ANNUAL STUDDED TIRE SURVEY
WINTER 1973-1974

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

ANNUAL STUDDED TIRE SURVEY
WINTER 1973-1974

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Background

This annual report represents a continuation of a study initiated in 1969-1970. The study was designed to estimate the number of vehicles using studded tires throughout the State and to monitor pavement wear caused by the studs. This study was composed of two phases; first, to estimate the number of vehicles using studded tires in Michigan; and second, to measure wear which has occurred on pavements across the state.

Public Act 138, passed in 1973, bans the use of the present form of studded tire, after April 1, 1975. The Act gives the Department of State Highways and Transportation the responsibility of promulgating rules to establish acceptability standards for winter traction aid devices.

Tire Stud Usage in Michigan

Field surveys for the fifth annual studded tire survey were performed by Research Laboratory personnel during the period from December 1973 through February 1974.

Only vehicles with Michigan license plates were included in the survey. State owned vehicles, buses, and trucks larger than a pickup or panel truck were not included since none of those vehicles are known to use studs. A predetermined number of vehicles are inspected in each county, usually in parking lots where large concentrations of vehicles are available. The sampling plan designed and used for this survey is explained in MDSHT Research Report No. R-766. This predetermined number is broken up into clusters of 25, 50, or 100. Each vehicle present is inspected in order of occurrence omitting only those previously mentioned, until the predetermined number has been sampled.

Figure 1 shows a map of the State indicating tire stud use by counties. An alphabetical listing of counties is given in Table 1 showing the number of vehicles surveyed, percent of vehicles using studded tires, and the location of these tires on the vehicle. Table 2 contains the same information combined into the nine Highway Districts. Table 3 relates studded tire use with type of vehicle. Table 4 lists the 83 counties in order of decreasing tire stud use. Table 5 gives a historical review of the five surveys conducted to date, while Table 6 gives statistical precision estimates for this year's survey.

The weighted statewide percentage of vehicles using studded tires decreased from 9.2 percent in 1972-1973 to 7.6 percent in 1973-1974. This use is down from a peak of 15.2 percent in 1970-1971 and can be attributed primarily to public reluctance to invest in studs due to questionable future legality of their use.

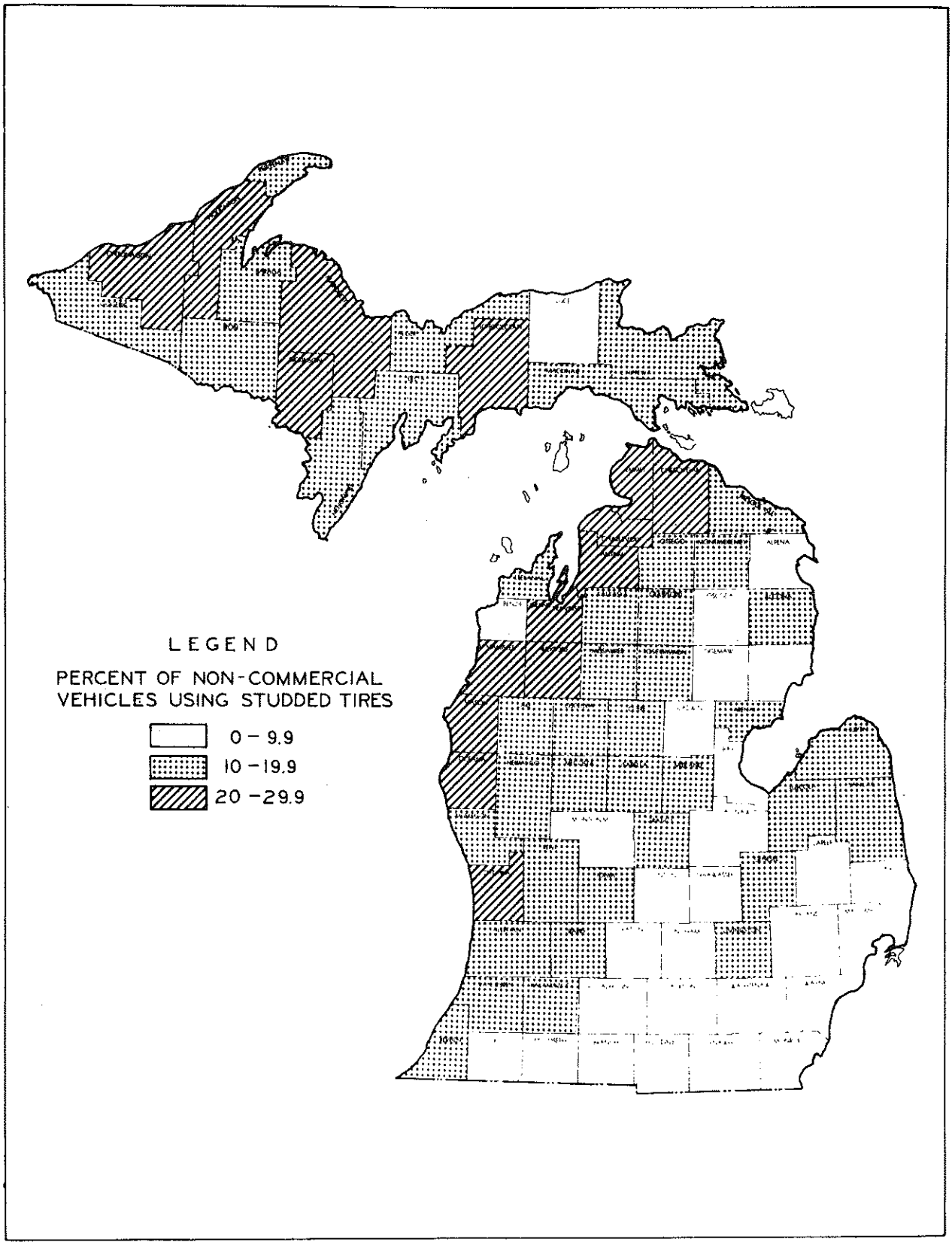

Figure 1. Studded tire usage in Michigan, winter 1973-74.

