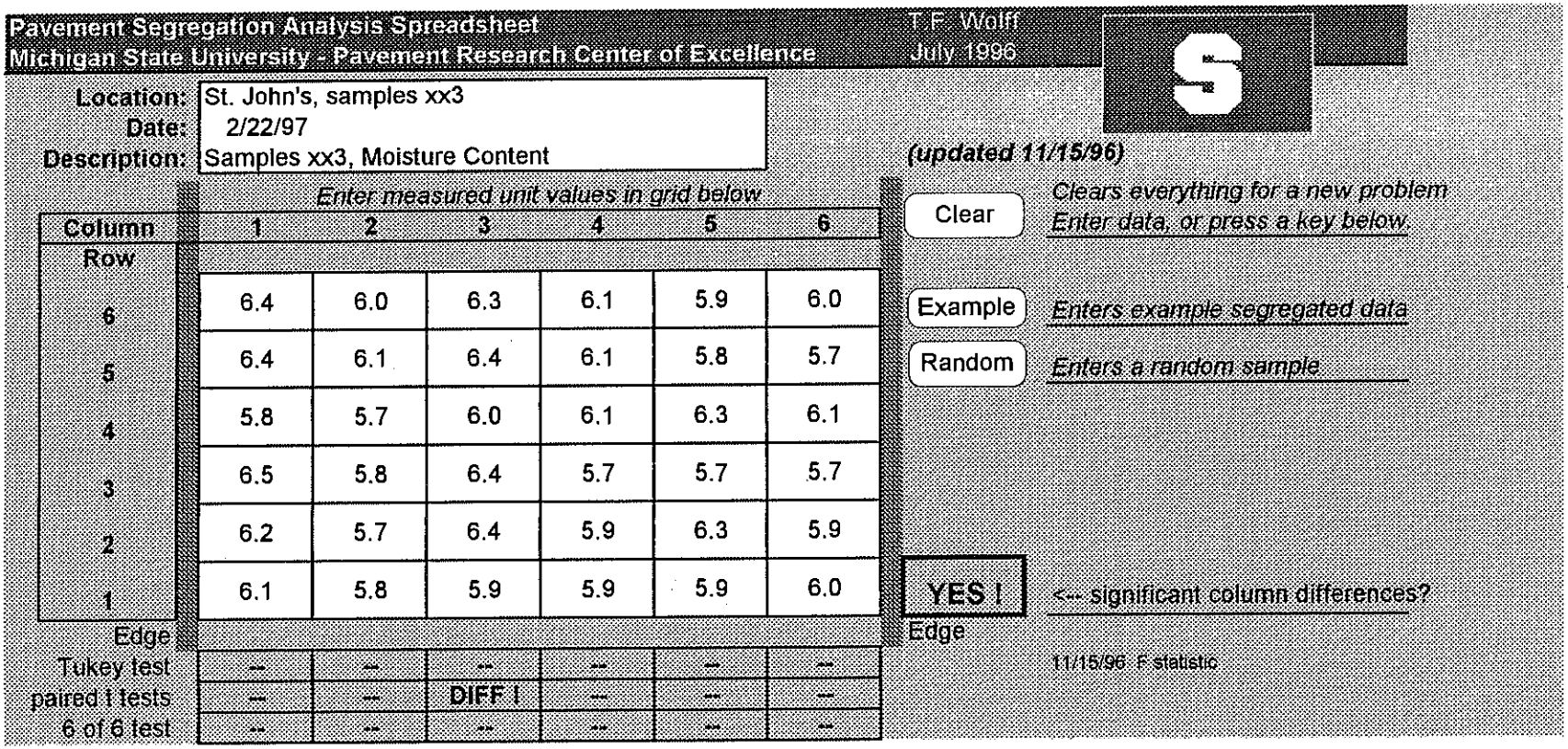
Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	6.18	0.12	0.014	0.232	0.054
2	5.97	-0.10	0.010	0.234	0.055
3	6.28	0.22	0.047	0.232	0.054
4	6.05	-0.02	0.000	0.164	0.027
5	6.07	0.00	0.000	0.137	0.019
6	5.85	-0.22	0.047	0.187	0.035
sum			0.118		0.243
all data	6.07			0.234216	0.0549

