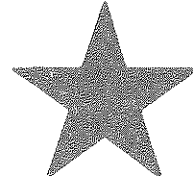


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Statewide



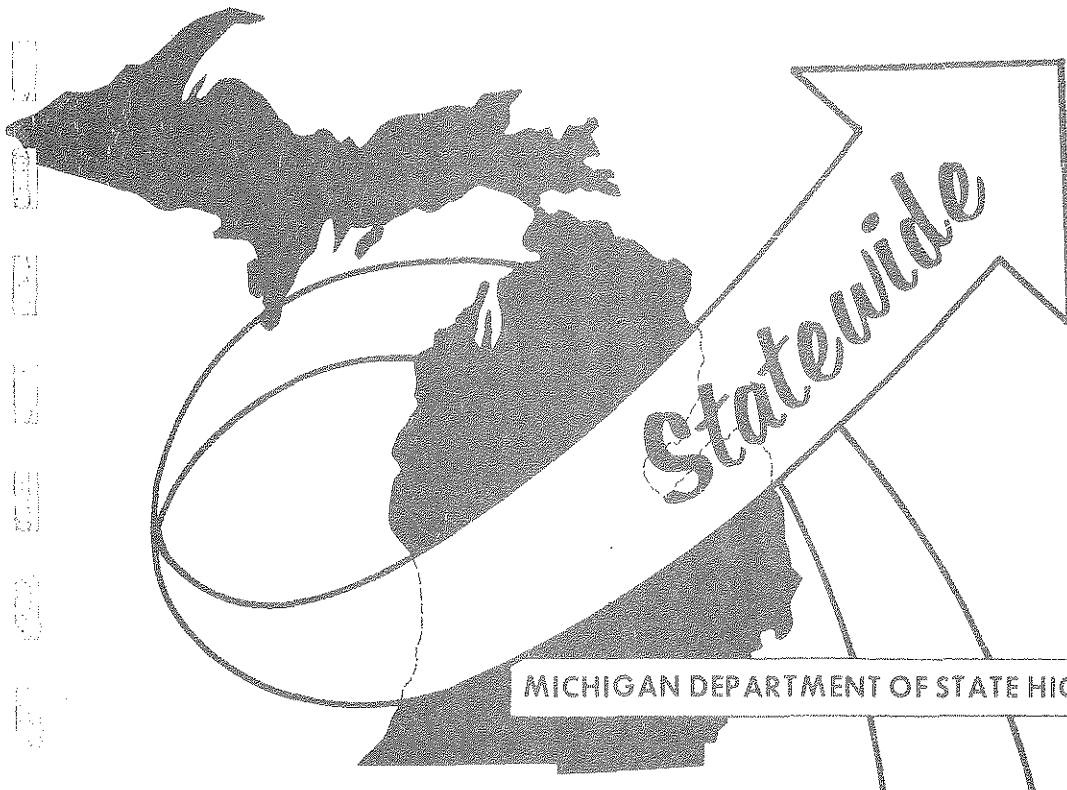
Transportation Analysis & Research

MICHIGAN'S
STATEWIDE TRANSPORTATION
MODELING SYSTEM

**ACCIDENT RATES
547 ZONE SYSTEM**

Vol. I - 0
JULY 1973

STATEWIDE
PROCEDURES SECTION
REVISED APRIL, 1979



MICHIGAN DEPARTMENT OF STATE HIGHWAYS AND TRANSPORTATION

MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF TRANSPORTATION PLANNING

MICHIGAN'S
STATEWIDE TRANSPORTATION
MODELING SYSTEM

**ACCIDENT RATES
547 ZONE SYSTEM**

Vol. I - 0
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STATEWIDE
PROCEDURES SECTION
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POST OFFICE BOX 30050, LANSING, MICHIGAN 48909

JOHN P. WOODFORD, DIRECTOR

July 6, 1979

Mr. Sam F. Cryderman
Deputy Director
Bureau of Transportation Planning
Department of Transportation
P.O. Box 30050
Lansing, Michigan 48909

Dear Mr. Cryderman:

The following report was prepared in order to document the source of accident information and the standards now being used in the Statewide Transportation Modeling System to assist in the development and evaluation of regional transportation plans.

The report is oriented to use by staff of this Bureau in utilizing the capabilities of the Statewide Model. The results are not intended to replace accident data produced by the Traffic and Safety Division. Reference to the Traffic and Safety Division "Summary of Rates" is to indicate similarity in those adapted to the Statewide Model, which is a much more usable form for our purposes.

This report was prepared under the supervision of Richard E. Esch by Alan R. Friend with the assistance of W. Thomas Franklin and Charles N. Reed.

Sincerely,

A handwritten signature in cursive script that reads "Edgerton W. Bailey".

Edgerton W. Bailey, Administrator
Highway Planning Division



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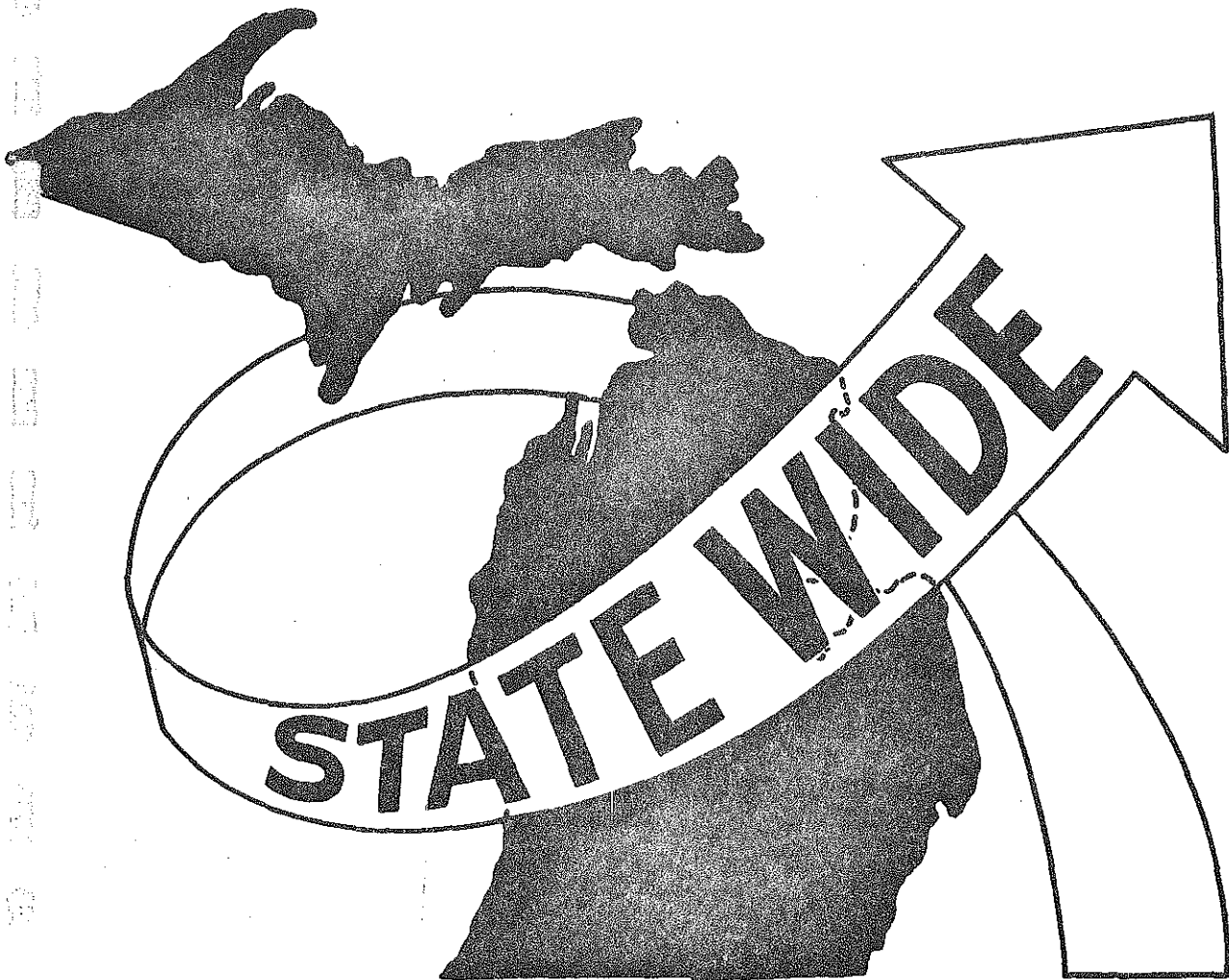
ACCIDENT RATES
547 ZONE SYSTEM