Tire Stud Wear on Michigan Pavements

This section summarizes the fourth annual survey of pavement wear attributable to the use of studded tires in Michigan. The field survey was conducted by Research Laboratory personnel during May 1974. The use of tire studs in Michigan is prohibited from May 1 through October 31.

In all, 75 locations were included in the survey as shown in Figures 2 and 3. Measurements were taken at each location and in all wheel tracks of the roadway. Table 7 summarizes the results of these measurements along with results of past surveys. The range of depths shown indicate the different depths found in separate wheel tracks. It should be mentioned that measurements taken on bituminous roadways combine stud wear with possible rutting from other causes. Although this may result in a measurement of depth greater than should be attributed to stud wear alone, there is no practical means of separating these two factors.

TABLE 1
STUDDED TIRE SURVEY BY COUNTIES, WINTER 1973-74

County	No. of Vehicles	Percent of Vehicles			
		Without Studs	With Studs on Front Only	With Studs on Rear Only	With Studs on Front and Rear
Alcona	100	89.00	0	11.00	0
Alger	125	89.60	0	10.40	0
Allegan	400	85.25	0	14.50	0.25
Alpena	200	90.50	0	9.50	0
Antrim	100	77.00	0	23.00	0
Arenac	100	87.00	0	13.00	0
Baraga	100	84.00	0	15.00	1.00
Barry	200	83.50	0	16.50	0
Bay	700	91.86	0	8.14	0
Benzie	100	83.00	0	17.00	0
Berrien	1,000	89.20	0	10.80	0
Branch	200	98.50	0	1.50	0
Calhoun	800	95.00	0	5.00	0
Cass	100	92.00	0	8.00	0
Charlevoix	100	79.00	0	20.00	1.00
Cheboygan	100	75.00	0	25.00	0
Chippewa	200	86.50	0	13.50	0
Clare	100	89.00	0	11.00	0
Clinton	200	92.50	0	7.50	0
Crawford	100	87.00	0	13.00	0
Delta	200	83.00	0	17.00	0
Dickenson	100	80.00	0	20.00	0
Eaton	300	92.67	0	7.33	0
Emmet	100	79.00	0	21.00	0
Genesee	800	87.00	0	13.00	0
Gladwin	100	97.00	0	3.00	0
Gogebic	100	81.00	0	19.00	0
Grand Traverse	200	76.00	0	23.50	0.50
Gratiot	200	84.50	0	15.50	0
Hillsdale	200	98.50	0	1.50	0
Houghton	200	80.00	0	20.00	0
Huron	200	90.00	0	10.00	0
Ingham	1,200	92.33	0	7.67	0
Ionia	200	89.50	0	10.50	0
Iosco	100	94.00	0	6.00	0
Iron	100	83.00	0	17.00	0
Isabella	200	82.00	0	17.50	0.50
Jackson	600	94.83	0	5.17	0
Kalamazoo	1,100	86.27	0	13.73	0
Kalkaska	100	81.00	0	19.00	0
Kent	1,500	88.26	0.07	11.67	0

TABLE 1 (Cont.)
STUDDED TIRE SURVEY BY COUNTIES, WINTER 1973-74

County	No. of Vehicles	Percent of Vehicles			
		Without Studs	With Studs on Front Only	With Studs on Rear Only	With Studs on Front and Rear
Keweenaw	100	82.00	0	18.00	0
Lake	100	84.00	0	16.00	0
Lapeer	200	95.50	0	4.50	0
Leelanau	100	84.00	0	16.00	0
Lenawee	500	98.40	0	1.60	0
Livingston	300	86.33	0	13.67	0
Luce	100	94.00	0	6.00	0
Mackinac	100	89.00	0	11.00	0
Macomb	1,000	97.00	0	3.00	0
Manistee	100	78.00	0	22.00	0
Marquette	300	78.00	0	21.67	0.33
Mason	100	75.00	0	24.00	1.00
Mecosta	100	84.00	0	16.00	0
Menominee	100	82.00	0	18.00	0
Midland	400	84.75	0	15.25	0
Missaukee	100	83.00	0	17.00	0
Monroe	600	98.50	0	1.50	0
Montcalm	200	91.00	0	9.00	0
Montmorency	100	88.00	0	12.00	0
Muskegon	900	82.45	0	17.44	0.11
Newaygo	200	82.50	0	17.50	0
Oakland	1,200	93.00	0	7.00	0
Oceana	100	72.00	0	26.00	2.00
Ogemaw	100	93.00	0	7.00	0
Ontonagon	100	72.00	1.00	25.00	2.00
Osceola	100	87.00	0	13.00	0
Oscoda	100	92.00	0	8.00	0
Otsego	100	82.00	0	17.00	1.00
Ottawa	700	82.58	0.14	17.14	0.14
Presque Isle	100	87.00	0	12.00	1.00
Roscommon	100	87.00	0	13.00	0
Saginaw	900	91.22	0.11	8.67	0
Sanilac	200	91.50	0	8.50	0
Schoolcraft	100	75.00	1.00	24.00	0
Shiawassee	300	96.00	0	4.00	0
St. Clair	700	96.71	0	3.29	0
St. Joseph	300	91.33	0	8.67	0
Tuscola	200	88.50	0	11.50	0
Van Buren	300	88.67	0	11.33	0
Washtenaw	1,200	91.58	0	8.42	0
Wayne	1,500	97.47	0	2.53	0
Wexford	100	78.00	0	21.00	1.00