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	0.70666667	5	0.141	**3.49451**	2.533554	0.0131611
within columns:	1.21333333	30	0.040			
Total:	1.92		**Different ?**	**1**	**YES!**	

ANOVA



Pavement Segregation Analysis Spreadsheet
Michigan State University - Pavement Research Center of Excellence
T. F. Wolff
July 1996

Location: St. John's, samples xx3
Date: 2/22/97
Description: Samples xx3, Moisture Content

(updated 11/15/96)

Enter measured unit values in grid below

Column	1	2	3	4	5	6
Row						
6	6.4	6.0	6.3	6.1	5.9	6.0
5	6.4	6.1	6.4	6.1	5.8	5.7
4	5.8	5.7	6.0	6.1	6.3	6.1
3	6.5	5.8	6.4	5.7	5.7	5.7
2	6.2	5.7	6.4	5.9	6.3	5.9
1	6.1	5.8	5.9	5.9	5.9	6.0
Edge						
Tukey test	--	--	--	--	--	--
paired t tests	--	--	DIFF !	--	--	--
6 of 6 test	--	--	--	--	--	--

Clear — *Clears everything for a new problem*
Enter data, or press a key below.

Example — *Enters example segregated data*

Random — *Enters a random sample*

YES ! — <-- significant column differences?

Edge

11/15/96 F statistic

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

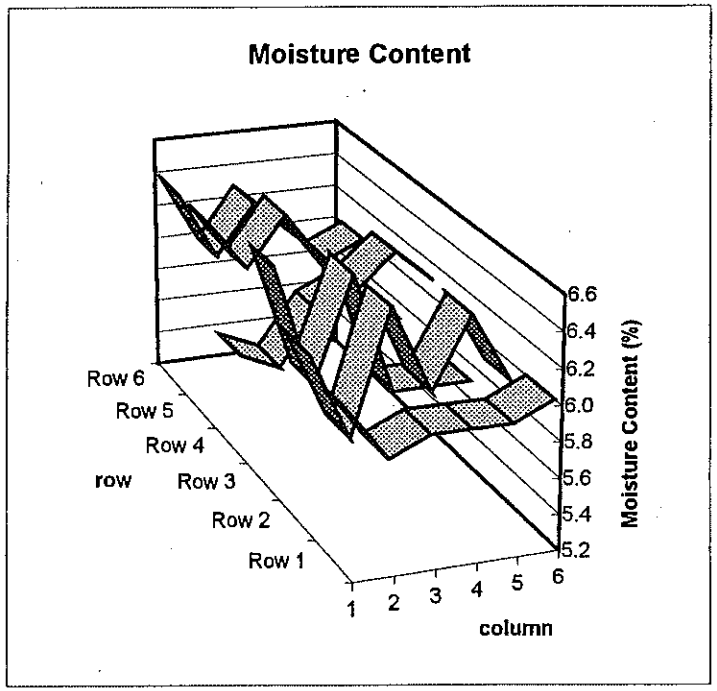
Michigan State University - Pavement Research Center of Excellence