BY

ALAN R. FRIEND

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INTRODUCTION



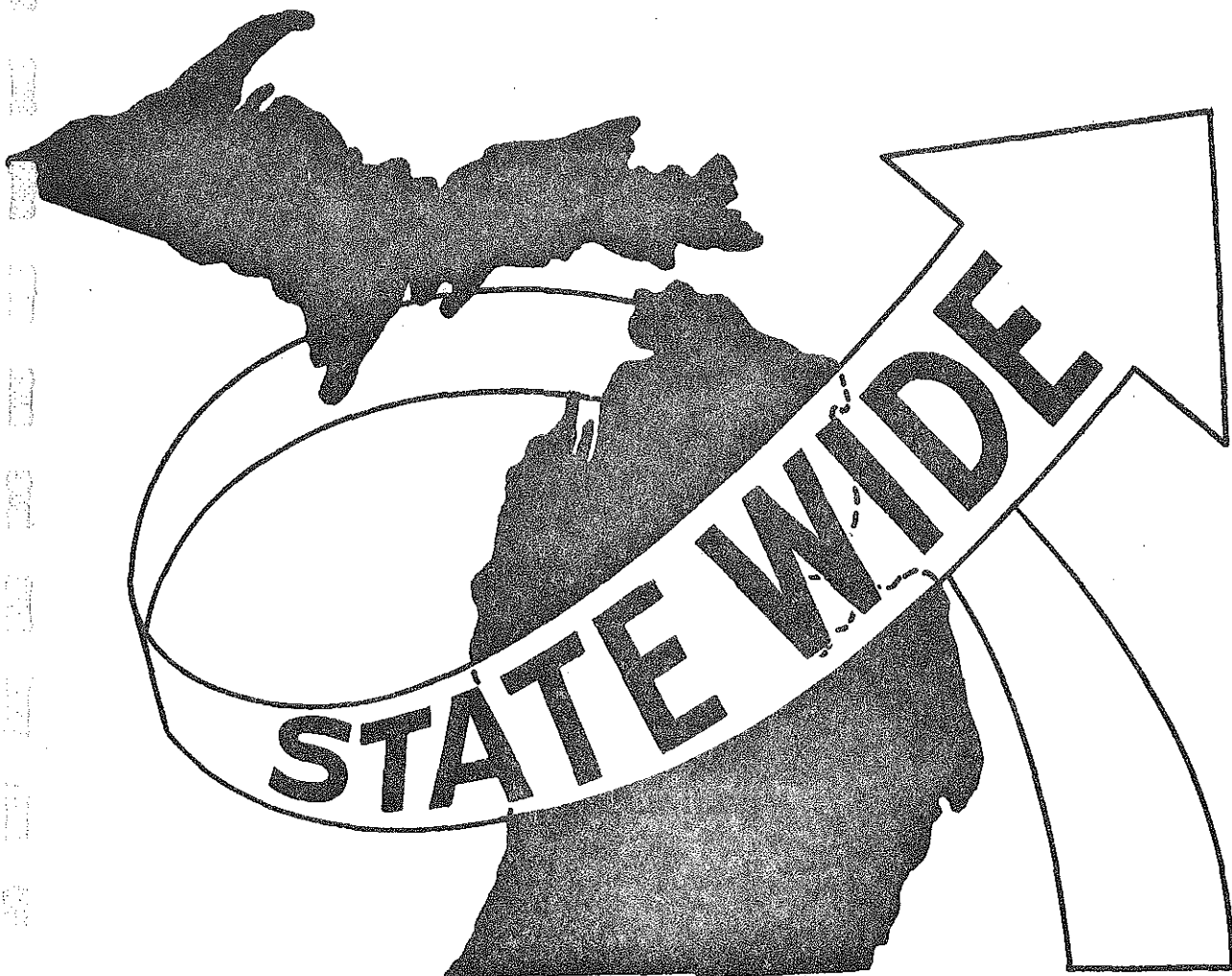
INTRODUCTION

The Statewide Transportation Modeling System is now being used to supply information to assist in the development and evaluation of alternate highway plans. The number of traffic accidents occurring for each alternate highway plan can be determined by using the accident rate and traffic volume associated with each road segment.

For those using the statewide model to obtain accident summaries for present or future highway plans, the following report documents the derivation of accident rates used in these calculations.

This process was completed in 1973 using 1970 data. A revised report using 1975 data follows.

ACCIDENT RATES
FOR
BASE-YEAR ROADS



ACCIDENT RATES FOR BASE-YEAR ROADS

The base-year (1975) highway network used in the transportation modeling system contains approximately 3500 road segments. Associated with each road section or link is a control-section. Accident information is stored by control-section and mileage point on the master highway accident file. By matching the two files on control-section and mileage, the number of accidents from the accident file can be accumulated for each link on the network file. This process was completed using 1975 data. Using the number of accidents, the distance, and the 1975 AADT (average annual daily traffic) the accident rate for each link was computed as follows:

$$\text{Accident Rate} = \frac{\text{Number of Accidents} \times 100,000,000}{\text{Distance} \times \text{AADT} \times 365}$$

This rate represents the number of accidents per hundred million vehicle-miles.

Some control-section mismatch between the two files was created by inconsistency in the accident file or network file and by the difference in the way urban one-way streets are numbered on the two files.

About 4% of the accidents occurring on the master accident file are dropped because they occur on segments of trunkline not on the network file. These segments are usually service drives, special connectors, business routes, or trunklines which "dead-end". A list of those control-sections and mile points may be seen in Appendix A.

A few more accidents (less than 1%) are dropped because of a discrepancy in the control-section number or the length of the control-section. The number of accidents involved in each county is documented in Appendix B.

Using 1975 data, 100,775 accidents (out of 106,176) were accumulated on statewide network links. Figure 1A provides an excellent picture of the resulting accident rates throughout the state. Interstate routes which have lower accident rates than non-interstate are readily noticeable with the narrower band widths. For comparison, Figure 1B shows 1970 rates.

In addition to the number of accidents, the number of injuries and number of fatalities were transferred from the accident master file to the statewide network file. While these figures are not as stable as the number of accidents and should probably be averaged over several years, the information on injuries and fatalities may still prove worthwhile.

Figure 2 shows a table of fatal rates, injury rates, and accident rates summarized by road type. These rates were obtained by computing weighted averages of the individual link accident rates. The weighting was based on vehicle-miles. Independently, the Traffic and Safety Division has prepared a summary of rates (see Figure 3) by similar (though not exact) road categories. The fatal and injury information is not directly comparable since the Traffic and Safety summary involves fatal and injuries accident rates while those with the statewide model involve fatal and injury rates. Considering the differences,

ACCIDENT RATES

1975

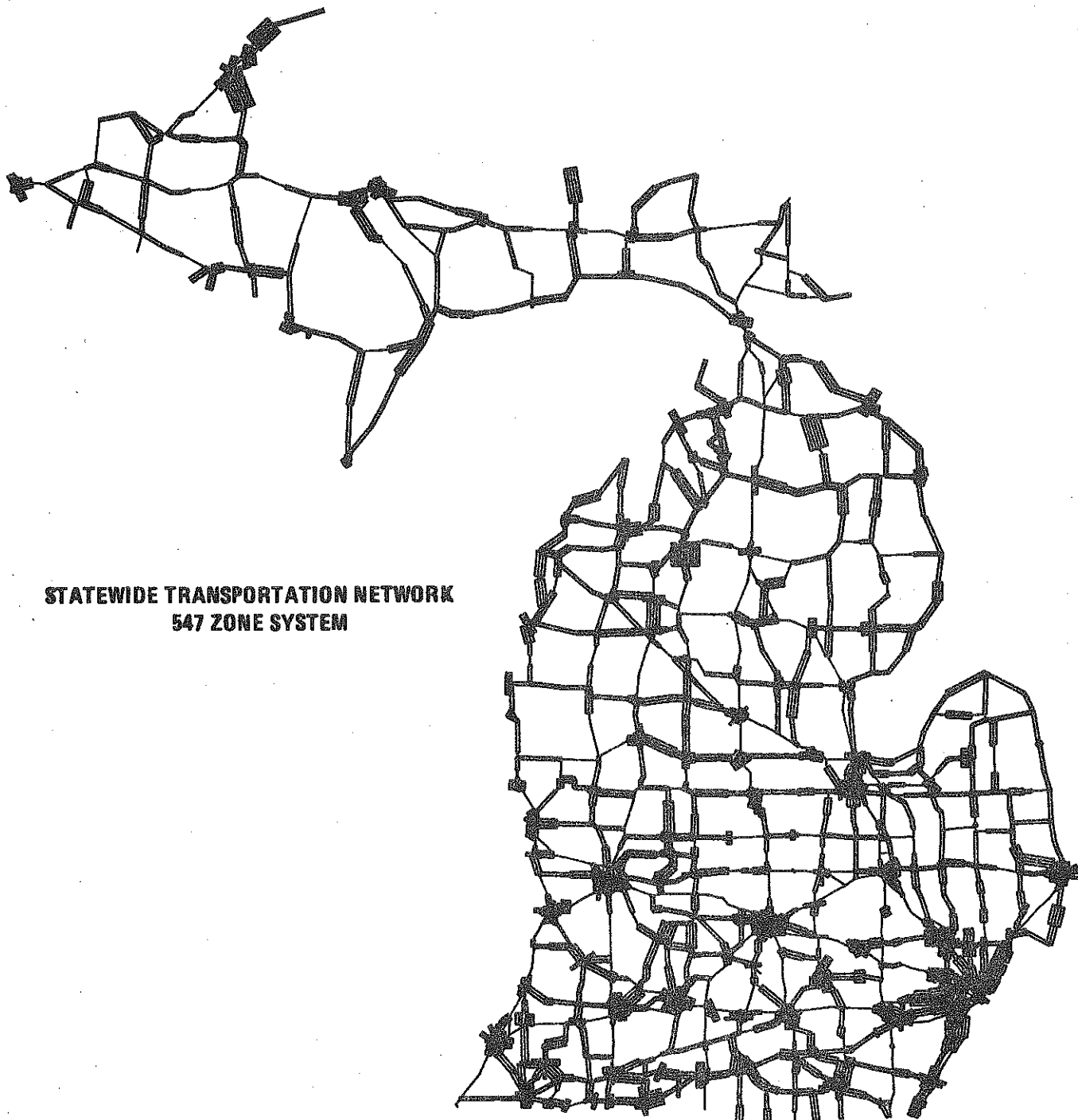


STATEWIDE TRANSPORTATION NETWORK
547 ZONE SYSTEM

EACH LINE - 200 ACCIDENTS PER HUNDRED MILLION VEHICLE MILES

ACCIDENT RATES

1970



STATEWIDE TRANSPORTATION NETWORK
547 ZONE SYSTEM

EACH LINE - 200 ACCIDENTS PER HUNDRED MILLION VEHICLE MILES

STATEWIDE TRANSPORTATION MODEL
1975 NETWORK
ACCIDENT RATE SUMMARY

TYPE OF FACILITY	MILES	NETWORK LINKS	FATAL RATE	INJURY RATE	TOTAL ACC RATE
ALL					
IS RURAL					
4 LANES (XWAY)	698.27	151	1.0	43	102
MORE THAN 4 LANES (XWAY)	90.14	21	0.8	50	101
IS URBAN					
4 LANES (XWAY)	129.40	60	0.8	71	161
MORE THAN 4 LANES (XWAY)	140.44	61	2.0	84	153
FAP RURAL					
MULTI-LANE (XWAY)	376.76	96	1.4	38	98
MULTI-LANE (DIV)	136.94	28	1.9	136	278
MULTI-LANE (UNDIV)	182.45	51	3.4	205	353
2 LANES	5883.34	904	4.6	166	384
FAP URBAN					
MULTI-LANE (XWAY)	92.22	44	1.1	104	185
MULTI-LANE (DIV)	3.05	2	0.0	77	185
MULTI-LANE (UNDIV)	419.49	219	2.4	353	785
2 LANES	213.29	125	3.5	299	733
FAS RURAL					
MORE THAN 2 LANES	25.78	7	5.8	265	486
2 LANES	297.50	47	7.1	233	536
FAS URBAN					
MORE THAN 2 LANES	282.35	123	3.5	338	699
2 LANES	65.13	30	4.5	265	716