TABLE 2
STUDDED TIRE SURVEY BY DISTRICTS, WINTER 1973-74

District	No. of Registered Vehicles	Percent of Vehicles			
		Without Studs	With Studs on Front Only	With Studs on Rear Only	With Studs on Front and Rear
1	97,598	79.83	0.08	19.76	0.33
2	47,864	85.94	0.12	13.94	0.00
3	116,591	80.71	0.00	19.00	0.29
4	91,658	87.23	0.00	12.62	0.15
5	527,674	85.42	0.05	14.42	0.11
6	589,012	90.29	0.03	09.68	0.00
7	434,848	89.50	0.00	10.48	0.02
8	540,301	93.73	0.00	06.27	0.00
M	2,358,713	96.02	0.00	03.98	0.00
Total	4,804,259	92.36	0.01	07.61	0.02

TABLE 3
STUDDED TIRE SURVEY BY VEHICLE TYPES, WINTER 1973-74

Vehicle		Percent of Vehicles			
Type	No. of Vehicles Surveyed	Without Studs	Studs on Front Only	Studs on Rear Only	Studs on Front and Rear
Passenger Car	24,562	89.27	0.01	10.69	0.03
Pickup & panel trucks	2,060	93.01	0	6.94	0.05
4 wheel drive	400	97.00	0.50	0.50	2.00

TABLE 4
PERCENT OF VEHICLES USING STUDDED TIRES BY COUNTIES

County	Percent	County	Percent	County	Percent
Oceana	28.00	Leelanau	16.00	Montcalm	9.00
Ontonagon	28.00	Mecosta	16.00	Saginaw	8.78
Cheboygan	25.00	Barry	15.50	St. Joseph	8.67
Mason	25.00	Gratiot	15.50	Washtenaw	8.42
Schoolcraft	25.00	Midland	15.25	Bay	8.14
Grand Traverse	24.00	Allegan	14.75	Cass	8.00
Antrim	23.00	Kalamazoo	13.73	Oscoda	8.00
Ottawa	22.43	Livingston	13.67	Ingham	7.67
Manistee	22.00	Chippewa	13.50	Clinton	7.50
Marquette	22.00	Arenac	13.00	Eaton	7.33
Wexford	22.00	Crawford	13.00	Oakland	7.00
Charlevoix	21.00	Genesee	13.00	Ogemaw	7.00
Emmet	21.00	Osceola	13.00	Iosco	6.00
Dickinson	20.00	Presque Isle	13.00	Luce	6.00
Houghton	20.00	Roscommon	13.00	Jackson	5.17
Gogebic	19.00	Sanilac	13.00	Calhoun	5.00
Kalkaska	19.00	Montmorency	12.00	Lapeer	4.50
Isabella	18.00	Kent	11.73	Shiawassee	4.00
Keweenaw	18.00	Tuscola	11.50	St. Clair	3.29
Menominee	18.00	Van Buren	11.33	Gladwin	3.00
Otsego	18.00	Alcona	11.00	Macomb	3.00
Muskegon	17.56	Clare	11.00	Wayne	2.53
Newaygo	17.50	Mackinac	11.00	Benzie	1.70
Delta	17.00	Berrien	10.80	Lenawee	1.60
Iron	17.00	Ionia	10.50	Branch	1.50
Missaukee	17.00	Alger	10.40	Hillsdale	1.50
Baraga	16.00	Huron	10.00	Monroe	1.50
Lake	16.00	Alpena	9.50		

TABLE 5
HISTORICAL REVIEW OF STUDDED TIRE SURVEYS

County	1969-1970 Studded Tire Proportion	1970-1971 Studded Tire Proportion	1971-1972 Studded Tire Proportion	1972-1973 Studded Tire Proportion	1973-1974 Studded Tire Proportion
Alcona	0.11	0.28	0.22	0.17	0.11
Alger	0.30	0.26	0.21	0.22	0.10
Allegan	0.17	0.27	0.21	0.21	0.15
Alpena	0.08	0.24	0.20	0.16	0.10
Antrim	0.25	0.32	0.21	0.17	0.23
Arenac	0.14	0.27	0.19	0.10	0.13
Baraga	0.30	0.31	0.26	0.29	0.16
Barry	0.23	0.36	0.18	0.17	0.16
Bay	0.08	0.16	0.20	0.14	0.08
Benzie	0.23	0.38	0.24	0.19	0.17
Berrien	0.12	0.21	0.13	0.13	0.11
Branch	0.08	0.12	0.08	0.08	0.02
Calhoun	0.10	0.12	0.10	0.09	0.05
Cass	0.13	0.24	0.26	0.11	0.08
Charlevoix	0.18	0.31	0.21	0.10	0.21
Cheboygan	0.23	0.36	0.28	0.16	0.25
Chippewa	0.16	0.28	0.22	0.15	0.14
Clare	0.20	0.21	0.19	0.14	0.11
Clinton	0.10	0.22	0.22	0.14	0.08
Crawford	0.25	0.35	0.20	0.23	0.13
Delta	0.20	0.32	0.29	0.26	0.17
Dickinson	0.24	0.49	0.34	0.19	0.20
Eaton	0.08	0.10	0.13	0.03	0.07
Emmet	0.33	0.40	0.23	0.29	0.21
Genesee	0.09	0.17	0.16	0.14	0.13
Gladwin	0.11	0.27	0.15	0.07	0.03
Gogebic	0.17	0.35	0.35	0.30	0.19
Grand Traverse	0.22	0.34	0.24	0.26	0.24
Gratiot	0.16	0.15	0.20	0.16	0.16
Hillsdale	0.09	0.17	0.06	0.08	0.02
Houghton	0.42	0.46	0.30	0.26	0.20
Huron	0.18	0.32	0.26	0.12	0.10
Ingham	0.13	0.13	0.15	0.12	0.08
Ionia	0.18	0.21	0.16	0.10	0.11
Iosco	0.07	0.19	0.21	0.14	0.06
Iron	0.12	0.32	0.19	0.27	0.17
Isabella	0.16	0.17	0.24	0.14	0.18
Jackson	0.06	0.20	0.09	0.09	0.05
Kalamazoo	0.18	0.15	0.10	0.16	0.14
Kalkaska	0.22	0.27	0.22	0.23	0.19
Kent	0.18	0.21	0.17	0.11	0.12
Keweenaw	0.35	0.37	0.33	0.23	0.18
Lake	0.10	0.20	0.10	0.20	0.16
Lapeer	0.06	0.13	0.16	0.07	0.05

