A Study of the Effectiveness of Strieter-Lite® Wild Animal Highway Warning Reflector Systems

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EXECUTIVE SUMMARY

The Strieter Corporation is the World distributor of Strieter-Lite® Wild Animal Highway Warning Reflector Systems. The Strieter-Lite® reflector is a new design patented in 1994 based on the concept of the Swareflex Wildlife Reflectors, which were originally developed in 1973 and tested in Austria. According to company literature, the reflectors, if properly installed and maintained, will significantly reduce the number of accidents involving motor vehicles and deer.

The Strieter Corporation requested a statistical analysis of a collection of reports that include data about the number of accidents before and after the installation of the Strieter-Lite® and Swareflex reflectors. The reports came from various highway and transportation agencies located in the United States and Canada (see Table 1).

State or Province		Sites
British Columbia	BC	13
Colorado	CO	1
Georgia	GA	1
Illinois	IL	1
Iowa	IA	4
Kansas	KS	1
Maryland	MD	5
Michigan	MI	4
Minnesota	MN	14
New Jersey	NJ	2
New York	NY	1
Virginia	VA	1
Wisconsin	WI	1
Washington	WA	4

Table 1 – Data Sources

Examining the reported rate of accidents before and after the installation of the reflectors, it seems obvious that the reflectors are effective. This is dramatically illustrated in the graph shown in Figure 1.

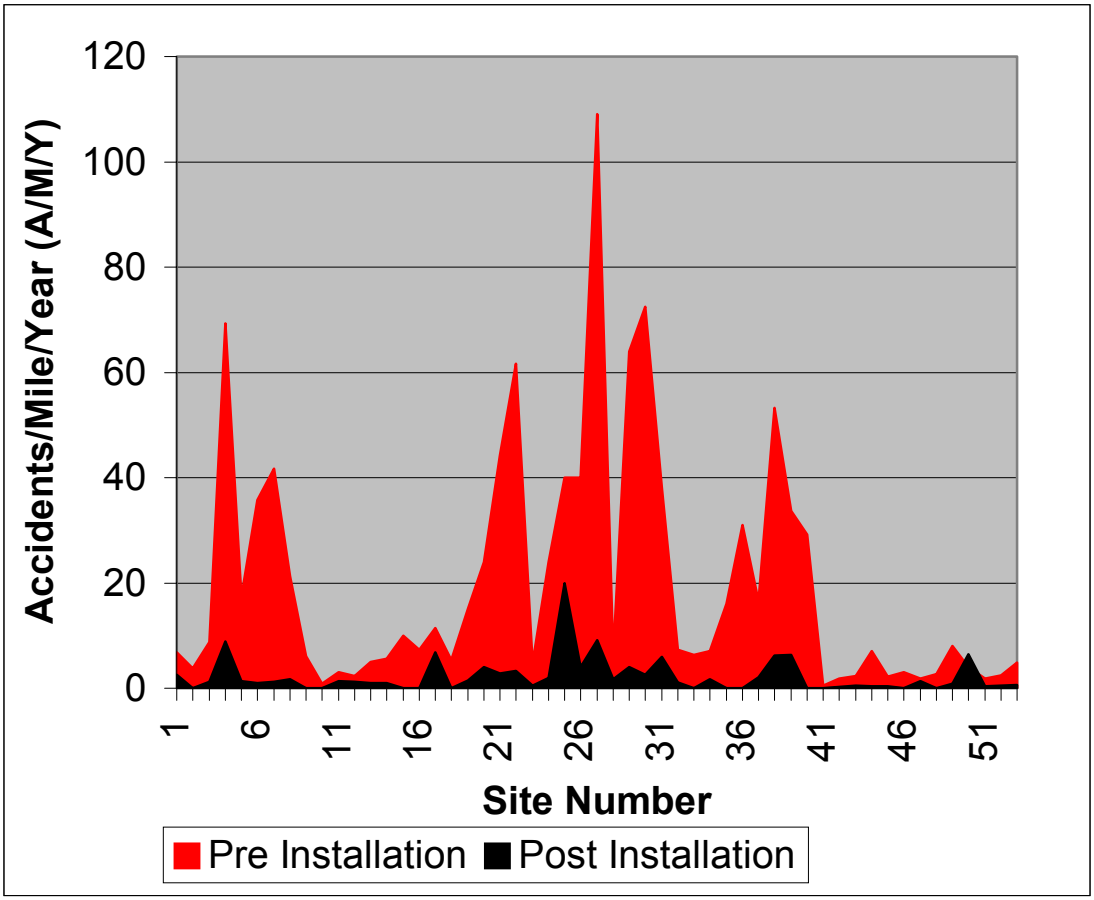

Figure 1 - Accident Rates before and after installation of reflectors

For each site, the graph shows the rate of accidents before the installation of the reflectors (red) and after the installation of the reflectors (black). Even though the effectiveness seems to be obvious, a more scientific basis for such a conclusion is necessary. To accomplish this need, the Strieter Corporation requested a study to analyze the data statistically. This report contains the results of the study, which indicated reductions ranging from 78% to 90%.