FIGURE 2

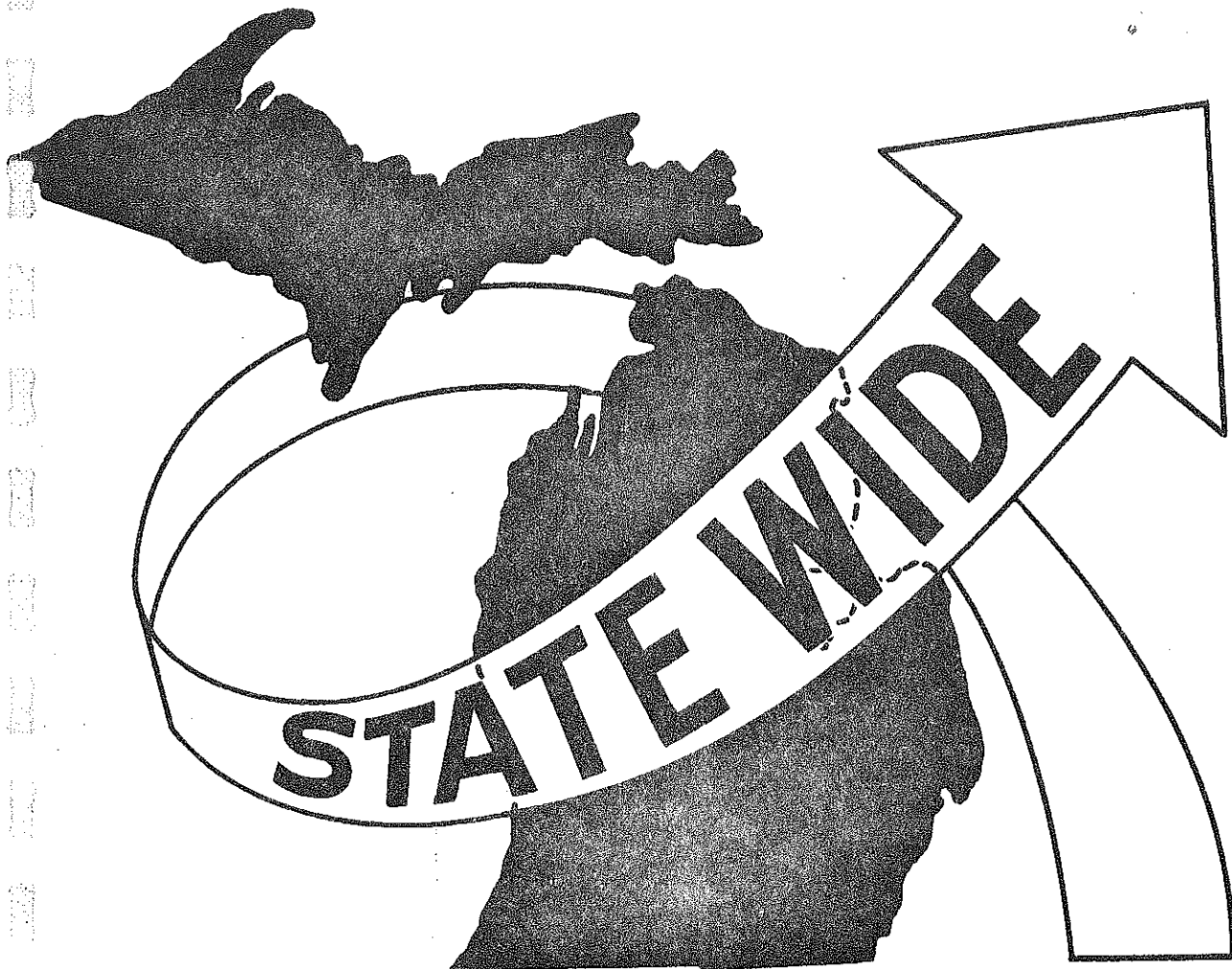
FIGURE 3

Urban		1975 Data							
Undivided Highways									
	Tot		Inj		Fat		Hwy	Veh Miles	Annual
	Acc	Rate	Acc	Rate	Acc	Rate	Miles	(mill.)	ADT
2 ln.	7952	744.57	1915	179.31	30	2.81	460	1068	6,361
3 ln.	594	1161.53	133	260.07	3	5.86	10	51.1	14,000
4 ln.	16187	960.51	4690	278.30	42	2.49	256	1685.25	18,250
5 ln.	2976	1061.78	787	280.86	6	2.08	27	280.6	30,428 [±]
6 ln.	4314	900.06	1389	289.80	29	6.05	36	479.3	36,476
Tot	32032	898.70	8914	250.10	110	3.09	789	3564.25	12,468
Divided Highways - At-Grade									
4 ln.	4121	695.36	1146	193.37	14	2.36	77	592.64	21,087
5 ln.	159	1047.99	43	283.42	0	-	2	15.17	20,781
6 ln.	4718	509.70	1468	158.59	14	1.51	50	925.64	50,720
7 ln.	614	534.20	237	206.20	3	2.61	5	114.94	62,981
8 ln.	3141	555.27	1032	182.43	10	1.76	32	565.67	48,431
Tot	12753	576.00	3926	177.32	41	1.85	166	2214.06	36,542
Freeways									
4 ln.	2006	156.33	637	49.64	8	.62	138	1283.18	25,475
5 ln.	20	235.18	5	58.79	0	-	.5	8.50	46,575
6 ln.	6091	147.78	2249	54.56	62	1.50	140	4121.67	80,659
8 ln.	359	146.42	145	59.22	6	2.45	7	244.85	95,832
Tot	8476	149.80	3036	53.66	76	1.34	285.5	5658.20	54,297
Rural		1975 Data							
Undivided Highways									
	Tot		Inj		Fat		Hwy	Veh Miles	Annual
	Acc	Rate	Acc	Rate	Acc	Rate	Miles	(mill.)	ADT
2 ln.	22414	305.49	6315	86.07	283	3.86	6158	7337	3,264
3 ln.	258	367.67	82	116.85	0	-	20	70.2	9,616
4 ln.	5272	614.76	1752	204.29	31	3.61	160	857.6	14,685
5 ln.	788	578.14	246	180.48	5	3.67	23	136.3	16,236
6 ln.	389	953.43	103	252.45	2	4.90	4	40.8	27,945
Tot	29121	344.96	8498	100.66	321	3.80	6365	8441.90	3,634
Divided Highways - At-Grade									
4 ln.	4262	298.05	1349	94.34	32	2.23	311	1429.96	12,597
5 ln.	75	561.78	20	149.80	0	-	4	13.35	9,144
6 ln.	760	539.09	263	186.55	5	2.54	8	140.98	48,281
7 ln.	261	493.77	98	185.40	0	-	2	52.86	72,411
8 ln.	524	492.32	190	178.51	2	1.87	8	106.44	36,452
Tot	5882	337.35	1920	110.12	39	2.24	333	1743.59	14,345
Freeways									
4 ln.	6740	103.14	1879	28.75	63	.96	1160	6534.81	15,434
5 ln.	28	125.70	11	49.38	0	-	5	22.28	12,208
6 ln.	834	94.47	285	32.28	9	1.01	86	882.82	28,124
8 ln.	71	1526.40	31	666.45	0	-	.5	4.65	25,480
Tot	7673	103.07	2206	29.63	72	.97	1251.5	7444.56	16,297

the tables for total accident rate agree remarkably well. The largest differences occur for multi-lane divided and undivided roads. The relationship between divided and undivided has been a problem in the past. This report was originally completed in 1973 using 1970 data; and, at that time, no attempt was made to separate divided from undivided.

The reliability of the number of miles of divided versus undivided is much less than other road categories. The accident rates for undivided roadways are higher than accident rates for divided roadways, as may be expected.

FUTURE ACCIDENT RATES



FUTURE ACCIDENT RATES

Future Rates for Existing Roads

The possibility of predicting accident rates by selected physical road characteristics and by traffic-volume to capacity ratios was investigated and no significant relationship was found. For further details, see a previous statewide publication entitled: Preliminary Investigation: A Technique for the Projection of Accident Rates, April 1975, by Mark D. DuBay. This publication is available through the Statewide Procedures Section.

A comparison of Figure 1A showing 1975 accident rates and Figure 1B showing 1970 accident rates indicate that while a few sections have changed significantly most have not. The present rates will then be assumed to hold true for future years. Assuming future rates to be the same as present rates still allows the comparison of alternate transportation plans. Even though rates do not change, the actual number of accidents will change from plan to plan since the rate is expressed as the number of accidents per hundred-million vehicle miles. The vehicle-miles on each link will change according to the Statewide Model's prediction of AADT for a given year and highway plan. Until further information is available relative to the prediction of future accident rates, it is reasonable to assume that the utilization of present accident rates as future accident rates will suffice.

Future Rates For New Roads

Since proposed roads to be inserted in the Statewide Model network have no established accident rate, another approach must be used.

Most proposed roads will fall into one of three categories:

1. Rural Interstate
2. Rural Two-Lane
3. Rural Four-Lane (non-freeway)

It was felt that the summary table from Figure 2 for the present statewide network might be used as a basis for the proposed roads.

Interstate rates seem to vary little regionally; therefore, the values from Figure 2 will be used for proposed Interstate sections.

In considering new two-lane roads, Figure 2 might also be used. Since these two-lane roads include older roads having higher accident rates, newer two-lane roads were examined to see if there was any appreciable change in the accident rate. The Sufficiency Master file was compared with the statewide model network and a link was classified "newer" if:

1. Lane width was at least 12 feet
2. Year of latest improvement was 1970 or later.
3. No improvements were recommended in the next 5 years.

Using the 1975 data, "newer" roads were found to have lower rates than the "older" roads. This was also found to be true several years ago using 1970 data even though the method of determining newer roads was different.

The rates of the newer roads are summarized in Figure 4 while the rates for the remaining older roads can be seen in Figure 5.

Two-lane rural roads show a significant difference (newer = 248, older = 386). Figure 6 shows the location of those sections falling into the newer category for rural two-lane roads. A more detailed list of these links and their characteristics as they occur on the statewide model network can be seen in Appendix C.

There were not enough links which fell into the newer category to make any conclusions about other road types except Rural Interstate which shows little difference (newer = 98, older = 102).

For remaining road types, it was felt that the summaries of existing rates (Figures 2 & 3) could serve as a guide to associating an accident rate to proposed roads. As we have seen, a newly built road would have a somewhat lower rate than the existing roads of the same type. Mainly for this reason the final rates chosen for proposed roads were biased on the low side. The final summary of rates for proposed roads can be seen in Table A. Any information to improve these figures (especially divided vs undivided) is welcomed.

Tables from the original report using 1970 data can be seen in Appendix D for comparison.