TABLE 5 (Cont.)
HISTORICAL REVIEW OF STUDDED TIRE SURVEYS

County	1969-1970 Studded Tire Proportion	1970-1971 Studded Tire Proportion	1971-1972 Studded Tire Proportion	1972-1973 Studded Tire Proportion	1973-1974 Studded Tire Proportion
Leelanau	0.17	0.38	0.28	0.16	0.16
Lenawee	0.05	0.14	0.09	0.07	0.02
Livingston	0.15	0.21	0.17	0.09	0.14
Luce	0.29	0.27	0.24	0.21	0.06
Mackinac	0.18	0.27	0.24	0.21	0.11
Macomb	0.09	0.08	0.08	0.06	0.03
Manistee	0.24	0.35	0.26	0.27	0.22
Marquette	0.40	0.42	0.30	0.24	0.22
Mason	0.19	0.33	0.22	0.14	0.25
Mecosta	0.16	0.25	0.22	0.13	0.16
Menominee	0.09	0.41	0.25	0.26	0.18
Midland	0.15	0.22	0.13	0.10	0.15
Missaukee	0.25	0.35	0.26	0.22	0.17
Monroe	0.06	0.14	0.06	0.04	0.02
Montcalm	0.12	0.32	0.28	0.14	0.09
Montmorency	0.10	0.16	0.12	0.12	0.12
Muskegon	0.18	0.25	0.17	0.19	0.18
Newaygo	0.26	0.26	0.26	0.14	0.18
Oakland	0.11	0.12	0.11	0.07	0.07
Oceana	0.25	0.36	0.24	0.20	0.28
Ogemaw	0.17	0.24	0.29	0.19	0.07
Ontonagon	0.12	0.35	0.33	0.26	0.28
Osceola	0.20	0.25	0.21	0.22	0.13
Oscoda	0.13	0.25	0.20	0.15	0.08
Otsego	0.18	0.44	0.24	0.18	0.18
Ottawa	0.19	0.25	0.18	0.13	0.22
Presque Isle	0.09	0.27	0.20	0.15	0.13
Roscommon	0.19	0.21	0.26	0.09	0.13
Saginaw	0.09	0.14	0.15	0.09	0.09
Sanilac	0.14	0.11	0.12	0.02	0.13
Schoolcraft	0.30	0.26	0.26	0.25	0.25
Shiawassee	0.13	0.14	0.17	0.13	0.04
St. Clair	0.08	0.10	0.07	0.05	0.03
St. Joseph	0.10	0.14	0.09	0.11	0.09
Tuscola	0.22	0.23	0.26	0.14	0.12
Van Buren	0.16	0.25	0.15	0.13	0.11
Washtenaw	0.10	0.12	0.11	0.08	0.02
Wayne	0.10	0.10	0.06	0.05	0.03
Wexford	0.24	0.34	0.22	0.21	0.22

Weighted 1969-70 Statewide Tire Stud Proportion = 0.1196
Weighted 1970-71 Statewide Tire Stud Proportion = 0.1524
Weighted 1971-72 Statewide Tire Stud Proportion = 0.1183
Weighted 1972-73 Statewide Tire Stud Proportion = 0.0922
Weighted 1973-74 Statewide Tire Stud Proportion = 0.0764

TABLE 6
SUMMARY OF 1973-74 STUDDED TIRE SURVEY DATA

County	Vehicle Registration	Number of Clusters in County	Number of Clusters Sampled	Vehicles per Cluster	Number of Vehicles With Studs	Proportion With Studs	Standard Deviation	Precision of Estimated Proportion With Studs (95% Confidence)
Alcona	4,433	177.32	4	25	11	0.11	0.02	0.02
Alger	3,287	131.48	5	25	13	0.104	0.04	0.04
Allegan	31,097	621.94	8	50	59	0.1475	0.02	0.01
Alpena	15,363	614.52	8	25	19	0.095	0.03	0.02
Antrim	6,420	256.80	4	25	23	0.23	0.02	0.02
Arenac	5,294	211.76	4	25	13	0.13	0.05	0.05
Baraga	3,564	142.56	4	25	16	0.16	0.02	0.02
Barry	16,214	648.56	8	25	31	0.155	0.02	0.02
Bay	56,154	1,123.08	14	50	57	0.0814	0.01	0.01
Benzie	4,666	186.64	4	25	17	0.017	0.02	0.02
Berrien	87,979	879.79	10	100	108	0.108	0.01	0.01
Branch	18,349	733.96	8	25	3	0.015	0.01	0.01
Calhoun	71,583	715.83	8	100	40	0.05	0.01	0.01
Cass	21,493	859.72	4	25	8	0.08	0.02	0.02
Charlevoix	8,158	326.32	4	25	21	0.21	0.02	0.02
Cheboygan	8,323	332.92	4	25	25	0.25	0.04	0.04
Chippewa	13,706	548.24	8	25	27	0.135	0.04	0.03
Clare	8,571	342.84	4	25	11	0.11	0.01	0.01
Clinton	20,649	825.96	8	25	15	0.075	0.01	0.01
Crawford	3,377	135.08	4	25	13	0.13	0.05	0.05
Delta	16,154	646.16	8	25	34	0.17	0.03	0.02
Dickinson	12,089	483.56	4	25	20	0.2	0.04	0.04
Eaton	32,943	1,317.72	12	25	22	0.0733	0.02	0.01
Emmet	9,867	394.68	4	25	21	0.21	0.04	0.04
Genesee	222,999	2,229.99	8	100	104	0.13	0.01	0.01
Gladwin	6,658	266.32	4	25	3	0.03	0.02	0.02
Gogebic	8,769	350.76	4	25	19	0.19	0.06	0.05
Grand Traverse	24,504	980.16	8	25	48	0.24	0.03	0.02
Gratiot	18,562	742.48	8	25	31	0.155	0.03	0.02
Hillsdale	18,013	720.52	8	25	3	0.015	0.01	0.01
Houghton	13,619	544.76	8	25	40	0.2	0.04	0.03
Huron	17,251	690.04	8	25	20	0.1	0.02	0.02
Ingham	130,892	1,308.92	12	100	92	0.0767	0.01	0.01
Ionia	20,219	808.76	8	25	21	0.105	0.03	0.02
Iosco	11,680	467.20	4	25	6	0.06	0.03	0.02
Iron	6,448	257.92	4	25	17	0.17	0.06	0.06
Isabella	16,790	671.60	8	25	36	0.18	0.02	0.01
Jackson	69,514	1,390.28	12	50	31	0.0517	0.01	0.01
Kalamazoo	98,625	986.25	11	100	151	0.1373	0.01	0.01
Kalkaska	3,221	128.84	4	25	19	0.19	0.02	0.02
Kent	216,326	2,163.26	15	100	176	0.1173	0.01	0.01
Keweenaw	977	39.08	4	25	18	0.18	0.08	0.08