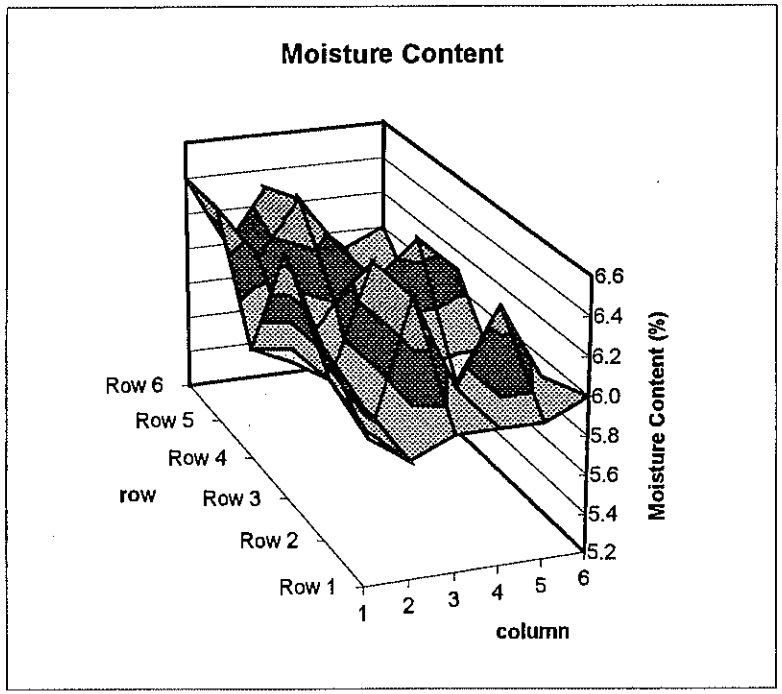
Location: *St. John's, samples xx3*
Date: *2/22/97*
Description: *Samples xx3, Moisture Content*

Color 1 *Color Above and Below Average*
Clear Color

Column	1	2	3	4	5	6	Average	Standard Deviation	Coeff of Variation
Row									
6	6.4	6.0	6.3	6.1	5.9	6.0	6.12	0.194	3.17%
5	6.4	6.1	6.4	6.1	5.8	5.7	6.08	0.293	4.81%
4	5.8	5.7	6.0	6.1	6.3	6.1	6.00	0.219	3.65%
3	6.5	5.8	6.4	5.7	5.7	5.7	5.97	0.378	6.33%
2	6.2	5.7	6.4	5.9	6.3	5.9	6.07	0.273	4.50%
1	6.1	5.8	5.9	5.9	5.9	6.0	5.93	0.103	1.74%
Average	6.23	5.85	6.23	5.97	5.98	5.90	6.03	**6.03**	0.243	4.04%
Std. Dev.	0.258	0.164	0.225	0.163	0.256	0.167	0.206		**0.24798**	
Coeff. of Var.	4.14%	2.81%	3.61%	2.74%	4.28%	2.84%	3.40%			**4.11%**

Location: *St. John's, samples xx3*
Date: *2/22/97*
Description: *Samples xx3, Moisture Content*





Moisture Graph

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

Michigan State University - Pavement Research Center of Excellence

Location: *St. John's, samples xx3*
Date: *2/22/97*
Description: *Samples xx3, Moisture Content*