THE STUDY

Various highway and transportation agencies located in the United States and Canada provided reports that included data about the number of accidents involving deer and vehicle collisions before and after installation of the Strieter-Lite reflectors. Experimental design and data collection methodologies varied from report to report. The reports also varied as to the length of the control sections and the pre-installation and post-installation time frames. The purpose of the analysis is to determine scientifically the effectiveness of the reflectors based on the reported data, which can be viewed in Appendix 7.

For the purpose of this analysis, an accident is a collision between a vehicle and a deer. Since the numbers of collisions, between vehicles and deer were recorded for different lengths of time at sites of different lengths, they were converted to comparable numbers by computing the rate of accidents per mile per year (A/M/Y). The objective of this analysis is to test whether the installation of the Strieter-Lite® reflectors reduced A/M/Y at the sites where the reflectors are installed.

The data analysis involves sample observations from two statistical populations that are defined as follows.

- Population 1 is the A/M/Y before the installation of the reflectors.
- Population 2 is the A/M/Y after the installation of the reflectors.

Figure 2 is a graph showing the distribution of A/M/Y before the installation of reflectors at the test sites (Population 1).

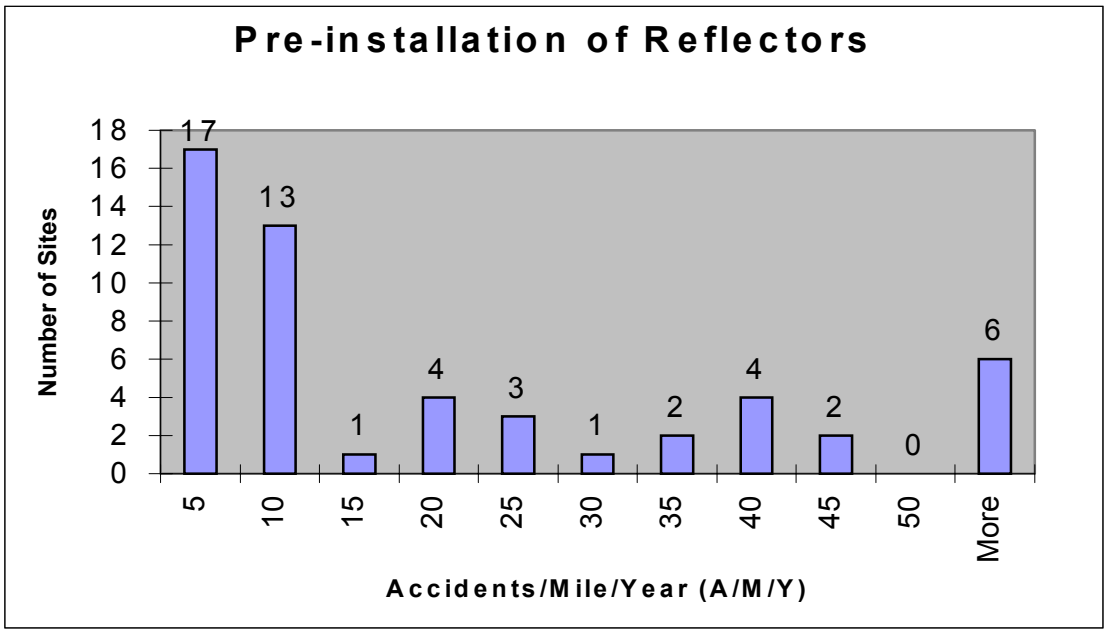

Figure 2 – A/M/Y Prior to Installation of Strieter-Lite® Reflectors (Population 1)

Figure 3 is a graph showing the A/M/Y after the reflectors were installed. Note the horizontal scale is different from that of Figure 2. It shows that thirteen sites reported no collisions after the reflectors were installed.