TABLE 6 (Cont.)
SUMMARY OF 1973-74 STUDDED TIRE SURVEY DATA

County	Vehicle Registration	Number of Clusters in County	Number of Clusters Sampled	Vehicles per Cluster	Number of Vehicles With Studs	Proportion With Studs	Standard Deviation	Precision of Estimated Proportion With Studs (95% Confidence)
Lake	2,905	116.20	4	25	16	0.16	0.04	0.04
Lapeer	22,741	909.64	8	25	9	0.045	0.01	0.01
Leelanau	5,243	209.72	4	25	16	0.16	0.04	0.04
Lenawee	41,021	820.42	10	50	8	0.016	0.01	0.01
Livingston	29,738	1,189.52	12	25	41	0.1367	0.02	0.01
Luce	2,789	111.56	4	25	6	0.06	0.01	0.01
Mackinac	3,724	148.96	4	25	11	0.11	0.07	0.07
Macomb	341,256	3,412.56	10	100	30	0.03	0.01	0.01
Manistee	10,167	406.68	4	25	22	0.22	0.03	0.02
Marquette	27,904	1,116.16	12	25	66	0.22	0.02	0.01
Mason	11,727	469.08	4	25	25	0.25	0.03	0.03
Mecosta	10,868	434.72	4	25	16	0.16	0.02	0.02
Menominee	11,202	448.08	4	25	18	0.18	0.05	0.05
Midland	32,529	650.58	8	50	61	0.1525	0.02	0.01
Missaukee	3,513	140.52	4	25	17	0.17	0.02	0.02
Monroe	57,141	1,142.82	12	50	9	0.015	0.01	0.01
Montcalm	19,330	773.20	8	25	18	0.09	0.03	0.02
Montmorency	2,997	119.88	4	25	12	0.12	0.02	0.02
Muskegon	74,701	1,494.02	18	50	158	0.1756	0.01	0.01
Newaygo	13,935	557.40	8	25	35	0.175	0.03	0.02
Oakland	496,423	4,964.23	12	100	84	0.07	0.01	0.01
Oceana	7,521	300.84	4	25	28	0.28	0.04	0.04
Ogemaw	6,396	255.84	4	25	7	0.07	0.02	0.02
Ontonagon	4,722	188.88	4	25	28	0.28	0.04	0.04
Osceola	7,420	296.80	4	25	13	0.13	0.05	0.05
Oscoda	2,464	98.56	4	25	8	0.08	0.02	0.02
Otsego	5,886	235.44	4	25	18	0.18	0.05	0.05
Ottawa	63,875	1,277.50	14	50	157	0.2243	0.02	0.01
Presque Isle	6,023	240.92	4	25	13	0.13	0.03	0.03
Roscommon	7,050	282.00	4	25	13	0.13	0.04	0.04
Saginaw	107,401	1,074.01	9	100	79	0.878	0.01	0.01
Sanilac	16,850	674.00	8	25	26	0.13	0.05	0.03
Schoolcraft	4,131	165.24	4	25	25	0.25	0.02	0.02
Shiawassee	29,136	1,165.44	12	25	12	0.04	0.01	0.01
St. Clair	58,521	1,170.42	14	50	23	0.0329	0.01	0.01
St. Joseph	24,916	996.64	12	25	26	0.0867	0.02	0.01
Tuscola	21,882	875.28	8	25	23	0.115	0.02	0.01
Van Buren	27,592	1,103.68	12	25	34	0.1133	0.02	0.01
Washtenaw	115,066	1,150.66	12	100	26	0.0217	0.01	0.01
Wayne	1,261,817	12,618.17	15	100	38	0.0253	0.01	0.01
Wexford	10,156	406.24	4	25	22	0.22	0.03	0.03