STATEWIDE TRANSPORTATION MODEL
1975 NETWORK
ACCIDENT RATE SUMMARY

TYPE OF FACILITY	MILES	NETWORK LINKS	FATAL RATE	INJURY RATE	TOTAL ACC RATE
NEWER					
IS RURAL					
4 LANES (XWAY)	77.37	16	0.9	29	98
MORE THAN 4 LANES (XWAY)	0.00	0	0.0	0	0
IS URBAN					
4 LANES (XWAY)	9.96	3	2.2	111	202
MORE THAN 4 LANES (XWAY)	5.43	2	0.0	13	64
FAP RURAL					
MULTI-LANE (XWAY)	3.02	1	0.0	25	25
MULTI-LANE (DIV)	0.00	0	0.0	0	0
MULTI-LANE (UNDIV)	0.00	0	0.0	0	0
2 LANES	70.90	13	4.3	144	248
FAP URBAN					
MULTI-LANE (XWAY)	8.70	2	0.0	39	118
MULTI-LANE (DIV)	0.00	0	0.0	0	0
MULTI-LANE (UNDIV)	0.79	2	0.0	363	509
2 LANES	1.62	1	0.0	279	806
FAS RURAL					
MORE THAN 2 LANES	0.00	0	0.0	0	0
2 LANES	0.00	0	0.0	0	0
FAS URBAN					
MORE THAN 2 LANES	0.00	0	0.0	0	0
2 LANES	0.00	0	0.0	0	0

FIGURE 4

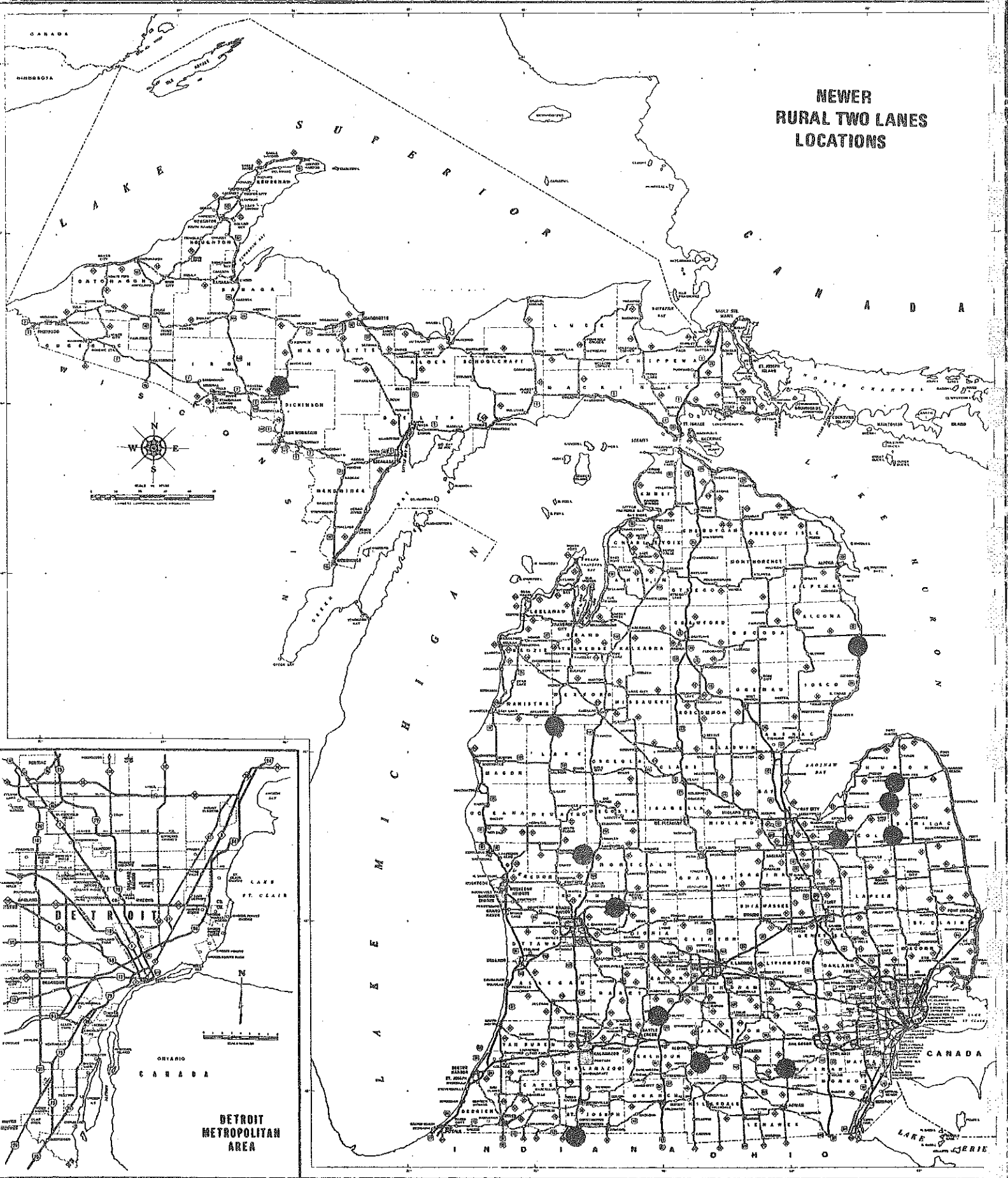
STATEWIDE TRANSPORTATION MODEL
1975 NETWORK
ACCIDENT RATE SUMMARY

TYPE OF FACILITY	MILES	NETWORK LINKS	FATAL RATE	INJURY RATE	TOTAL ACC RATE
OLDER					
IS RURAL					
4 LANES (XWAY)	620.90	135	1.1	44	102
MORE THAN 4 LANES (XWAY)	90.14	21	0.8	50	101
IS URBAN					
4 LANES (XWAY)	119.44	57	0.8	70	159
MORE THAN 4 LANES (XWAY)	135.01	59	2.1	86	156
FAP RURAL					
MULTI-LANE (XWAY)	373.74	95	1.4	38	98
MULTI-LANE (DIV)	136.94	28	1.9	136	278
MULTI-LANE (UNDIV)	182.45	51	3.4	205	353
2 LANES	5812.44	891	4.6	166	386
FAP URBAN					
MULTI-LANE (XWAY)	83.52	42	1.2	107	189
MULTI-LANE (DIV)	3.05	2	0.0	77	185
MULTI-LANE (UNDIV)	418.70	217	2.4	353	785
2 LANES	211.67	124	3.5	299	732
FAS RURAL					
MORE THAN 2 LANES	25.78	7	5.8	265	486
2 LANES	297.50	47	7.1	233	536
FAS URBAN					
MORE THAN 2 LANES	282.35	123	3.5	338	699
2 LANES	65.13	30	4.5	265	716

FIGURE 5

FIGURE 6

NEWER
RURAL TWO LANES
LOCATIONS



DETROIT
METROPOLITAN
AREA

ACCIDENT RATES FOR USE WITH THE STATEWIDE TRANSPORTATION MODELING SYSTEM

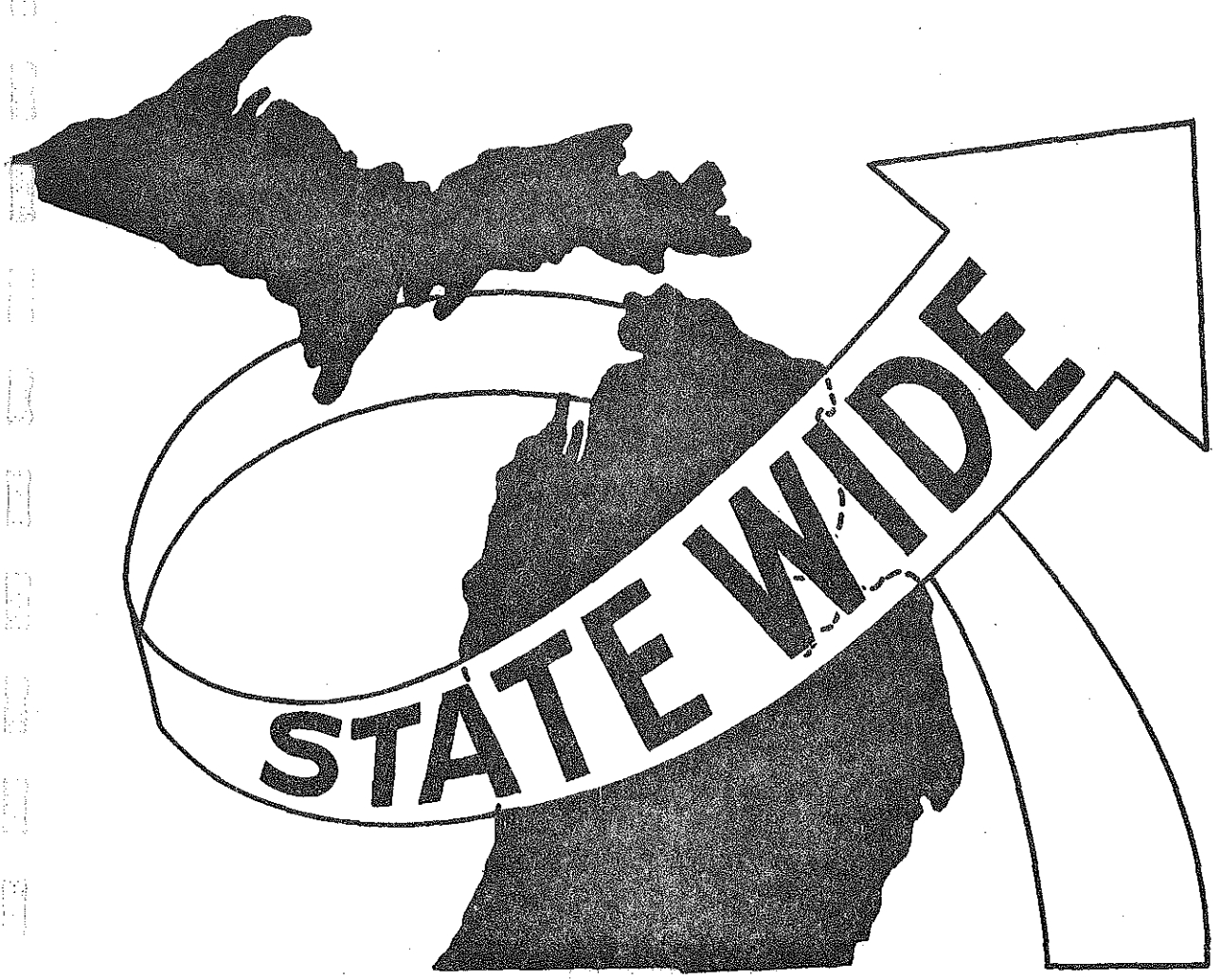
PROPOSED ROADS

RATES PER HUNDRED-MILLION VEHICLE-MILES		FATAL	INJURY	ACCIDENT
RURAL	2 LANE	4	140	250
	4 LANE DIVIDED	2	140	280
	UNDIVIDED	3	210	360
	INTER STATE	1	45	100
URBAN	2 LANE	3	300	730
	4 LANE DIVIDED	2	340	600
	UNDIVIDED	3	370	800
	INTER STATE	1	75	150