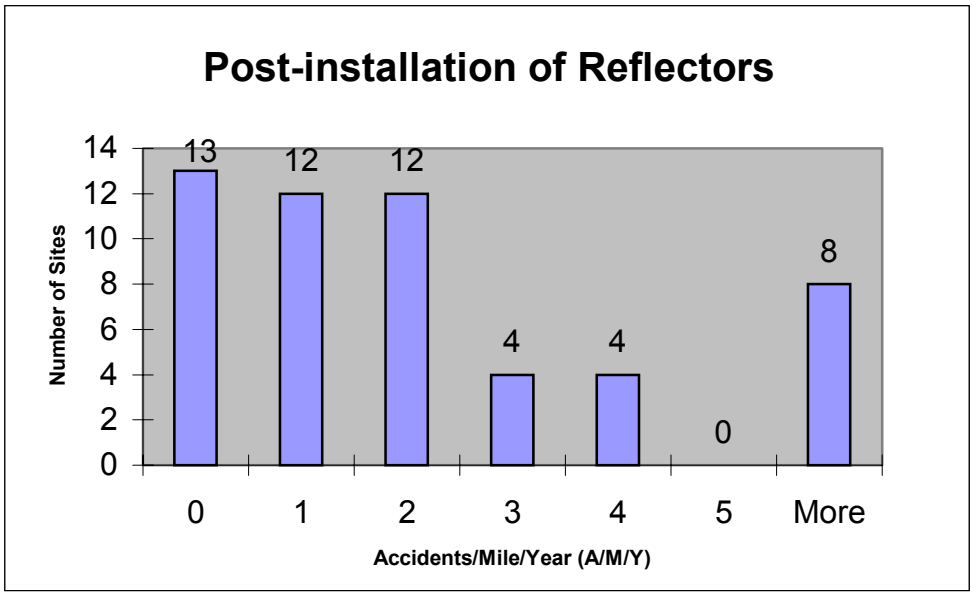

Figure 3 – A/M/Y After Installation of Strieter-Lite® Reflectors (Population 2)

The data collected for this test have another characteristic that needs to be considered when selecting the type of statistical test to use. The samples from the two populations are not independent; the data are paired observations. We have before and after observations on the same stretch of highway. Of interest, then, is the difference between the numbers of collisions before and after the reflectors were installed. Figure 4 illustrates the differences (reduction in collisions) for the paired observations.

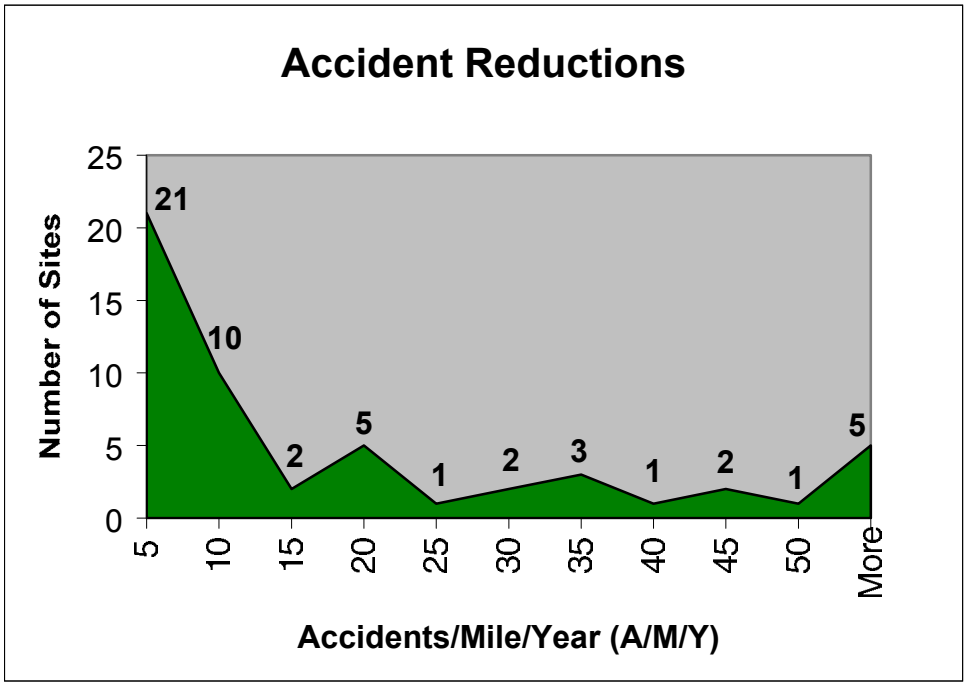

Figure 4 - Differences between the paired observations of populations 1 and 2

A simple visual scan of the data before and after installation of the reflectors seems to indicate that the reflectors do indeed result in a reduction of collisions between vehicles and deer on the roads where the reflectors are installed. To "prove" that this observation is not mere chance but that there is actually a reduction in collisions after the reflectors are installed, we need to compare the two populations using a statistical test. The characteristic of the populations that is of greatest interest in this case is the location of the populations; that is, central tendency, or where the populations tend to be positioned

on a number scale. The usual statistical tests for this comparison require an assumption that the populations are "normal"; that is, the distribution of the values in the population form an approximate bell shape. From the graphs shown in figures 2 and 3, it is apparent that the populations in this case do not appear to be normally distributed since they are skewed right. An appropriate test to compare the locations of the populations would be a "distribution free" or non-parametric test. Tests of this type do not require an assumption that the data are normally distributed. We can test for a difference in location of the two populations – not necessarily their means or other population characteristics (i.e., parameters). Therefore, a nonparametric statistical method was employed to test the hypothesis that the reflectors reduced A/M/Y. An appropriate choice for a statistical test for the case presented here is the Wilcoxon matched-pairs signed rank test for the following reasons:

1. the objective is to compare the locations of two populations,
2. the data is quantitative,
3. the differences are not normally distributed,
4. the samples are matched pairs.