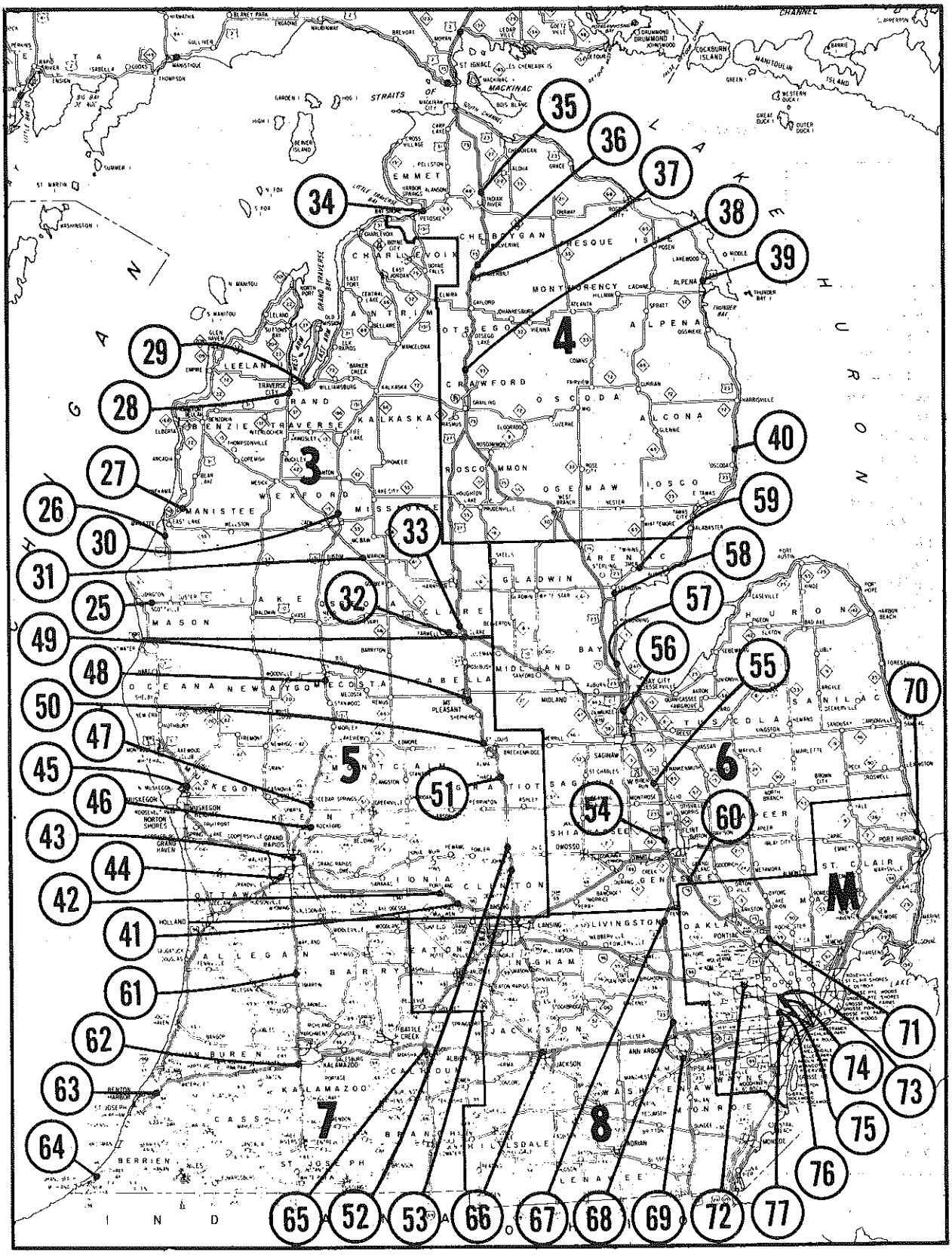

Figure 2. Pavement wear survey locations.

