

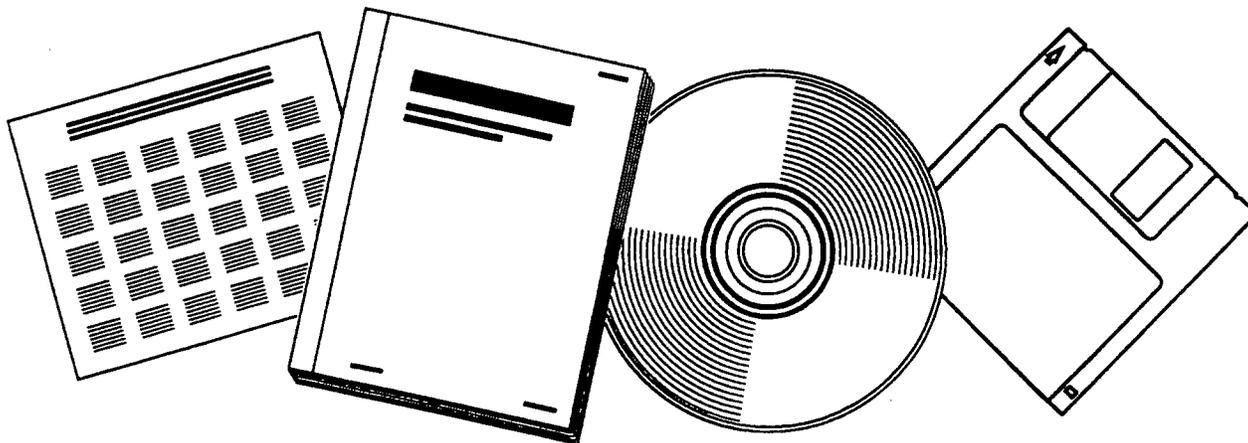


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EVALUATION OF REVISED LEFT TURN SIGNALIZATION

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EVALUATION OF REVISED LEFT TURN SIGNALIZATION

**Final Report
#FHWA-OR-RD-98-07**

by

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Prepared for

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16. Abstract Modified left turn signals had shown cost savings over the old style of traffic signals in initial installation and maintenance. This evaluation was conducted to determine whether those savings would be justified by no increase in the accident rates at the intersections where the new signals were installed. Eighteen intersections were selected for the evaluation and their accident rates before and after the new signal installation were compared. The results were statistically inconclusive, but since there was no indication of a significant rise overall in the accident rates, the evaluation committee determined that the savings already demonstrated would justify continuing to install the new signals.					
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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in ²	square inches	645.2	millimeters squared	mm ²
ft ²	square feet	0.093	meters squared	m ²
yd ²	square yards	0.836	meters squared	m ²
ac	acres	0.405	hectares	ha
mi ²	square miles	2.59	kilometers squared	km ²
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.028	meters cubed	m ³
yd ³	cubic yards	0.765	meters cubed	m ³
NOTE: Volumes greater than 1000 L shall be shown in m ³ .				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5(F-32)/9	Celsius temperature	°C

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm ²	millimeters squared	0.0016	square inches	in ²
m ²	meters squared	10.764	square feet	ft ²
ha	hectares	2.47	acres	ac
km ²	kilometers squared	0.386	square miles	mi ²
VOLUME				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	meters cubed	35.315	cubic feet	ft ³
m ³	meters cubed	1.308	cubic yards	yd ³
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams	1.102	short tons (2000 lb)	T
TEMPERATURE (exact)				
°C	Celsius temperature	1.8 + 32	Fahrenheit	°F