A more complete explanation of the test can be found in Appendix 1.

We tested the hypothesis that the installation of reflectors reduced A/M/Y, i.e., the location of population 1 was to the right of the location of population 2. In other words, the pre-installation A/M/Y are greater than the post-installation A/M/Y. Our null hypothesis was the status quo, i.e., there was not a difference in the locations of the two populations.

The results of three tests can be found in appendices 2, 3, and 4 and are summarized in the following table.

Test results	Sample size	Test statistic	P-value
Appendix 2	4	0	0.0625[a]
Appendix 3	35	4.979	0
Appendix 4	53	6.237	0

Table 2 - Test Results

The first test (see Appendix 2) was based on the four test sites in Washington State since their test was the most empirical. It produced a test statistic that is likely to be observed less than 6.3% of the time if the null hypothesis were true. This is strong evidence supporting the research hypothesis, i.e. the installation of reflectors reduced A/M/Y.

The second test included 35 pairs where the pre-installation A/M/Y was less than twenty. This was used as a conservative approach. The third test included all 53 matched pairs. Since the sample sizes are large, i.e., greater than 30, the test statistics are approximately normally distributed. Both tests provided overwhelming evidence supporting the research hypothesis. If the null hypothesis were true, the probability of observing a test statistic at least as extreme as that produced in the test is virtually zero. In other words, these two tests conclusively supported the hypothesis that the installation of Strieter-Lite® reflectors reduced the collisions between vehicles and deer.

Descriptive statistics about the sample data are shown in Appendix 5. These provide a basis for estimating the number and percentage of reductions in A/M/Y using confidence intervals. The confidence intervals can be interpreted as follows. Lower Confidence Limits (LCL) and Upper Confidence Limits (UCL) are calculated based on the sample size, mean, standard deviation, and confidence level.

[a] See Appendix 6

Sample Size	Mean A/M/Y	Standard Deviation	Confidence Level	LCL A/M/Y	UCL A/M/Y
35	6.17	4.51	95%	4.68	7.66
53	19.78	23.26	95%	13.52	26.04

Table 3 – Confidence Interval Estimates of Pre-Installation A/M/Y

Sample Size	Mean A/M/Y	Standard Deviation	Confidence Level	LCL A/M/Y	UCL A/M/Y
35	5.13	4.41	95%	3.67	6.59
53	17.53	21.56	95%	11.73	23.33

Table 4 – Confidence Interval Estimates of Reductions in A/M/Y

Considering the more conservative sample of 35 sites (with pre-installation A/M/Y less than twenty), we can be 95% confident that the mean number of reductions lies between 3.67 and 6.59 A/M/Y or 78% - 86%. Considering the sample of all 53 sites, we can be 95% confident that the mean number of reductions lies between 11.73 and 23.33 A/M/Y or 87% - 90%.

SUMMARY and CONCLUSION

The objective of this study was to test whether the installation of the Strieter-Lite® reflectors reduced accidents at the sites where the reflectors are installed. Before and after data from 53 sites were analyzed statistically. Since the data were reported for different time periods for sites of different lengths, the reported data were "normalized" by converting to accidents per mile per year (A/M/Y). This facilitated the comparison of results from the different sites. The sample data conclusively supported the hypothesis that the installation of Strieter-Lite® reflectors reduced accidents, involving collisions between vehicles and deer, by 78 – 90%.

Statistical Analysis software

The following software was used to prepare this report:

- Microsoft Excel
- Data Analysis Plus (a statistical analysis add-in for Excel)
- SPSS

About the author

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Appendix 1 – Rationale of the Wilcoxon Matched-Pairs Signed Rank Test

The Wilcoxon matched-pairs signed-rank test utilizes information about the relative magnitude as well as the direction of the differences within pairs of observed data. The test does not just consider the direction of a difference, but also gives more weight to a pair with a large difference than to a pair with a small difference.

For each matched pair we calculate the difference between the pair's values under two conditions (or treatments). Each pair has one difference. After all differences have been computed, the differences are ranked without respect to sign (negative or positive). Note that the direction of the ranking -- smallest to largest or largest to smallest -- makes no difference in the final test results. After the differences have been ranked, then the sign of the difference is affixed to each rank.