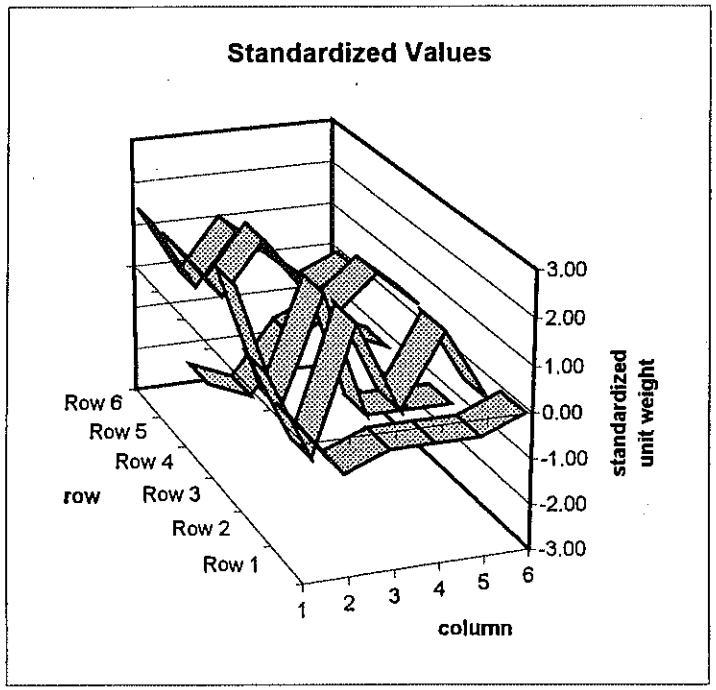
Color 1 *Color Above and Below Average*

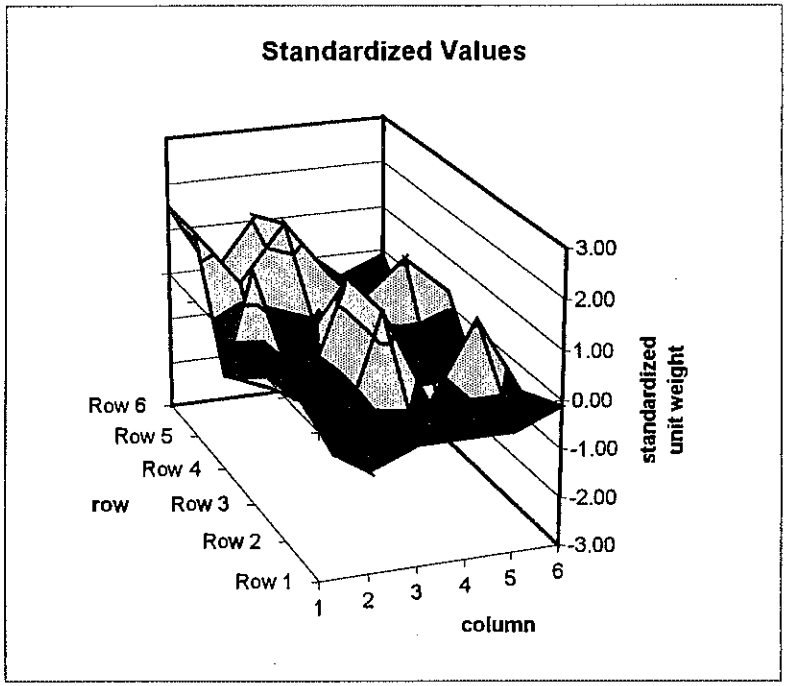
Clear Color

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	1.50	-0.11	1.10	0.29	-0.52	-0.11	0.36	0.783
5	1.50	0.29	1.50	0.29	-0.92	-1.32	0.22	1.180
4	-0.92	-1.32	-0.11	0.29	1.10	0.29	-0.11	0.884
3	1.90	-0.92	1.50	-1.32	-1.32	-1.32	-0.25	1.523
2	0.69	-1.32	1.50	-0.52	1.10	-0.52	0.16	1.102
1	0.29	-0.92	-0.52	-0.52	-0.52	-0.11	-0.38	0.416
Average	0.83	-0.72	0.83	-0.25	-0.18	-0.52	0.00	**0.00**	0.981
Std. Dev.	1.041	0.663	0.908	0.659	1.033	0.675	0.830		**1.00**

Location: *St. John's, samples xx3*
Date: *2/22/97*
Description: *Samples xx3, Moisture Content*