TABLE A

PREPARED 1979

APPENDIX A



APPENDIX A

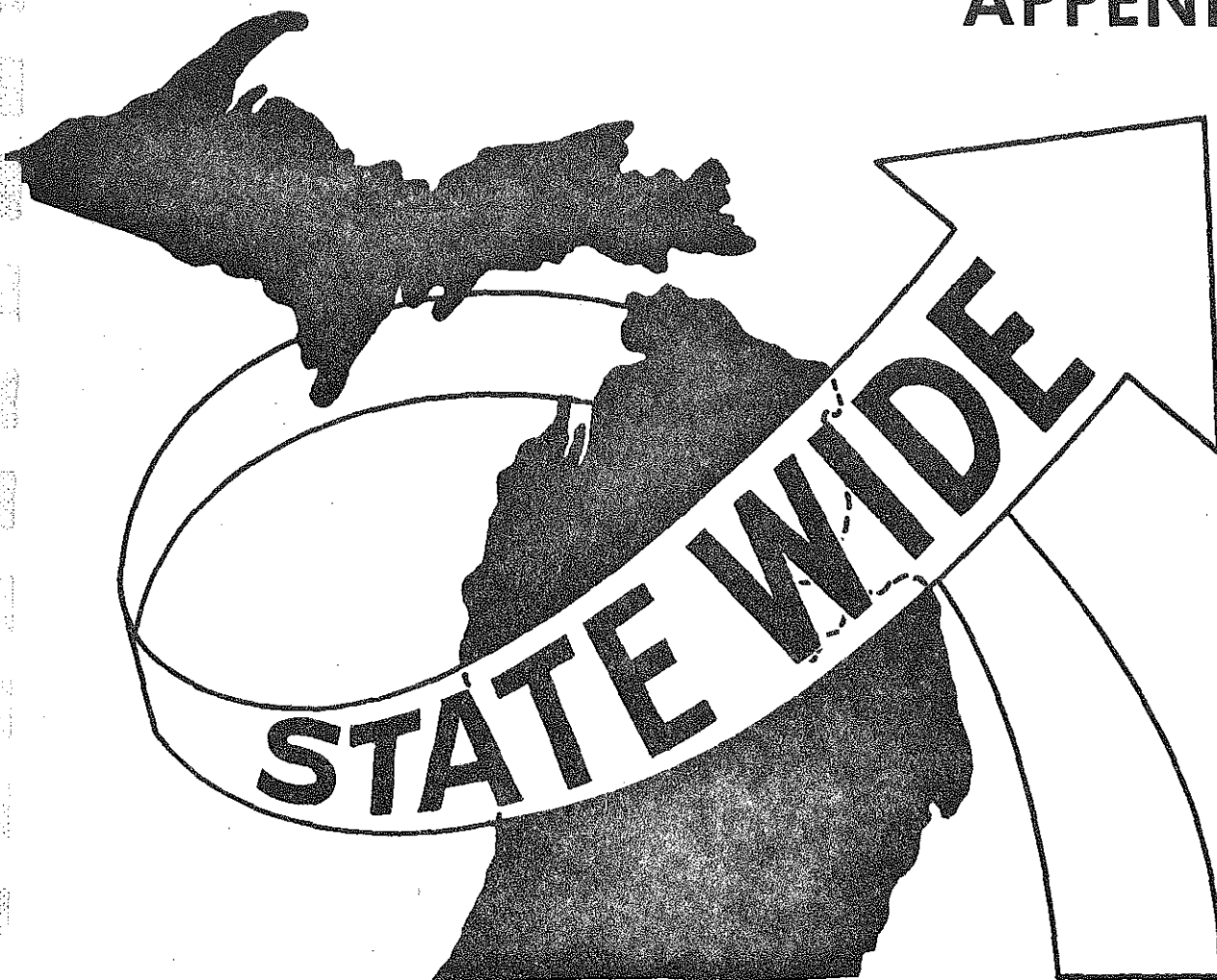
The following pages list those sections of trunkline which were not on the Statewide Model Network but did have some accidents. Each line shows the control-section, beginning mile-point, ending mile-point, description, and number of accidents.

09012	00000	99999	M=247	NOT ON NETWORK--ACCS DROPPED	0054
10021	00000	99999	M=168	NOT ON NETWORK--ACCS DROPPED	0005
11011	00000	99999	US=12	NOT ON NETWORK--ACCS DROPPED	0068
11014	00000	01640	I=94 STATELINE	NOT ON NETWORK--ACCS DROPPED	0014
14101	00000	04800	M=152 TRANSFER	NOT ON NETWORK--ACCS DROPPED	0018
16041	00000	99999	M=212	NOT ON NETWORK--ACCS DROPPED	0003
16071	00000	99999	M=108	NOT ON NETWORK--ACCS DROPPED	0002
17032	01710	03620	DOWNTOWN S00	NOT ON NETWORK--ACCS DROPPED	0218
17051	00000	99999	M=221	NOT ON NETWORK--ACCS DROPPED	0007
18024	00000	99999	US=10 SURRY	NOT ON NETWORK--ACCS DROPPED	0012
19043	00000	99999	I=69	NOT ON NETWORK--ACCS DROPPED	0003
20031	00000	99999	M=93	NOT ON NETWORK--ACCS DROPPED	0014
20032	04300	07500	M=93 STUB	NOT ON NETWORK--ACCS DROPPED	0007
23811	00000	12900	OLD=78	NOT ON NETWORK--ACCS DROPPED	0028
23821	00000	99999	?	NOT ON NETWORK--ACCS DROPPED	0001
23831	00000	08600	OLD=27	NOT ON NETWORK--ACCS DROPPED	0012
24091	00000	99999	US=23 MACK C	NOT ON NETWORK--ACCS DROPPED	0005
25051	00000	99999	BR54 TRANSFER	NOT ON NETWORK--ACCS DROPPED	0111
25052	00000	99999	BR54 TRANSFER	NOT ON NETWORK--ACCS DROPPED	0739
25082	00000	99999	FLINT	NOT ON NETWORK--ACCS DROPPED	0093
25085	72600	73000	FLINT M21 SD	NOT ON NETWORK--ACCS DROPPED	0025
25085	82600	83000	FLINT M21 SD	NOT ON NETWORK--ACCS DROPPED	0017
25132	06160	99999	I=475 PROP	NOT ON NETWORK--ACCS DROPPED	0041
25851	00000	99999	BR54 TRANSFER	NOT ON NETWORK--ACCS DROPPED	0138
25852	00000	99999	BR54 TRANSFER	NOT ON NETWORK--ACCS DROPPED	0002
25852	00000	99999	FLINT	NOT ON NETWORK--ACCS DROPPED	0000
28031	00000	99999	M=137	NOT ON NETWORK--ACCS DROPPED	0008
28052	00000	99999	M=37	NOT ON NETWORK--ACCS DROPPED	0040
31031	00000	99999	M=203	NOT ON NETWORK--ACCS DROPPED	0029
33062	00000	99999	M=143	NOT ON NETWORK--ACCS DROPPED	0278
33171	50000	99999	HOMER-HOWARD SD	NOT ON NETWORK--ACCS DROPPED	0170
38021	00000	99999	M=124	NOT ON NETWORK--ACCS DROPPED	0015
38121	00000	99999	M=147	NOT ON NETWORK--ACCS DROPPED	0000
41821	00000	99999	US=131 TRANSFER	NOT ON NETWORK--ACCS DROPPED	0007
41842	00000	99999	GR RAPIDS	NOT ON NETWORK--ACCS DROPPED	0014
42021	00000	99999	M=26	NOT ON NETWORK--ACCS DROPPED	0009
45031	00000	99999	M=109	NOT ON NETWORK--ACCS DROPPED	0008
45041	00000	99999	M=204	NOT ON NETWORK--ACCS DROPPED	0019
45051	00000	99999	M=209	NOT ON NETWORK--ACCS DROPPED	0000
45091	00000	99999	M=201	NOT ON NETWORK--ACCS DROPPED	0010
46051	00000	99999	M=124	NOT ON NETWORK--ACCS DROPPED	0006