The null hypothesis being tested is that there is no difference in the treatments; that is, there is no difference in the number of collisions before and after installation of the reflectors. Now if the treatments were equivalent, we would expect to find some of the larger differences favoring no reflectors installed and some favoring the installation of reflectors. That is, some of the larger ranks would come from negative differences and some would come from positive differences. Thus, if we summed the ranks having a plus sign and summed the ranks having a minus sign, we would expect the two sums to be about equal under the null hypothesis. But if the sum of the positive ranks is very much different from the sum of the negative ranks, we would infer that the treatments are different. That is, we would infer that installation of the reflectors does make a difference in the number of collisions, and thus we would reject the null hypothesis.

Reference: Sidney Siegel, **Nonparametric Statistics**, McGraw-Hill Book Co., New York, 1956. pp. 75 – 83.

Appendix 2 – A/M/Y for the state of Washington sites

Wilcoxon Signed Rank Test

Site	*Pre-reflector*	*Post-reflector*	*Difference*	*|Difference|*	*Rank*
36	30.99	0.00	30.99	30.99	3
37	16.57	2.07	14.50	14.50	1
38	53.21	6.26	46.95	46.95	4
39	33.63	6.31	27.33	27.33	2

Number of Nonzero Differences = 4[a]
T+ = 10
T- = 0
Test Statistic Z = 0
P-Value = 0.0625

[a] Number of data points

Appendix 3 – A/M/Y where pre-installation A/M/Y < 20

Wilcoxon Signed Rank Test

Site	*Pre-reflector*	*Post-reflector*	*Difference*	*|Difference|*	*Rank*
41	0.47	0.00	0.47	0.47	2
10	0.83	0.00	0.83	0.83	3
47	1.79	1.34	0.45	0.45	1
42	1.83	0.24	1.58	1.58	6
51	1.86	0.31	1.55	1.55	5
45	2.24	0.36	1.88	1.88	9
43	2.35	0.50	1.84	1.84	8
12	2.35	1.17	1.17	1.17	4
52	2.38	0.45	1.94	1.94	10
48	2.68	0.00	2.68	2.68	12
46	3.02	0.00	3.02	3.02	13
11	3.10	1.34	1.75	1.75	7
2	3.79	0.00	3.79	3.79	14
50	4.02	6.44	-2.41	2.41	11
23	4.78	0.43	4.35	4.35	18
53	4.83	0.64	4.18	4.18	16
13	5.00	1.00	4.00	4.00	15
18	5.33	0.00	5.33	5.33	22
14	5.58	1.00	4.58	4.58	19
9	6.10	0.00	6.10	6.10	24
28	6.28	1.67	4.60	4.60	20
33	6.33	0.00	6.33	6.33	26
1	6.79	2.50	4.29	4.29	17
44	7.04	0.40	6.64	6.64	27
34	7.08	1.67	5.42	5.42	23
16	7.33	0.00	7.33	7.33	29
32	7.33	1.07	6.27	6.27	25
49	8.05	0.80	7.24	7.24	28
3	8.78	1.22	7.56	7.56	30
15	10.00	0.00	10.00	10.00	31
17	11.49	6.84	4.65	4.65	21
19	15.13	1.47	13.66	13.66	32
35	16.00	0.00	16.00	16.00	34
37	16.57	2.07	14.50	14.50	33
5	17.33	1.33	16.00	16.00	35

Appendix 3 – A/M/Y where pre-installation A/M/Y < 20

Number of Nonzero Differences = 35[a]
T+ = 619
T- = 11
Large Sample Approximation
Test Statistic Z = 4.979
P-Value < .001