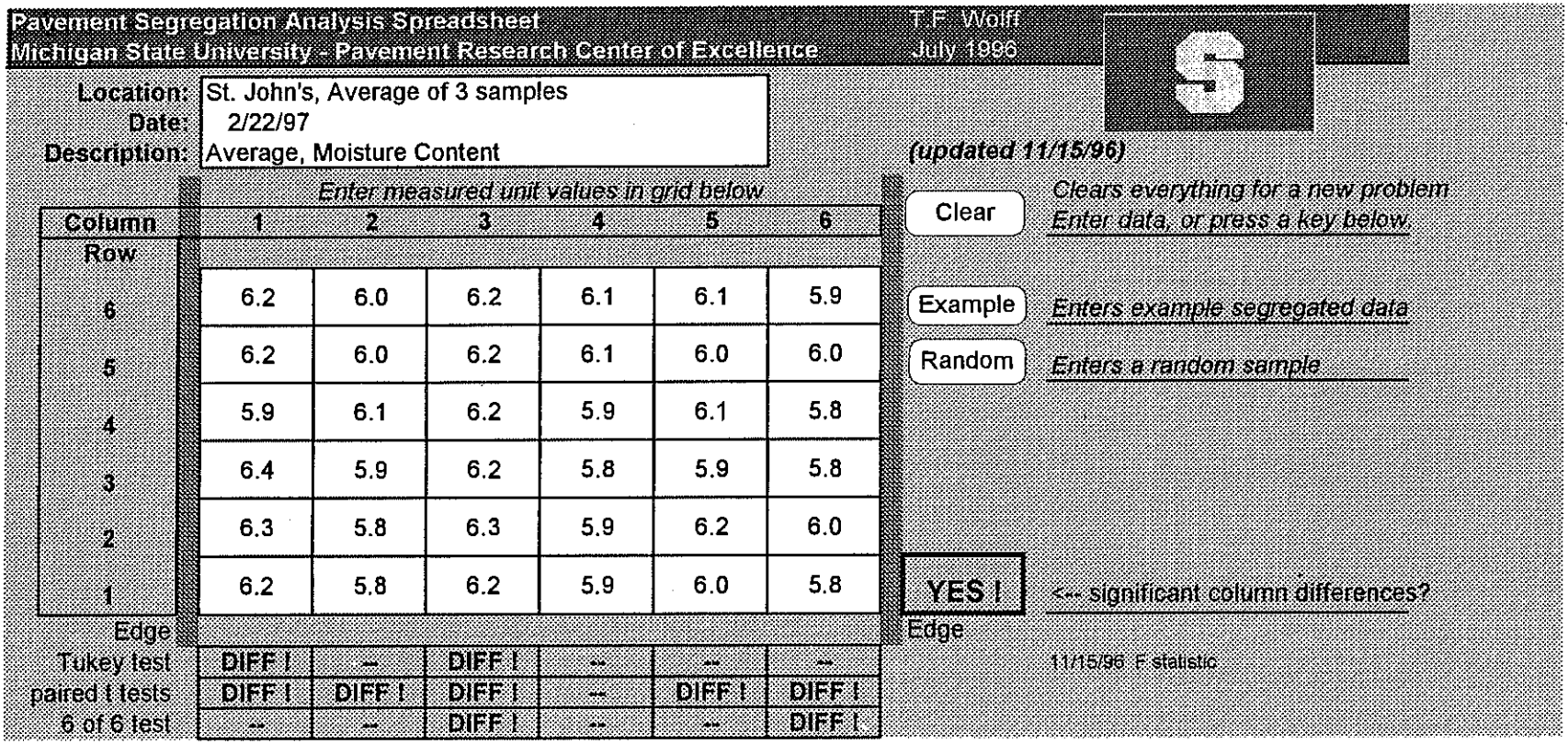


Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	6.23	0.21	0.042	0.258	0.067
2	5.85	-0.18	0.032	0.164	0.027
3	6.23	0.21	0.042	0.225	0.051
4	5.97	-0.06	0.004	0.163	0.027
5	5.98	-0.04	0.002	0.256	0.066
6	5.90	-0.13	0.016	0.167	0.028
sum			0.138		0.265
all data	6.03			0.247976	0.0615

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	0.82888889	5	0.166	**3.75819**	2.533554	0.0092423
within columns:	1.32333333	30	0.044			
Total:	2.15222222			**Different ?**	1	YES!