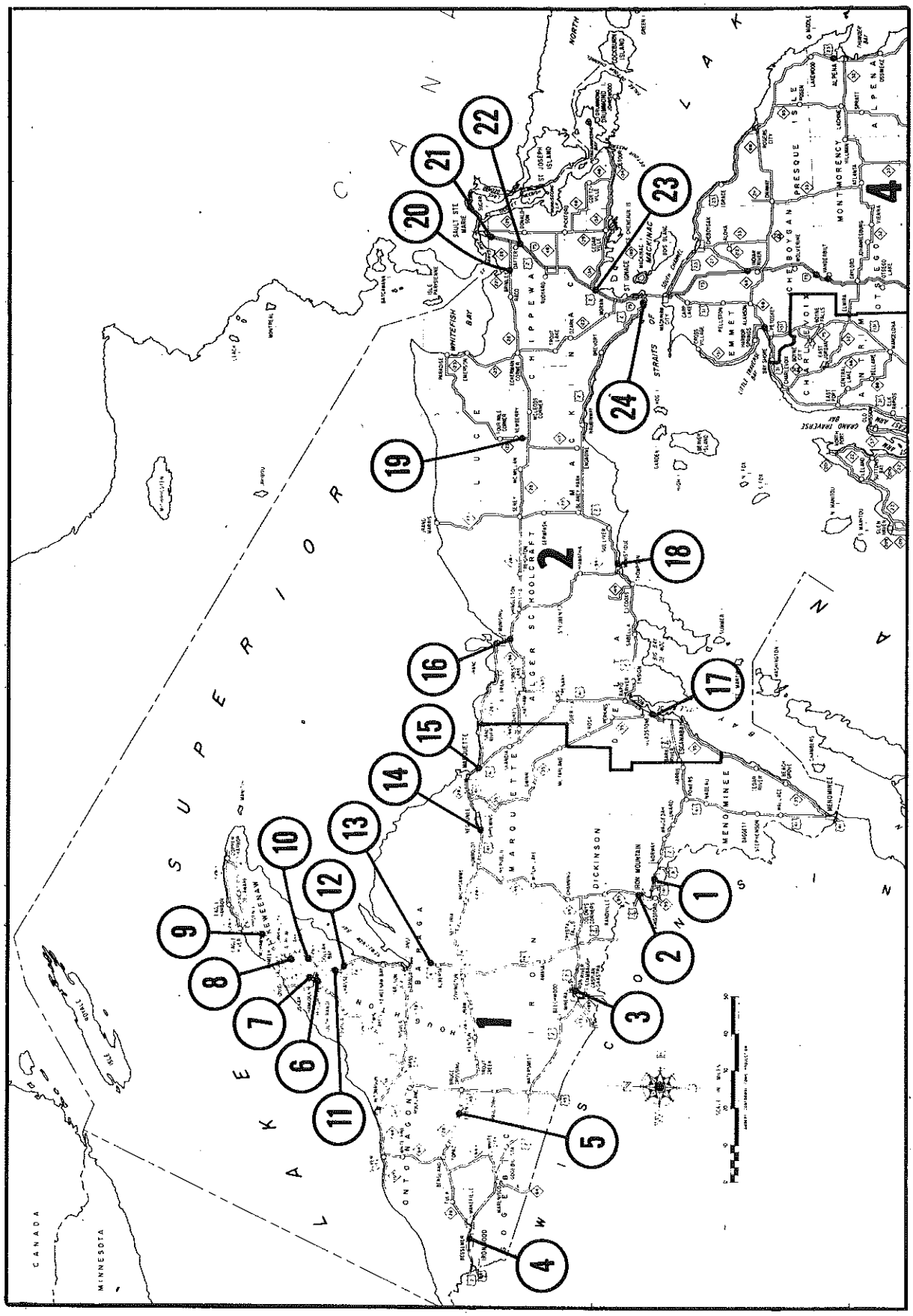

Figure 3. Pavement wear survey locations.

TABLE 7
MEASUREMENT OF STUD WEAR ON MICHIGAN PAVEMENTS
Spring 1974

	Map Reference No.	Location	Surface Type	Depth of Wear			
				1971	1972	1973	1974
DISTRICT 1	1	US 2 E of Iron Mountain	Bit. over Conc.	1/8	1/16 - 3/16	1/16 - 3/16	1/16 - 1/4
	2	US 2 W of Iron Mountain	Bit. over Conc.	---	---	1/8 - 3/16	1/8 - 1/4
	3	US 2 E of Iron River	Concrete	---	---	1/32	1/16 - 3/32
	4	US 2 at Bessemer	Concrete	1/16	1/16	1/16	1/16 - 1/8
	5	M 28 at Ewen	Bituminous	---	1/8	1/8 - 3/16	1/8 - 3/16
	6	US 41 at ends of Houghton-Hancock Bridge	Concrete	---	1/8 - 3/16	1/8 - 1/4	1/8 - 5/16
	7	US 41 in Hancock	Bit. over Conc.	---	1/8 - 1/4	1/4	1/4 - 9/16
	8	US 41 S of Calumet	Concrete	---	1/16	1/16	1/16 - 1/8
	9	US 41 at Mohawk	Bit. over Conc.	3/8 - 1/2	3/8 - 1/2	3/8 - 1/2	3/8 - 17/32
	10	M 26 at Hubble	Bit. over Conc.	3/16	1/8 - 3/16	1/8 - 1/4	1/4 - 5/16
	11	US 41 N of Chassell	Bit. over Conc.	---	---	1/8 - 3/16	1/4 - 3/8
	12	US 41 S of Chassell	Concrete	---	---	1/16 - 1/8	3/32 - 5/32
	13	US 41 S of L'Anse	Concrete	1/16	1/16	1/16	1/16 - 1/8
	14	US 41 at Negaunee	Concrete	1/8	1/16 - 3/16	1/8 - 3/16	1/8 - 5/16
	15	US 41 S of Marquette	Concrete	---	1/16 - 1/8	1/8 - 3/16	1/8 - 3/16
DISTRICT 2	16	M 28 E of Munising	Bituminous	1/8	3/16 - 5/16	3/16 - 5/16	3/16 - 5/16
	17	US 2 at Escanaba	Concrete	1/8	1/16 - 1/8	1/16 - 1/8	1/16 - 1/4
	18	US 2 at Manistique	Bit. over Conc.	1/8	1/8 - 1/4	1/8 - 1/4	7/32 - 5/16
	19	M 123 S of Newberry	Bituminous	---	---	3/16 - 7/16	11/32 - 7/16
	20	M 28 at Brimley	Concrete	---	---	1/32	1/32 - 1/16
	21	I 75 S of Sault Ste. Marie	Concrete	---	---	1/32 - 1/16	1/32 - 3/32
	22	I 75 S of M 28	Concrete	---	---	1/32	1/32
	23	I 75 S of M 134	Concrete	---	---	1/32	1/32 - 3/32
	24	US 2 W of St. Ignace	Bit. over Conc.	1/8 - 3/16	1/8 - 1/4	3/16 - 1/4	3/16 - 1/4
DISTRICT 3	25	US 10 W of Scottville	Bit. over Conc.	1/4	1/4 - 5/16	1/4 - 3/8	1/4 - 7/16
	26	US 31 S of Manistee	Concrete	1/16 - 3/32	1/8	1/8	1/8 - 7/32
	27	US 31 N of Manistee	Bit. over Conc.	1/8	1/8 - 3/16	1/8 - 3/16	5/32 - 1/4
	28	US 31 S of Traverse City	Concrete	1/32	1/16	1/8	3/16 - 9/32
	29	US 31 in Traverse City	Concrete	1/16	1/16 - 1/8	1/16 - 1/8	1/16 - 3/16
	30	US 131 N of Cadillac	Bit. over Conc.	---	1/8	1/8 - 3/16	1/8 - 7/32
	31	M 115 S of Cadillac	Bit. over Conc.	---	---	1/8 - 3/16	5/32 - 5/16
	32	US 10 W of Clare	Bit. over Conc.	---	---	1/4 - 3/8	1/4 - 3/8
	33	US 27 N of Clare	Concrete	---	1/16 - 1/8	1/16 - 1/8	1/16 - 1/8
DISTRICT 4	34	US 31 N of Petoskey	Bit. over Conc.	1/8	3/16 - 1/4	3/16 - 5/16	3/16 - 9/16
	35	I 75 N of Indian River	Bituminous	---	1/16 - 1/8	1/16 - 1/8	1/16 - 5/32
	36	I 75 N of Vanderbilt	Bituminous	1/8 - 3/16	1/8 - 3/16	1/8 - 3/16	1/8 - 1/4
	37	US 27 N of Vanderbilt (on Bit. Patch)	Bituminous	3/16	1/4 - 5/16	1/4 - 5/16	1/4 - 3/8
	38	US 27 N of Grayling	Bituminous	1/8 - 1/4	1/8 - 1/4	1/8 - 1/4	1/8 - 5/16
	39	US 23 N of Alpena	Bit. over Conc.	---	1/8	1/8	1/8 - 7/32
	40	US 23 N of Oscoda	Bit. over Conc.	---	1/8	1/8	5/32 - 3/16
DISTRICT 5	41	I 96 E of Portland	Concrete	1/8	1/8 - 1/4	3/16 - 5/16	3/16 - 5/16
	42	I 96 W of Portland	Concrete	1/16	1/8	1/8	1/16 - 1/8
	43	I 296 in Grand Rapids	Concrete	3/32 - 1/4	3/16	1/8 - 5/16	3/16 - 3/8
	44	I 196 W of US 131	Concrete	---	3/16	3/16 - 1/4	7/32 - 9/32
	45	US 31 at Muskegon	Concrete	---	1/16	1/16 - 1/8	1/16 - 5/32
	46	Old US 131 at Rockford	Bit. over Conc.	1/8	1/8 - 3/16	1/8 - 3/16	1/8 - 3/16
	47	Old US 131 S of Cedar Spring	Bit. over Conc.	3/8	3/8 - 7/16	3/8 - 7/16	7/16 - 1/2
	48	US 131 S of Big Rapids	Bit. over Conc.	3/16 - 1/4	1/4 - 5/16	1/4 - 5/16	1/4 - 7/16
	49	US 27 at Mt. Pleasant	Concrete	1/16	1/16	1/16	1/16 - 1/8
	50	US 27 at Alma	Concrete	1/16	1/16	1/16 - 1/8	1/16 - 1/8
	51	US 27 at Ithaca	Concrete	1/16	1/16 - 3/32	1/16 - 1/8	1/16 - 5/32
	52	US 27 N of St. Johns	Concrete	1/16	1/16 - 1/8	1/16 - 1/8	1/16 - 7/32
	53	US 27 S of St. Johns	Concrete	3/32	1/8	1/8	1/8 - 3/16