[a] Number of data points

Appendix 4 – A/M/Y for all 53 sites

Wilcoxon Signed Rank Test

Site	*Pre-reflector*	*Post-reflector*	*Difference*	*|Difference|*	*Rank*
1	6.79	2.50	4.29	4.29	17
2	3.79	0.00	3.79	3.79	14
3	8.78	1.22	7.56	7.56	30
4	69.33	8.89	60.44	60.44	51
5	17.33	1.33	16.00	16.00	34
6	35.71	0.95	34.76	34.76	44
7	41.67	1.16	40.51	40.51	46
8	21.30	1.70	19.60	19.60	36
9	6.10	0.00	6.10	6.10	24
10	0.83	0.00	0.83	0.83	3
11	3.10	1.34	1.75	1.75	7
12	2.35	1.17	1.17	1.17	4
13	5.00	1.00	4.00	4.00	15
14	5.58	1.00	4.58	4.58	19
15	10.00	0.00	10.00	10.00	31
16	7.33	0.00	7.33	7.33	29
17	11.49	6.84	4.65	4.65	21
18	5.33	0.00	5.33	5.33	22
19	15.13	1.47	13.66	13.66	32
20	24.00	4.00	20.00	20.00	37
21	44.29	2.86	41.43	41.43	47
22	61.67	3.33	58.33	58.33	49
23	4.78	0.43	4.35	4.35	18
24	24.00	2.00	22.00	22.00	39
25	40.00	20.00	20.00	20.00	38
26	40.00	4.00	36.00	36.00	45
27	109.09	9.09	100.00	100.00	53
28	6.28	1.67	4.60	4.60	20
29	64.00	4.00	60.00	60.00	50
30	72.50	2.50	70.00	70.00	52
31	38.00	6.00	32.00	32.00	43
32	7.33	1.07	6.27	6.27	25
33	6.33	0.00	6.33	6.33	26
34	7.08	1.67	5.42	5.42	23
35	16.00	0.00	16.00	16.00	35
36	30.99	0.00	30.99	30.99	42
37	16.57	2.07	14.50	14.50	33
38	53.21	6.26	46.95	46.95	48
39	33.63	6.31	27.33	27.33	40
40	29.17	0.00	29.17	29.17	41
41	0.47	0.00	0.47	0.47	2

Appendix 4 – A/M/Y for all 53 sites

42	1.83	0.24	1.58	1.58	6
43	2.35	0.50	1.84	1.84	8
44	7.04	0.40	6.64	6.64	27
45	2.24	0.36	1.88	1.88	9
46	3.02	0.00	3.02	3.02	13
47	1.79	1.34	0.45	0.45	1
48	2.68	0.00	2.68	2.68	12
49	8.05	0.80	7.24	7.24	28
50	4.02	6.44	-2.41	2.41	11
51	1.86	0.31	1.55	1.55	5
52	2.38	0.45	1.94	1.94	10
53	4.83	0.64	4.18	4.18	16

Number of Nonzero Differences = 53[a]
T+ = 1420
T- = 11
Large Sample Approximation
Test Statistic Z = 6.237
P-Value < .001

[a] Number of data points

Appendix 5 – Descriptive Statistics

All 53 sites	***A/M/Y***		
	Pre-reflector	Post-reflector	Difference
Mean	19.78	2.25	17.53
Standard Error	3.20	0.47	2.96
Median	7.33	1.16	6.64
Mode	7.33	0.00	20.00
Standard Deviation	23.26	3.43	21.56
Sample Variance	541.21	11.74	464.77
Kurtosis	3.34	13.30	3.44
Skewness	1.78	3.16	1.82
Range	108.62	20.00	102.41
Minimum	0.47	0.00	-2.41
Maximum	109.09	20.00	100.00
Sum	1048.41	119.32	929.09
Count	53	53	53
Confidence Level(95.0%)	6.41	0.94	5.94

35 selected sites	***A/M/Y***		
	Pre-reflector	Post-reflector	Difference
Mean	6.17	1.04	5.13
Standard Error	0.76	0.26	0.75
Median	5.33	0.50	4.35
Mode	7.33	0.00	#N/A
Standard Deviation	4.51	1.56	4.41
Sample Variance	20.36	2.42	19.45
Kurtosis	0.81	8.69	1.09
Skewness	1.18	2.84	1.14
Range	16.86	6.84	18.41
Minimum	0.47	0.00	-2.41
Maximum	17.33	6.84	16.00
Sum	215.86	36.28	179.58
Count	35	35	35
Confidence Level(95.0%)	1.55	0.53	1.52

Appendix 6

The table shows all possible outcomes of a Wilcoxon Signed-Ranks Test when the number of observations is 4.

Illustration for Deriving the P-value

	+1	*+1*	*+1*	*+1*	*-1*	*+1*	*+1*	*-1*	*+1*	*-1*	*-1*	*+1*	*-1*	*-1*	*-1*	*-1*
	+2	*+2*	*+2*	*-2*	*+2*	*+2*	*-2*	*-2*	*-2*	*+2*	*+2*	*-2*	*+2*	*-2*	*-2*	*-2*
	+3	*+3*	*-3*	*+3*	*+3*	*-3*	*-3*	*+3*	*+3*	*-3*	*+3*	*-3*	*-3*	*+3*	*-3*	*-3*
	+4	*-4*	*+4*	*+4*	*+4*	*-4*	*+4*	*+4*	*-4*	*+4*	*-4*	*-4*	*-4*	*-4*	*+4*	*-4*
T+	*10*	*6*	*7*	*8*	*9*	*3*	*5*	*7*	*4*	*6*	*5*	*1*	*2*	*3*	*4*	*0*
T-	*0*	*4*	*3*	*2*	*1*	*7*	*5*	*3*	*6*	*4*	*5*	*9*	*8*	*7*	*6*	*10*