Pavement Segregation Analysis Spreadsheet
Michigan State University - Pavement Research Center of Excellence
T.F. Wolff
July 1996

Location: St. John's, Average of 3 samples
Date: 2/22/97
Description: Average, Moisture Content

(updated 11/15/96)

Enter measured unit values in grid below

Column / Row	1	2	3	4	5	6
6	6.2	6.0	6.2	6.1	6.1	5.9
5	6.2	6.0	6.2	6.1	6.0	6.0
4	5.9	6.1	6.2	5.9	6.1	5.8
3	6.4	5.9	6.2	5.8	5.9	5.8
2	6.3	5.8	6.3	5.9	6.2	6.0
1	6.2	5.8	6.2	5.9	6.0	5.8
Edge						
Tukey test	DIFF !	--	DIFF !	--	--	--
paired t tests	DIFF !	DIFF !	DIFF !	--	DIFF !	DIFF !
6 of 6 test	--	--	DIFF !	--	--	DIFF !

Clear — *Clears everything for a new problem*
Enter data, or press a key below

Example — *Enters example segregated data*

Random — *Enters a random sample*

YES ! — <-- significant column differences?

Edge

11/15/96 F statistic

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

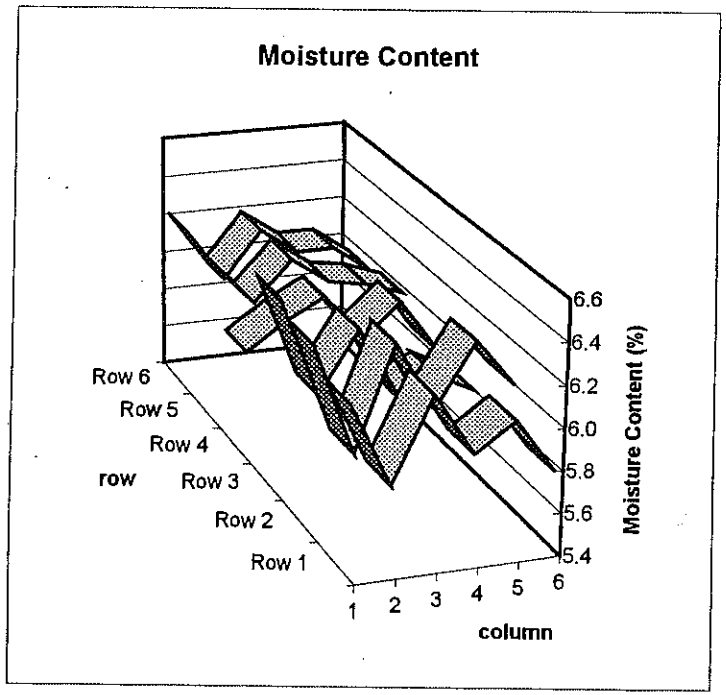
Michigan State University - Pavement Research Center of Excellence

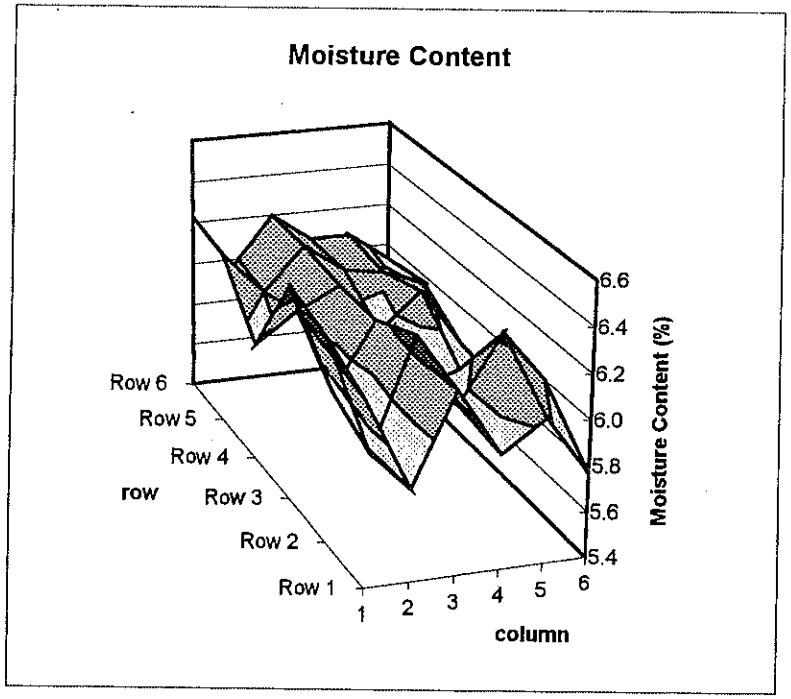
Location: *St. John's, Average of 3 samples*
Date: *2/22/97*
Description: *Average, Moisture Content*