* SI is the symbol for the International System of Measurement

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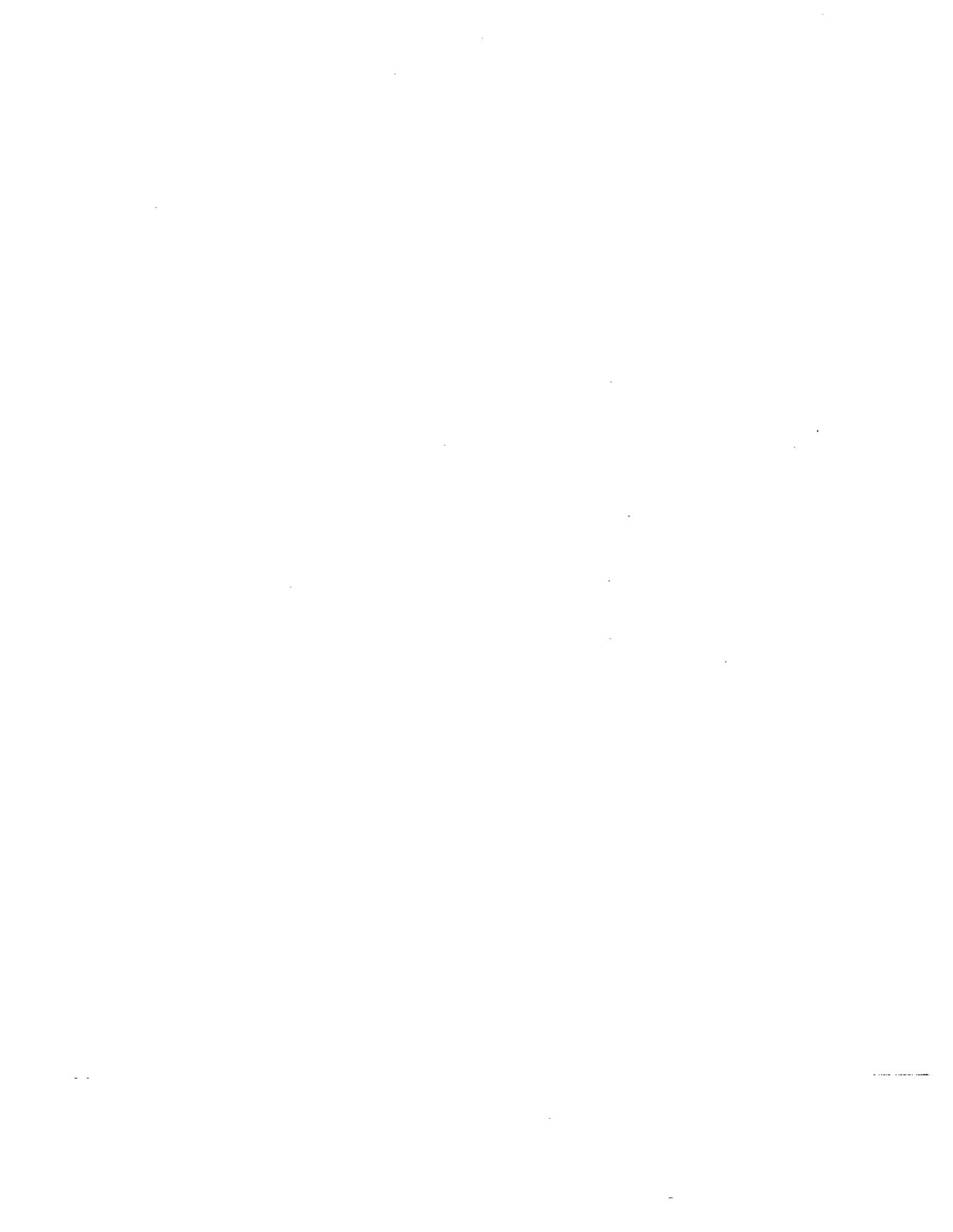
EVALUATION OF REVISED LEFT TURN SIGNALIZATION

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1.0 INTRODUCTION

The Oregon Transportation Commission approved a change in policy for the signalization of exclusive left turn lanes in January 1992. The new policy follows federal guidelines using all arrow indications in a standard vehicle signal head without any supplemental signing. Previous policy used an optically programmed signal head with only the green indication having an arrow. The programmed head was supplemented with a "LEFT TURN SIGNAL" interior illuminated sign. There was a definite initial installation and maintenance cost benefit to ODOT with the new policy, but there was some concern that intersections constructed or retrofitted to the new policy may have experienced an increase in accidents. A comparison of intersections utilizing the old policy and those same intersections after having been retrofitted was conducted to compare accident rates.

2.0 METHODOLOGY

Eighteen intersections in western Oregon were chosen for evaluation, based on the fact that each had been recently retrofitted with a revised left turn signal, and on the fact that no additional modification of the intersection was anticipated for the three years following the retrofit. For each of the eighteen intersections, two sets of accident history data were obtained from the Oregon Department of Transportation's Accident Data Unit. One set of data was a history of accidents at a given intersection covering the three years prior to its signal retrofit. The second set covered the available history of accidents up to three years following the retrofit. Some of the intersections did not have three years of "after" data available, due to the recent dates of retrofit.

The number of "before" and "after" accidents for each of the eighteen intersections was recorded and an accident rate per million entering vehicles (PMEV) was calculated (see Appendix A) for each time period using the following formula:

$$[(\text{number of accidents}) \times 10^6] \div [(\text{EV}) \times (\text{number of days})] = \text{Rate(PMEV)} \quad (2-1)$$

OR

$$[(\text{number of accidents}) \times 10^6] \div [(\text{EV}) \times (\text{years}) \times (365)] = \text{Rate(PMEV)} \quad (2-2)$$

Where: EV = number of Entering Vehicles per day, and years are indicated by a decimal.

The paired Student's T-Test was then applied to the resulting accident rates (see Appendix B).

3.0 FINDINGS AND CONCLUSIONS

Our results show a 4% decrease in the overall accident rate, but we can only say this with a 15% level of confidence. Even if no modifications had been made to any of the signal heads in the evaluation, we could expect this 4% change as part of a normal, random fluctuation. Although the evaluation of the accident rates has proved inconclusive, the original objective of the study has been met. The new signal heads are known to have an initial installation and maintenance cost benefit over the old, and our evaluation indicates that no adverse change in the overall accident rates has compromised this cost benefit.