$P [T+ \geq 10] = P [T - \leq 0] = 1/16 = 0.0625$

Appendix 7 – Raw Data

Site	State	Road				Pre-Reflector				Post-Reflector					Accident Reduction	
						Report Years					Report Period					
		Name	Site Report Document	Km	Miles			Collisions	A/M/Y	Installed			Collisions	A/M/Y	%	A/M/Y
1	**CO**	US-36	CO Boulder Dist		0.70	1993	1996	19	6.79	Dec-96	1997	2000	7	2.50	63%	4.29
2	**GA**	SR-155	GA DOT		0.50	1993	1997	7	3.79	Mar-97	1997	1999	0	0.00	100%	3.79
3	**IL**	SR-47	IL Mahomet		0.41	1992	1996	18	8.78	Jan-98	1998	1999	1	1.22	86%	7.56
4	**IA**	Dubuque St	IA City #1		0.75	1996	1996	52	69.33	Jul-96	1997	1999	20	8.89	87%	60.44
5	**IA**	Dodge St	IA City #2		1.50	1998	1998	26	17.33	Aug-99	1999	1999	2	1.33	92%	16.00
6	**IA**	SR-76	IA DOT #1		1.40	1984	1986	150	35.71	Jan-87	1987	2000	16	0.95	97%	34.76
7	**IA**	SR-26	IA DOT #2		0.54	1992	1992	22.5	41.67	Apr-92	1993	2000	5	1.16	97%	40.51
8	KS	K-4	KS DOT John Babcock		0.75	88	Sep-90		21.30	Oct-90	1991	2000		1.70	92%	19.60
9	MD	Worthington Ave	MD Baltimore County		1.50	1995	1996	16	6.10	Sep-96	1997	1999	0	0.00	100%	6.10
10	**MD**	SR-25	MD Falls Road		2.00	1996	1998	5	0.83	Nov-98	1999	2000	0	0.00		0.83
11	**MD**	SR-23	MD Harford Cnty #1		2.50	1993	1994	11	3.10	Oct-94	1994	2000	21	1.34	57%	1.75
12	**MD**	SR-24	MD Harford Cnty #2		1.50	1993	1994	5	2.35	Oct-94	1994	2000	11	1.17	50%	1.17
13	**MD**	MD-156	MD Harford Cnty #3		0.80	1999	1999	4	5.00	Oct-99	1999	2000	1	1.00	80%	4.00
14	**MI**	Old-27	MI Calhoun Cnty #s1&2		1.00	1996	1999	13	5.58	Sep-96	1999	1999	1	1.00	82%	4.58
15	**MI**	Homer Road	MI Calhoun Cnty #3			1997	1997		10.00	Sep-98	1999	1999	0	0.00	100%	10.00
16	**MI**	B Drive	MI Calhoun Cnty #4		1.00	1998	1998	5.5	7.33	Oct-99	1999	2000	0	0.00	100%	7.33
17	**MI**	Ricketts Rd	MI Livingston Cnty Goryl		0.50	1993	1996	22	11.49	Nov-96	1997	1998	4	6.84	40%	4.65
18	**MN**	County Rd 13	MN New Ulm		1.50	1965	1985	168	5.33	85 &91	1986	2000	0	0.00	100%	5.33
19	**MN**	County Rd 23	MN Paynesville, Legatt		2.00	1986	1989	121	15.13	May-90	1990	1999	28	1.47	90%	13.66
20	**MN**	TH-32	Pafko Report		1.00	1987	1987	24	24.00	1988	1988	1994	28	4.00	83%	20.00
21	**MN**	TH-71	Pafko Report		0.70	1987	1987	31	44.29	1988	1988	1994	14	2.86	94%	41.43
22	**MN**	TH-71	Pafko Report		0.60	1987	1987	37	61.67	1988	1988	1994	14	3.33	95%	58.33
23	**MN**	TH-64	Pafko Report		2.30	1987	1987	11	4.78	1988	1988	1994	7	0.43	91%	4.35
24	**MN**	TH-75	Pafko Report		1.00	1987	1987	24	24.00	1988	1988	1994	14	2.00	92%	22.00
25	**MN**	TH-23	Pafko Report		1.00	1987	1987	40	40.00	1988	1988	1994	140	20.00	50%	20.00
26	**MN**	TH-67	Pafko Report		0.75	1987	1987	30	40.00	1988	1988	1994	21	4.00	90%	36.00
27	**MN**	TH-75	Pafko Report		1.10	1987	1987	120	109.09	1988	1988	1994	70	9.09	92%	100.00
28	**MN**	TH-371	Pafko Report		2.39	1987	1987	15	6.28	1988	1988	1994	28	1.67	73%	4.60
29	**MN**	Th-64	Pafko Report		0.25	1987	1987	16	64.00	1988	1988	1994	7	4.00	94%	60.00
30	MN	TH-169	Pafko Report		0.40	1987	1987	29	72.50	1988	1988	1994	7	2.50	97%	70.00
31	**MN**	I-94	Pafko Report		1.00	1987	1987	38	38.00	1988	1988	1994	42	6.00	84%	32.00
32	**NJ**	County Rd 617	NJ Hunterdon Cnty #1		1.50	1999	1999	11	7.33	Sep-99	1999	2000	2	1.07	85%	6.27