Color 1 *Color Above and Below Average*
Clear Color

Column	1	2	3	4	5	6	Average	Standard Deviation	Coeff of Variation
Row									
6	6.2	6.0	6.2	6.1	6.1	5.9	6.08	0.120	1.98%
5	6.2	6.0	6.2	6.1	6.0	6.0	6.08	0.100	1.65%
4	5.9	6.1	6.2	5.9	6.1	5.8	6.01	0.125	2.09%
3	6.4	5.9	6.2	5.8	5.9	5.8	5.99	0.227	3.79%
2	6.3	5.8	6.3	5.9	6.2	6.0	6.08	0.216	3.55%
1	6.2	5.8	6.2	5.9	6.0	5.8	5.98	0.192	3.21%
Average	6.21	5.91	6.20	5.96	6.06	5.88	6.04	**6.04**	0.163	2.71%
Std. Dev.	0.148	0.119	0.037	0.093	0.108	0.096	0.100		**0.16434**	
Coeff. of Var.	2.39%	2.01%	0.59%	1.57%	1.79%	1.63%	1.66%			**2.72%**

Location: *St. John's, Average of 3 samples*
Date: *2/22/97*
Description: *Average, Moisture Content*





Moisture Graph

Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996

Michigan State University - Pavement Research Center of Excellence

Location: *St. John's, Average of 3 samples*
Date: *2/22/97*
Description: *Average, Moisture Content*