APPENDIX A

ACCIDENT RATE TABLES

CRATER LAKE HWY. @ FRED MEYER ENTRANCE (Medford)									
Hwy. 22, Route 62									
BEFORE					AFTER				
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	RATE CHANGE	
70	33673	1096	1.90	20	35394	931	0.61	-68%	

CRATER LAKE HWY., BIDDLE RD. @ I-5 NB OFF-RAMP (Medford)									
Hwy. 22, Route 62									
BEFORE					AFTER				
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	RATE CHANGE	
21	25539	1096	0.75	9	30837	872	0.33	-55%	

CRATER LAKE HWY. @ POPLAR DRIVE (Medford)									
Hwy. 22, Route 62									
BEFORE					AFTER				
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	RATE CHANGE	
65	37964	1096	1.56	22	45686	750	0.64	-59%	

BELTLINE HWY. @ ROYAL AVE. (Eugene)									
Hwy. 69									
BEFORE					AFTER				
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	RATE CHANGE	
15	21134	1096	0.65	10	23018	876	0.50	-23%	

BELTLINE HWY. @ ROOSEVELT AVE. (Eugene)									
Hwy. 69									
BEFORE					AFTER				
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	RATE CHANGE	
4	12484	1096	0.29	1	14646	876	0.08	-73%	

BELTLINE HWY. @ BARGER RD. (Eugene) Hwy. 69									
BEFORE					AFTER				
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	RATE CHANGE	
29	28808	1096	0.92	13	31086	876	0.48	-48%	

HILLSBORO-SILVERTON HWY. @ SETTLEMEIR AVE. & BOONES FERRY RD. (Woodburn) Hwy. 140, Route 214									
BEFORE					AFTER				
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	RATE CHANGE	
12	24187	1096	0.45	11	28349	901	0.43	-5%	

OREGON COAST HWY. @ S.E. NEPTUNE DR. (FRED MEYER ENTRANCE) (Warrenton) Hwy. 9, Route 101									
BEFORE					AFTER				
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	RATE CHANGE	
3	13077	1096	0.21	3	17872	844	0.20	-5%	

CORVALLIS-NEWPORT HWY. @ 15th ST. (AVERY PARK ENTRANCE) (Corvallis) Hwy. 33, Route 20									
BEFORE					AFTER				
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	RATE CHANGE	
6	15770	1096	0.35	10	19301	870	0.60	72%	

SALEM HWY. @ 25th ST. (Salem) Hwy. 72, Route 22									
BEFORE					AFTER				
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	RATE CHANGE	
42	50190	1096	0.76	72	68281	821	1.28	68%	

SALEM HWY. @ AIRPORT RD. (Salem)

Hwy. 72, Route 22

BEFORE				AFTER				RATE CHANGE
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	
22	47223	1424	0.33	9	59084	935	0.16	-50%

OREGON COAST HWY. @ N. 20th (Newport)

Hwy. 9, Route 101

BEFORE				AFTER				RATE CHANGE
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	
12	29584	1096	0.37	17	33469	900	0.56	52%

ROGUE VALLEY HWY. @ PINE ST. (Central Point)

Hwy. 63, Route 99

BEFORE				AFTER				RATE CHANGE
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	
6	19303	1096	0.28	12	22477	606	0.88	211%

EUGENE-SPRINGFIELD HWY. @ 52nd ST. (Springfield)

Hwy. 227, Route 126

BEFORE				AFTER				RATE CHANGE
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	
14	23473	1096	0.54	17	29998	1024	0.55	2%

GREEN SPRINGS HWY. @ ROGUE VALLEY HWY. (Ashland)

Hwy. 21, Route 66

BEFORE				AFTER				RATE CHANGE
No. of Accidents	EV	No. of Days	Rate (PMEV)	No. of Accidents	EV	No. of Days	Rate (PMEV)	
12	23653	1096	0.46	12	22723	596	0.89	91%

CRATER LAKE HWY. @ DELTA WATERS RD. (Medford)
Hwy. 22, Route 62

BEFORE			AFTER			RATE CHANGE
No. of Accidents	EV	No. of Days	No. of Accidents	EV	No. of Days	
8	28248	1096	10	37674	241	326%
		Rate (PMEV)			Rate (PMEV)	
		0.26			1.10	

REDWOOD HWY. SPUR @ AGNESS AVE. (Grants Pass)
Hwy. 25

BEFORE			AFTER			RATE CHANGE
No. of Accidents	EV	No. of Days	No. of Accidents	EV	No. of Days	
10	15686	1096	4	22275	630	-51%
		Rate (PMEV)			Rate (PMEV)	
		0.58			0.29	

OREGON COAST HWY. @ RHODODENDRON DR. (Florence)
Hwy. 9, Route 101

BEFORE			AFTER			RATE CHANGE
No. of Accidents	EV	No. of Days	No. of Accidents	EV	No. of Days	
4	22889	1096	7	17974	488	401%
		Rate (PMEV)			Rate (PMEV)	
		0.16			0.80	

APPENDIX B

PAIRED STUDENT'S T-TEST

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