47121	00000	01252	M=155 STUB	NOT ON NETWORK==ACCS	DROPPED	= 0042
49111	00000	99999	M=185	NOT ON NETWORK==ACCS	DROPPED	= 0000
50021	00000	02800	OLD=59	NOT ON NETWORK==ACCS	DROPPED	= 0042
50061	00000	99999	I=696	NOT ON NETWORK==ACCS	DROPPED	= 0334
50062	00000	99999	I=696	NOT ON NETWORK==ACCS	DROPPED	= 0122
50821	00000	99999	OLD=M59	NOT ON NETWORK==ACCS	DROPPED	= 0070
51051	00000	99999	M=110	NOT ON NETWORK==ACCS	DROPPED	= 0007
53011	00000	99999	M=116	NOT ON NETWORK==ACCS	DROPPED	= 0052
59811	00000	99999	US=131 TRANSFER	NOT ON NETWORK==ACCS	DROPPED	= 0043
59841	00000	99999	M=82 TRANSFER	NOT ON NETWORK==ACCS	DROPPED	= 0005
60031	00000	99999	M=32	NOT ON NETWORK==ACCS	DROPPED	= 0003
61092	00000	99999	M=46	NOT ON NETWORK==ACCS	DROPPED	= 0000
62811	00000	99999	M=82 TRANSFER	NOT ON NETWORK==ACCS	DROPPED	= 0022
63042	00000	99999	OLD=59	NOT ON NETWORK==ACCS	DROPPED	= 0131
63082	00000	99999	M=4	NOT ON NETWORK==ACCS	DROPPED	= 0201
63102	00000	99999	I=696 PROP	NOT ON NETWORK==ACCS	DROPPED	= 0004
63103	00000	99999	I=696 PROP	NOT ON NETWORK==ACCS	DROPPED	= 0114
65832	00000	99999	M=55 TRANSFER	NOT ON NETWORK==ACCS	DROPPED	= 0003
66061	00000	99999	M=107	NOT ON NETWORK==ACCS	DROPPED	= 0005
67062	00000	99999	M=61 PROP	NOT ON NETWORK==ACCS	DROPPED	= 0009
70023	05470	99999	OLD RTE TRANSFER	NOT ON NETWORK==ACCS	DROPPED	= 0005
70823	00000	99999	OLD RTE TRANSFER	NOT ON NETWORK==ACCS	DROPPED	= 0113
71031	00000	99999	M=211	NOT ON NETWORK==ACCS	DROPPED	= 0003
72091	00000	99999	M=76 TRANSFER	NOT ON NETWORK==ACCS	DROPPED	= 0011
72092	00000	99999	M=76 TRANSFER	NOT ON NETWORK==ACCS	DROPPED	= 0022
72823	00000	99999	OLD M=59	NOT ON NETWORK==ACCS	DROPPED	= 0004
73101	90000	99999	SAGINAW I=675 SD	NOT ON NETWORK==ACCS	DROPPED	= 0022
75011	00000	99999	M=149	NOT ON NETWORK==ACCS	DROPPED	= 0004
77071	00000	99999	M=154	NOT ON NETWORK==ACCS	DROPPED	= 0006
77111	90000	91460	PTHURUN SD LAP. RD	NOT ON NETWORK==ACCS	DROPPED	= 0021
80032	00950	99999	I=196 BL	NOT ON NETWORK==ACCS	DROPPED	= 0012
80033	00000	99999	BL=196	NOT ON NETWORK==ACCS	DROPPED	= 0019
80051	00000	99999	M=152 TRANSFER	NOT ON NETWORK==ACCS	DROPPED	= 0018
81083	00000	99999	YPSI SHORTY	NOT ON NETWORK==ACCS	DROPPED	= 0079
82104	00000	99999	DAVISON XWAY	NOT ON NETWORK==ACCS	DROPPED	= 0082
82122	00000	99999	I=96 W OF M39	NOT ON NETWORK==ACCS	DROPPED	= 0521
82123	00000	99999	I=96 E OF M39	NOT ON NETWORK==ACCS	DROPPED	= 0103
82124	00000	99999	I=96 SE OF US12	NOT ON NETWORK==ACCS	DROPPED	= 0045
82132	00000	99999	M3 TO RIVER	NOT ON NETWORK==ACCS	DROPPED	= 0044
82293	00000	99999	M275	NOT ON NETWORK==ACCS	DROPPED	= 0008

READ 106176 CHANGED 2580 WRITTEN101575

APPENDIX B

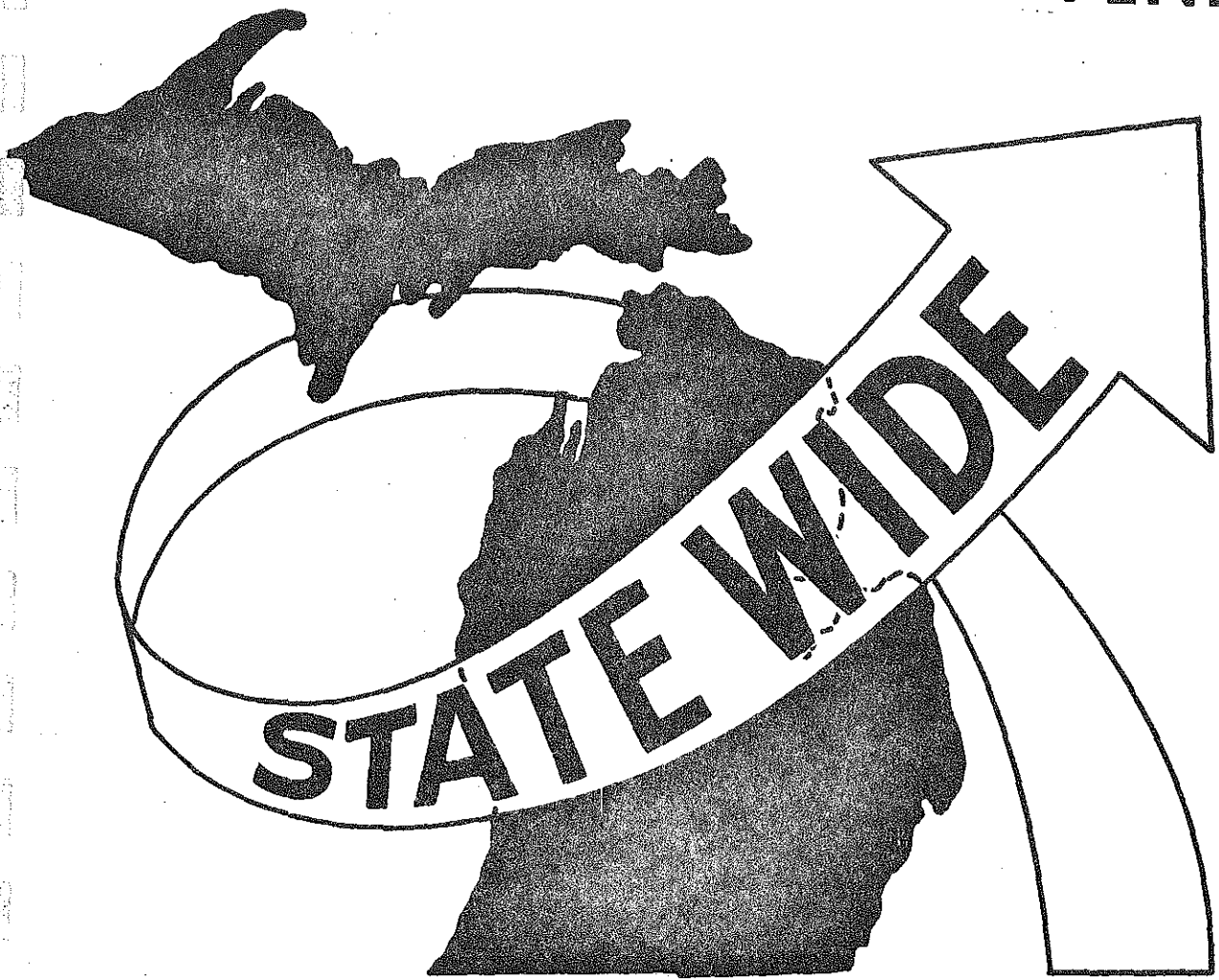


CREATE VOLA ACC RECORDS RETURN TO STWD 12-19-78

CNTY	UNMATCHED ACCIDENTS	TOTAL ACCIDENTS	CORRECTED BY MILEAGE INCREASE
1	1 (000.5%)	173	0000
2	2 (001.0%)	192	0000
3	24 (003.0%)	775	0001
4	2 (000.3%)	533	0001
5	1 (000.4%)	220	0000
6	5 (001.6%)	295	0004
7	1 (000.6%)	157	0001
8	14 (003.0%)	460	0002
9	8 (000.5%)	1581	0001
11	11 (000.4%)	2643	0002
12	3 (000.4%)	662	0000
13	12 (000.6%)	1944	0003
14	1 (000.1%)	726	0002
16	4 (001.1%)	352	0000
17	2 (000.7%)	254	0001
18	5 (001.0%)	477	0000
19	16 (002.7%)	586	0001
20	1 (000.3%)	253	0000
21	1 (000.1%)	515	0001
22	1 (000.2%)	371	0000
23	5 (000.3%)	1311	0001
24	4 (000.8%)	474	0000
25	22 (000.8%)	2529	0005
26	1 (000.3%)	282	0001
28	4 (000.4%)	897	0001
29	2 (000.3%)	529	0000
30	6 (001.1%)	524	0000
31	6 (000.7%)	848	0001
32	6 (001.1%)	502	0000
33	57 (001.3%)	4085	0005
34	4 (000.5%)	686	0002
35	2 (000.3%)	558	0000
36	2 (000.8%)	238	0000
37	15 (002.2%)	665	0000
38	24 (001.0%)	2235	0002
39	18 (000.7%)	2527	0004
40	1 (000.3%)	263	0002
41	66 (001.3%)	4980	0006
44	4 (000.5%)	733	0000
45	1 (000.5%)	187	0000

46	18 (001.3%)	1359	0003
47	14 (001.7%)	806	0002
48	1 (000.6%)	160	0000
49	18 (005.8%)	308	0000
50	40 (000.6%)	6001	0004
51	1 (000.2%)	395	0000
52	5 (000.4%)	1061	0001
53	4 (000.9%)	405	0000
54	7 (000.8%)	792	0001
55	1 (000.1%)	503	0000
56	4 (000.7%)	520	0000
57	6 (004.8%)	123	0000
58	21 (001.2%)	1733	0003
59	10 (001.4%)	703	0002
60	1 (000.8%)	124	0000
61	25 (001.5%)	1623	0003
62	7 (001.5%)	462	0001
63	65 (000.7%)	8346	0004
64	5 (002.4%)	203	0000
65	2 (000.5%)	346	0002
67	2 (000.5%)	369	0001
69	1 (000.3%)	297	0000
70	16 (001.3%)	1194	0002
71	1 (000.4%)	238	0000
72	2 (000.5%)	340	0001
73	31 (001.0%)	3096	0001
74	5 (001.0%)	460	0000
75	1 (000.4%)	223	0000
76	3 (000.5%)	590	0000
77	12 (000.5%)	2031	0002
78	5 (000.5%)	882	0001
79	4 (000.6%)	586	0002
80	3 (000.4%)	658	0000
81	34 (001.1%)	2983	0003
82	61 (000.2%)	21330	0017
83	3 (000.4%)	649	0000
84	1 (100.0%)	1	0000
85	805 (000.7%)	101575	0108

APPENDIX C



NEWER
RURAL TWO LANE
NETWORK LINKS

ANOD	BNOD	DISTANCE	SITE	YR=IMP	IMP PERIOD	INJR	FATR	ACC RATE
1094	1107	13.00	11	71	2	0	146	365
1292	1334	10.43	4	70	3	7	129	200
1357	2616	4.08	6	74	2	36	216	359
1500	1540	6.50	11	74	2	0	120	196
1507	2657	5.40	8	74	2	0	258	393
1520	1532	7.03	3	74	2	0	161	177
1604	2009	2.75	0	75	2	0	53	321
1841	1971	2.89	29	71	2	0	0	237
2044	2206	5.20	0	74	4	28	196	196
2134	2208	2.03	29	74	2	0	0	100
2351	2462	2.88	7	73	2	0	72	144
2559	2657	6.71	3	74	2	0	194	247
2572	2705	2.00	10	71	3	0	90	361