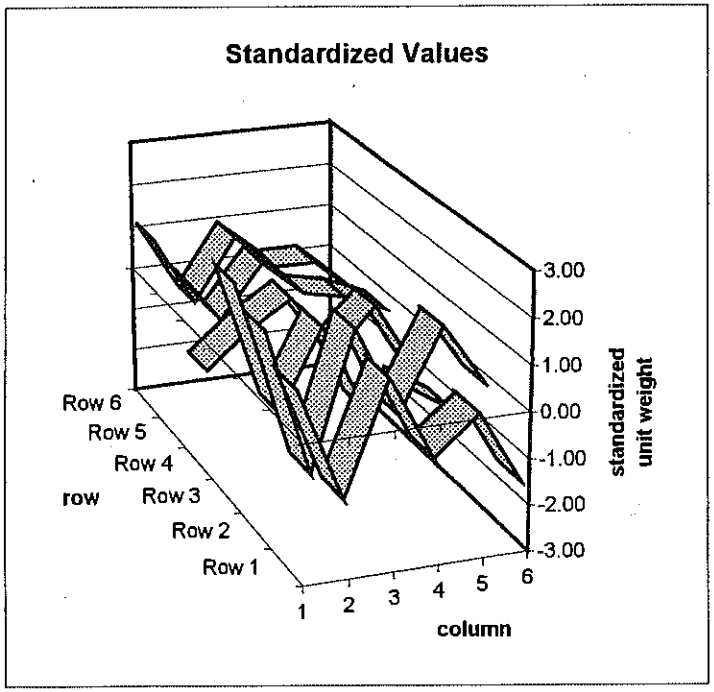
Color 1 *Color Above and Below Average*

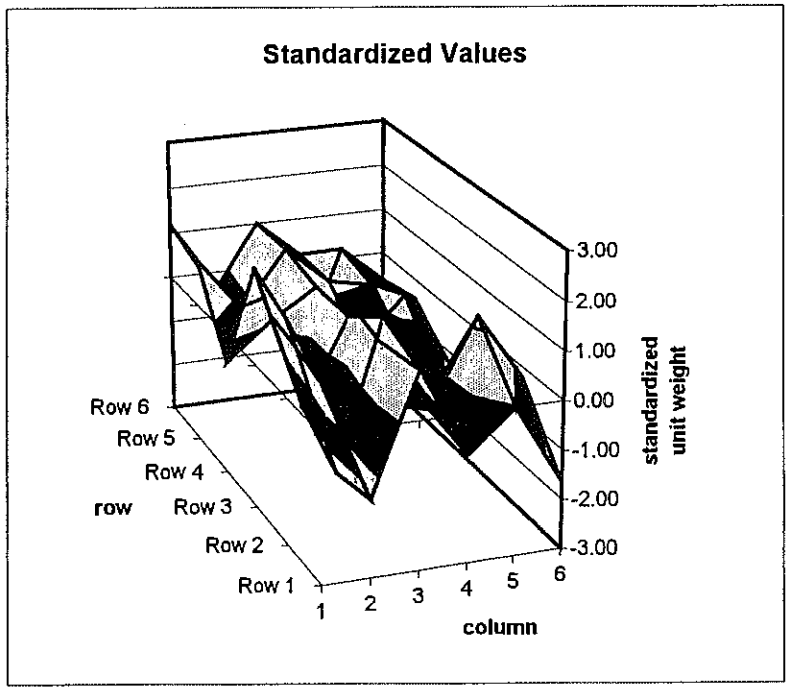
Clear Color

Standardized Values

Column	1	2	3	4	5	6	Average	Standard Deviation
Row								
6	1.20	-0.42	1.00	0.19	0.19	-0.63	0.25	0.733
5	1.00	-0.22	1.00	0.19	-0.02	-0.42	0.25	0.611
4	-0.63	0.19	0.79	-0.63	0.39	-1.23	-0.19	0.763
3	2.01	-1.03	0.79	-1.23	-0.83	-1.44	-0.29	1.380
2	1.61	-1.64	1.40	-0.63	1.20	-0.22	0.29	1.313
1	1.00	-1.44	1.00	-0.83	-0.02	-1.64	-0.32	1.167
Average	1.03	-0.76	1.00	-0.49	0.15	-0.93	0.00	**0.00** 0.994
Std. Dev.	0.902	0.722	0.222	0.569	0.659	0.584	0.610	**1.00**

Location: *St. John's, Average of 3 samples*
Date: *2/22/97*
Description: *Average, Moisture Content*





Pavement Segregation Analysis Spreadsheet T. F. Wolff June 1996
Michigan State University - Pavement Research Center of Excellence

One-way analysis of variance on column data

Column	Average	Diff from grnd mean	Diff ^2	sigma	Variance
1	6.21	0.17	0.029	0.148	0.022
2	5.91	-0.13	0.016	0.119	0.014
3	6.20	0.16	0.027	0.037	0.001
4	5.96	-0.08	0.006	0.093	0.009
5	6.06	0.03	0.001	0.108	0.012
6	5.88	-0.15	0.023	0.096	0.009
sum			0.102		0.067
all data	6.04			0.164341	0.0270

	Sum Sq	df	Variance	F	Fcrit	Prob
between columns:	0.60990741	5	0.122	**10.91165**	2.533554	4.772E-06
within columns:	0.33537037	30	0.011			
Total:	0.94527778		**Different ?**	1	**YES!**	