TABLE 7 (Cont.)
MEASUREMENT OF STUD WEAR ON MICHIGAN PAVEMENTS
Spring 1974

	Map Reference No.	Location	Surface Type	Depth of Wear			
				1971	1972	1973	1974
DISTRICT 6	54	I 75 N of Flint	Concrete	1/8	1/8	1/8 - 3/16	---
	55	I 75 at Birch Run	Concrete	---	1/16 - 1/8	1/16 - 1/4	1/8 - 9/32
	56	I 75 at Zilwaukee	Bit. over Conc.	---	1/16 - 1/8	1/8 - 1/4	1/8 - 5/16
	57	M 13 at Kawkawlin	Bit. over Conc.	---	1/8 - 3/16	1/8 - 3/16	1/8 - 9/32
	58	US 23 S of Standish	Bit. over Conc.	---	1/8 - 1/4	1/8 - 5/16	1/8 - 7/16
	59	US 23 W of M 65	Bit. over Conc.	---	1/8 - 3/16	1/8 - 1/4	1/8 - 7/16
	60	I 75 N of Holly	Concrete	1/16	1/16 - 1/8	1/16 - 1/8	1/16 - 7/32
DISTRICT 7	61	US 131 at Martin	Concrete	---	---	1/16 - 1/8	1/8 - 3/16
	62	I 94 at Kalamazoo	Concrete	3/32	1/8	1/8 - 3/16	1/8 - 7/32
	63	I 94 at St. Joseph	Concrete	1/32	1/16	1/16 - 1/8	1/16 - 5/32
	64	I 94 S of Bridgeman	Bituminous	1/16	1/16 - 3/16	1/16 - 3/16	1/16 - 15/32
	65	I 69 at Marshall	Concrete	---	---	1/16	1/16 - 3/32
DISTRICT 8	66	I 94 W of M 106	Concrete	---	1/16	1/16 - 3/16	1/16 - 7/32
	67	US 23 S of Fenton	Concrete	---	---	1/16 - 3/16	1/16 - 3/16
	68	US 23 N of Ann Arbor	Concrete	1/8	1/8 - 3/16	1/8 - 1/4	1/8 - 1/4
	69	I 94 W of US 23	Concrete	1/16	1/16 - 1/8	1/8 - 1/4	1/8 - 1/4
METRO DISTRICT	70	US 25 N of Port Huron	Concrete	---	1/16	1/16	1/16 - 1/8
	71	I 75 N of M 59	Concrete	---	1/16	3/16 - 1/4	3/16 - 5/16
	72	I 696 E of Novi	Concrete	---	7/32	7/32 - 9/32	5/16
	73	US 10 at 8 Mile Rd	Concrete	1/8	7/32	9/32	5/16
	74	US 10 at Schaefer	Concrete	7/32	5/16	3/8	7/16
	75	US 10 at Wyoming	Concrete	7/32	9/32	11/32	7/16
	76	M 39 at Schoolcraft	Concrete	5/32	3/8	7/16	7/16
	77	M 39 at Ford Rd	Concrete	3/16	9/32	11/32	3/8