APPENDIX D

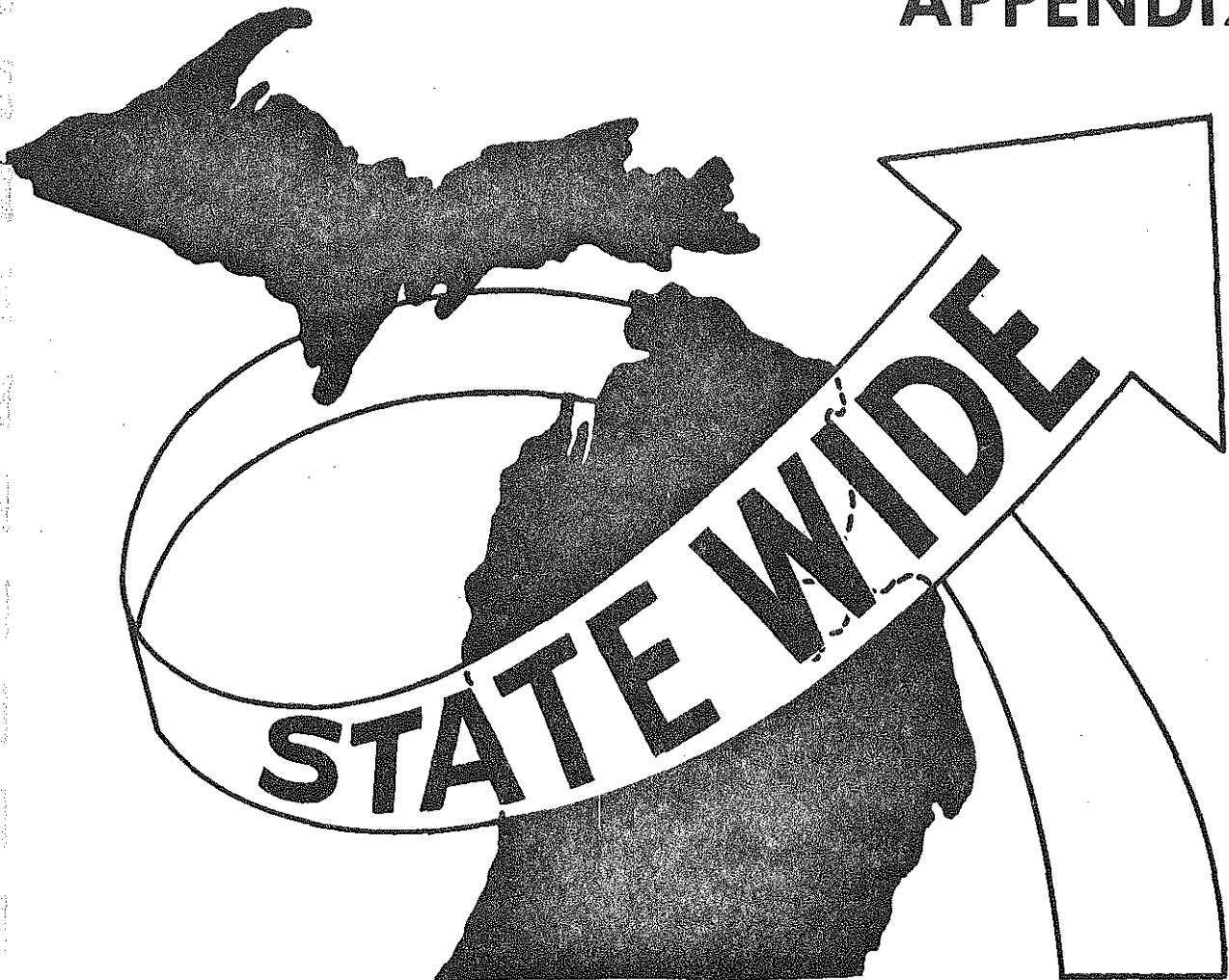


FIGURE 1

1970

COMPARISON OF AVERAGE ACCIDENT RATES*

ON MICHIGAN TRUNKLINE SYSTEM,

BY ROADWAY TYPE BY DISTRICT

Roadway Type: Non-divided - Free Access

Highway Area Type

<u>Dis-</u> <u>trict</u>	<u>Urban</u>				<u>Rural</u>			
	<u>2</u> <u>lanes</u>	<u>3</u> <u>lanes</u>	<u>4</u> <u>lanes</u>	<u>6+</u> <u>lanes</u>	<u>2</u> <u>lanes</u>	<u>3</u> <u>lanes</u>	<u>4</u> <u>lanes</u>	<u>6+</u> <u>lanes</u>
1	751.3	-	1044.8	-	312.8	-	404.3	-
2	1038.4	-	1489.8	-	312.6	-	-	-
3	745.0	1340.4	1722.5	-	323.2	-	799.0	-
4	753.8	545.7	1592.1	-	372.6	-	743.1	-
5	801.8	1680.3	1003.1	-	324.7	-	517.9	-
6	689.4	584.9	921.2	-	284.3	251.9	498.7	928.6
7	999.8	973.1	1305.2	-	373.7	-	748.2	-
8	781.5	-	1066.4	479.3	373.8	-	927.3	-
9	787.9	700.5	916.6	633.0	354.0	-	610.5	-
10	676.4	-	463.6	78.0	350.0	-	544.9	722.9

*Accident Rates per 100 Million Vehicle Miles

FIGURE 2

Roadway Type: Divided - Free Access

<u>District</u>	<u>Highway Area Type</u>				
	<u>Urban</u>			<u>Rural</u>	
	<u>4 lanes</u>	<u>5 lanes</u>	<u>6+ lanes</u>	<u>4 lanes</u>	<u>6+ lanes</u>
1	942.6	-	-	420.7	-
2	665.4	-	-	474.2	-
3	1375.9	-	-	242.6	-
4	1275.4	-	-	136.7	-
5	702.4	-	882.6	262.2	-
6	661.9	557.0	500.8	309.7	-
7	936.3	-	1689.7	356.7	-
8	639.1	842.3	1113.1	458.9	477.1
9	666.4	-	696.9	427.6	677.4
10	673.5	-	385.7	426.7	551.1

Roadway Type: Divided - Controlled Access

<u>District</u>	<u>Highway Area Type</u>					
	<u>Urban</u>			<u>Rural</u>		
	<u>4 lanes</u>	<u>5 lanes</u>	<u>6+ lanes</u>	<u>4 lanes</u>	<u>5 lanes</u>	<u>6+ lanes</u>
1	-	-	-	-	-	-
2	122.2	-	-	169.2	-	-
3	-	-	-	180.3	-	-
4	216.8	-	-	135.5	-	-
5	282.2	-	307.3	163.0	-	-
6	210.6	-	-	165.2	-	-
7	287.3	-	-	145.6	-	118.5
8	216.8	-	-	150.5	-	272.5
9	155.0	251.4	180.6	135.1	480.4	144.2
10	249.4	-	51.1	124.3	-	172.8

ACCIDENT RATES PER 100,000,000 VEHICLE MILES

JURISDICTION 1 IS (RUR)

# LANES=4	147.9	TOTAL MILES=	697.68
# LANES=GREATER THAN 4	145.2	TOTAL MILES=	85.92

JURISDICTION 2 IS (URB)

# LANES=4	243.7	TOTAL MILES=	56.55
# LANES=GREATER THAN 4	170.5	TOTAL MILES=	98.68

JURISDICTION 3 FAP (RUR)

# LANES=4 AND GREATER EXPRESSWAY	156.3	TOTAL MILES=	101.17
# LANES=4 AND GREATER NON-EXPRESSWAY	352.4	TOTAL MILES=	695.62
# LANES=LESS THAN 4	386.3	TOTAL MILES=	4303.38

JURISDICTION 4 FAP (URB)

# LANES=4 AND GREATER EXPRESSWAY	307.0	TOTAL MILES=	133.89
# LANES=4 AND GREATER NON-EXPRESSWAY	648.2	TOTAL MILES=	391.00
# LANES=LESS THAN 4	864.9	TOTAL MILES=	210.67

JURISDICTION 5 FAS (RUR)

# LANES=4 AND GREATER	1174.4	TOTAL MILES=	10.43
# LANES=LESS THAN 4	418.2	TOTAL MILES=	2239.22

JURISDICTION 6 FAS (URB)

# LANES=4 AND GREATER	816.6	TOTAL MILES=	19.23
# LANES=LESS THAN 4	1449.1	TOTAL MILES=	60.75

FIGURE 3

SUMMARIZED FROM 1970 HIGHWAY NETWORK

INJURY RATES PER 100,000,000 VEHICLE MILES

JURISDICTION 1 IS (RUR)

# LANES=4	84.4	TOTAL MILES=	697.68
# LANES=GREATER THAN 4	90.7	TOTAL MILES=	85.92

JURISDICTION 2 IS (URB)

# LANES=4	135.3	TOTAL MILES=	56.55
# LANES=GREATER THAN 4	99.9	TOTAL MILES=	98.68

JURISDICTION 3 FAP (RUR)

# LANES=4 AND GREATER EXPRESSWAY	101.0	TOTAL MILES=	101.17
# LANES=4 AND GREATER NON-EXPRESSWAY	211.7	TOTAL MILES=	695.62
# LANES=LESS THAN 4	210.4	TOTAL MILES=	4303.38

JURISDICTION 4

# LANES=4 AND GREATER EXPRESSWAY	168.5	TOTAL MILES=	133.89
# LANES=4 AND GREATER NON-EXPRESSWAY	351.5	TOTAL MILES=	391.00
# LANES=LESS THAN 4	354.9	TOTAL MILES=	210.67

JURISDICTION 5 FAS (RUR)

# LANES=4 AND GREATER	501.3	TOTAL MILES=	10.43
# LANES=LESS THAN 4	210.3	TOTAL MILES=	2239.22

JURISDICTION 6 FAS (URB)

# LANES=4 AND GREATER	358.1	TOTAL MILES=	19.23
# LANES=LESS THAN 4	526.1	TOTAL MILES=	60.75

FIGURE 4

SUMMARIZED FROM 1970 HIGHWAY NETWORK

FATAL RATES PER 100,000,000 VEHICLE MILES

JURISDICTION 1 IS (RUR)

# LANES=4	2.2	TOTAL MILES= 697.68
# LANES=GREATER THAN 4	1.9	TOTAL MILES= 85.92

JURISDICTION 2 IS (URB)

# LANES=4	1.9	TOTAL MILES= 56.55
# LANES=GREATER THAN 4	2.3	TOTAL MILES= 98.68

JURISDICTION 3 FAP (RUR)

# LANES=4 AND GREATER EXPRESSWAY	3.2	TOTAL MILES= 101.17
# LANES=4 AND GREATER NON-EXPRESSWAY	4.0	TOTAL MILES= 695.62
# LANES=LESS THAN 4	6.5	TOTAL MILES= 4303.38