Appendix 7 – Raw Data

Site	State	Road				Pre-Reflector				Post-Reflector					Accident Reduction	
						Report Years					Report Period					
		Name	Site Report Document	Km	Miles			Collisions	A/M/Y	Installed			Collisions	A/M/Y	%	A/M/Y
33	**NJ**	Turnpike	NJ Turnpike Authority		1.00	1997	1999	19	6.33	Sep-99	Sep-99	Mar-01	0	0.00	100%	6.33
34	**NY**	Route 26	NY Lewis County, Lowville		1.20	1996	1997	17	7.08	Nov-97	1998	1998	2	1.67	76%	5.42
35	**VA**	Teleg Rd	VA Fairfax Cnty		0.50	1996	1998	24	16.00	Sep-99	1999	1999	0	0.00	100%	16.00
36	**WA**	SR-395	WA DOT		0.50	Mar-81	Apr-84	11	30.99		Mar-81	Apr-84	0	0.00	100%	30.99
37	**WA**	SR-395	WA DOT		0.68	Mar-81	Apr-84	8	16.57		Mar-81	Apr-84	1	2.07	88%	14.50
38	**WA**	SR-395	WA DOT		0.45	Mar-81	Apr-84	17	53.21		Mar-81	Apr-84	2	6.26	88%	46.95
39	**WA**	SR-395	WA DOT		0.67	Mar-81	Apr-84	16	33.63		Mar-81	Apr-84	3	6.31	81%	27.33
40	**WI**	SR-26	WI Fort Atkinson		1.20	1997	1997	35	29.17	Aug-97	1997	2000	0	0.00	100%	29.17
41	**BC**	Hwy 16	BC Smithers, Airport	3.4	2.11	1995	1998	3	0.47	Aug-98	1999	2000	0	0.00	100%	0.47
42	**BC**	Hwy 16	BC Smithers, Babine	2.2	1.37	1993	1995	5	1.83	Aug-95	1995	2000	2	0.24	87%	1.58
43	**BC**	Hwy 16	BC Smithers, Bourgon	1.6	0.99	1993	1996	7	2.35	Aug-96	1997	2000	2	0.50	79%	1.84
44	**BC**	Hwy 16	BC Smithers, Donaldson	0.8	0.50	1993	1995	7	7.04	Aug-95	1996	2000	1	0.40	94%	6.64
45	**BC**	Hwy 16	BC Smithers, Juniper	1.8	1.12	1993	1995	5	2.24	Aug-95	1996	2000	2	0.36	84%	1.88
46	**BC**	Hwy 16	BC Smithers, Larch	0.8	0.50	1993	1995	3	3.02	Sep-95	1996	2000	0	0.00	100%	3.02
47	**BC**	Hwy 16	BC Smithers, Neil	0.6	0.37	1993	1996	2	1.79	Aug-96	1997	2000	2	1.34	25%	0.45
48	**BC**	Hwy 16	BC Smithers, Quickw	0.9	0.56	1993	1995	3	2.68	Aug-95	1996	2000	0	0.00	100%	2.68
49	**BC**	Hwy 16	BC Smithers, Raymond	0.5	0.31	1994	1996	5	8.05	Aug-96	1997	2000	1	0.80	90%	7.24
50	**BC**	Hwy 16	BC Smithers, Telkwa	1.0	0.62	1994	1996	5	4.02	Aug-96	1998	2000	12	6.44	-60%	-2.41
51	**BC**	Hwy 16	BC Smithers, Vanhorn	1.3	0.81	1993	1995	3	1.86	Aug-96	1997	2000	1	0.31	83%	1.55
52	**BC**	Hwy 16	BC Smithers, Vics	0.9	0.56	1993	1996	4	2.38	Aug-96	1997	2000	1	0.45	81%	1.94
53	**BC**	Hwy 16	BC Smithers, Viewpoint	0.5	0.31	1993	1995	3	4.83	Aug-95	1996	2000	1	0.64	87%	4.18