JURISDICTION 4

# LANES=4 AND GREATER EXPRESSWAY	2.6	TOTAL MILES= 133.89
# LANES=4 AND GREATER NON-EXPRESSWAY	3.9	TOTAL MILES= 391.00
# LANES=LESS THAN 4	2.2	TOTAL MILES= 210.67

JURISDICTION 5 FAS (RUR)

# LANES=4 AND GREATER	0.0	TOTAL MILES= 10.43
# LANES=LESS THAN 4	8.8	TOTAL MILES= 2239.22

JURISDICTION 6 FAS (URB)

# LANES=4 AND GREATER	3.2	TOTAL MILES= 19.23
# LANES=LESS THAN 4	2.8	TOTAL MILES= 60.75

FIGURE 5

SUMMARIZED FROM 1970 HIGHWAY NETWORK

ACCIDENT RATES FOR USE WITH THE STATEWIDE TRANSPORTATION MODELING SYSTEM

PROPOSED ROADS

RATES PER HUNDRED-MILLION VEHICLE-MILES		FATAL	INJURY	ACCIDENT
RURAL	2 LANE	6	200	275
	4 LANE	4	210	350
	INTER STATE	2	84	147
URBAN	2 LANE	2	360	800
	4 LANE	4	350	600
	INTER STATE	2	135	240

TABLE A

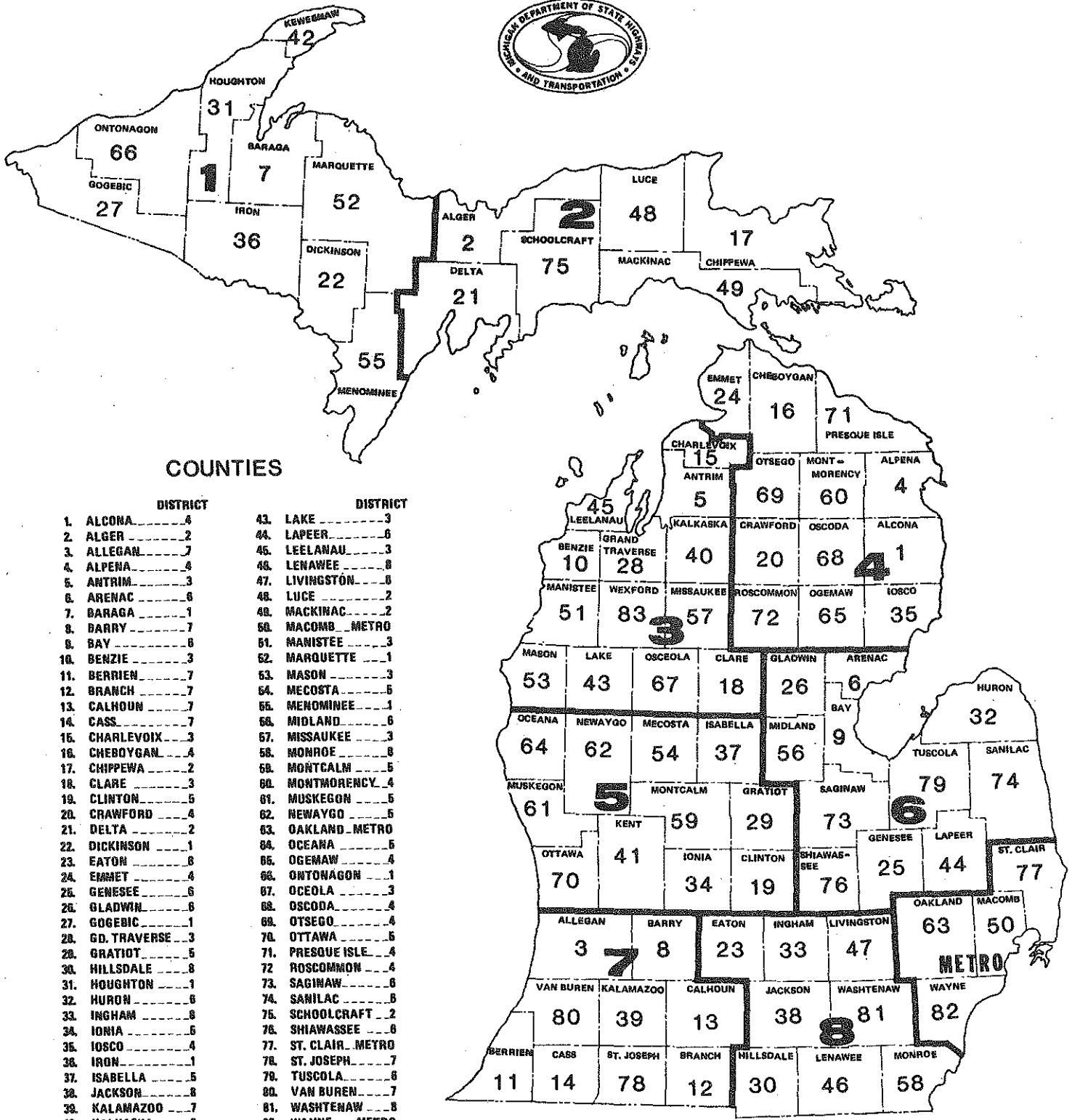
PREPARED 1973

ACCIDENT RATE SUMMARY

**TWO-LANE ROADS
NEWER IN 1970**

<u>D</u>	<u>MILES</u>	<u>1970 VEHICLE-MILES</u>	<u>ACCIDENT RATE</u>
<u>1-2</u>	<u>56.2</u>	<u>85,750</u>	<u>284</u>
<u>3-4</u>	<u>46.4</u>	<u>260,280</u>	<u>246</u>
<u>5-9</u>	<u>109.6</u>	<u>383,110</u>	<u>283</u>
<u>STATEWIDE WEIGHTED AVERAGE</u>			<u>275</u>

DISTRICT AND COUNTY NUMBERS



COUNTIES

DISTRICT	DISTRICT
1. ALCONA.....4	43. LAKE.....3
2. ALGER.....2	44. LAPEER.....6
3. ALLEGAN.....7	45. LEELANAU.....3
4. ALPENA.....4	46. LENAWEE.....8
5. ANTRIM.....3	47. LIVINGSTON.....8
6. ARENAC.....6	48. LUCE.....2
7. BARAGA.....1	49. MACKINAC.....2
8. BARRY.....7	50. MACOMB METRO.....1
9. BAY.....6	51. MANISTEE.....3
10. BENZIE.....3	52. MARQUETTE.....1
11. BERRIEN.....7	53. MASON.....3
12. BRANCH.....7	54. MECOSTA.....5
13. CALHOUN.....7	55. MENOMINEE.....1
14. CASS.....7	56. MIDLAND.....6
15. CHARLEVOIX.....3	57. MISSAUKEE.....3
16. CHEBOYGAN.....4	58. MONROE.....8
17. CHIPPEWA.....2	59. MONTCALM.....5
18. CLARE.....3	60. MONTMORENCY.....4
19. CLINTON.....5	61. MUSKEGON.....5
20. CRAWFORD.....4	62. NEWAYGO.....5
21. DELTA.....2	63. OAKLAND METRO.....1
22. DICKINSON.....1	64. OCEANA.....5
23. EATON.....8	65. OGEMAW.....4
24. EMMET.....4	66. ONTONAGON.....1
25. GENESEE.....6	67. OSCEOLA.....3
26. GLADWIN.....6	68. OSCODA.....4
27. GOGEBIC.....1	69. OTSEGO.....4
28. GR. TRAVERSE.....3	70. OTTAWA.....5
29. GRATIOT.....5	71. PRESQUE ISLE.....4
30. HILLSDALE.....8	72. ROSCOMMON.....4
31. HOUGHTON.....1	73. SAGINAW.....6
32. HURON.....6	74. SANILAC.....5
33. INGHAM.....8	75. SCHOOLCRAFT.....2
34. IONIA.....6	76. SHIAWASSEE.....6
35. IOSCO.....4	77. ST. CLAIR METRO.....1
36. IRON.....1	78. ST. JOSEPH.....7
37. ISABELLA.....5	79. TUSCOLA.....8
38. JACKSON.....8	80. VAN BUREN.....7
39. KALAMAZOO.....7	81. WASHTENAW.....8
40. KALKASKA.....3	82. WAYNE.....8
41. KENT.....5	83. WEXFORD.....3
42. KEWEENAW.....1	

NEWER (IN 1970) TWO-LANE ROADS ACCIDENT RATE

DISTRICT 1-2 (U.P.)	ADT	Miles	Yr. New	Acc. Rate*
US-2 Watersmeet - Lake Gogebic	800	16.1	65	189
US-41 Dagget - Powers	1500	15.7	66	372
M-28 W. Luce Co. Line - McMillan	1600	10.1	68	136
M-129 Near Donaldson	1400	7.0	69	196
US-2 Delta Co. L. - Escanaba	3200	7.3	70	387
DISTRICT 1-2 Average				284

DISTRICT 3-4

M-61 Harrison West	800	10.3	71	133
M-72 US-31 - East	3200	8.4	67	255
US-131 US-10 - North	3900	8.2	67	180
M-33 M-55 - Rose City	8200	9.6	69	268
US-23 Alcona S.C.L - Harrisville	2900	9.9	70	286
DISTRICT 3-4 Average				246

DISTRICT 5-9

M-20 M-82 - East	1500	6.5	69	84
M-44 Kent Co. Line - West	2300	5.0	70	214
M-120 Musk. Co. Line - West	4300	5.2	70	270
M-24 M-46 - Caro	4400	5.0	67	286
M-46 M-24 - Kingston	3100	9.4	66	376
M-52 Owosso - Saginaw C.L.	4200	6.9	65	130
M-52 St. Charles - M-46	6200	7.6	64	273
M-53 M-90 - Marlette	4200	5.9	71	260
US-25 Lexington - Port Sanilac	2600	8.3	65	236
M-66 Athens - North	3800	6.5	70	234
M-66 Barry C.L. - North	1800	8.7	71	262
US-12 Galein	4500	5.7	70	342
US-12 - US-12 BR	6400	2.9	70	340
US-12 Edwardsburg - M-205	3900	6.9	70	509
M-50 Charlotte - North	3000	3.6	70	304
M-52 US-12 - Manchester (2 Lane Lim. Access)	1700	5.2	69	93
M-52 M-36 - I-96	1600	7.3	69	188
M-153 Wayne County Line - East	7700	3.0	71	380
DISTRICT 5-9 Average				283

*All rates are expressed as the number of accidents per hundred-million vehicle miles.