

# Administrative Application of a Method of Road and Street Classification

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A method of rural road classification founded on the functional concept of highway service and operation has been used for classification purposes for more than ten years. It was found that all the populated places in the state could be put into five classes of different importance and that the relative importance of the connecting roads depended on the classified importance of the principal places connected.

In 1951 the method was adopted for the administration of Michigan's new highway legislation. County primary road and city and village major street systems were established in each county, city, and village. The mileage of these systems is one of the principal elements in the allocation to and use by local governments of state motor vehicle funds. Some local governments believe that there are considerable advantages to an extended system.

The extent of the principal road and street systems has been limited through the application of basic principles, guiding factors, and good inter-governmental relations.

● A METHOD founded on the functional concept of highway service and operation was discussed in "A Method of Rural Road Classification" (1). The idea of classifying roads and streets on the basis of relative traffic attraction was presented. The basic theory was stated in the paper:

1. Highways exist to serve the economic and social organization which consists of individual dwelling, farm, business, industrial, service, government, and other units, and successive accumulative groupings of these units into communities of increasing extent and function.

2. The organization functions by means of a constant movement of people and goods between and to the units and within and between the communities. The highways carrying these movements are classified by their predominant usage as determined by the character of the places they principally connect.

- (a) Highways used predominantly for traffic movement between and to the various land-use units, are local highways.

- (b) Highways used predominantly for traffic movement within communities, are community highways.

- (c) Highways used predominantly for traffic movement between communities, are transportation highways.

3. The relative importance of a transportation highway is indicated by the degree and range of the traffic attraction exerted by the communities it principally connects; this traffic attraction, in turn, is governed by the magnitude of the communities' operations and resources, and by the extent to which these operations and resources integrated with those of other communities.

The paper described how, with the fundamental concept, various types of economic and traffic data were used to establish the relative traffic attraction of some 1,300 populated places in Michigan. It then described how the classification of places was used to classify the state's primary and secondary roads.

The research described in the paper was carried out (1) to classify all the places in the state on the basis of traffic attraction for road and street classification, and (2) to identify readily available social economic data and analytical procedures that will produce comparable classification of places—the latter to be used in other states and to reclassify Michigan places in an expanding and shifting economy.

It was found that all of the places in Michigan from Detroit to the least important neighborhood center could be classified in groups of similar importance by the intensity of their traffic attraction. Ten place groups were identified. They were combined to

form 5 classes with two place groups in each class:

- Class I, metropolitan centers;
- Class II, regional centers;
- Class III, intermediate market centers;
- Class IV, minor market centers; and
- Class V, neighborhood centers.

It was found that the populated groups can be classified and placed in five classes of relative importance using one or more of the following indices: (1) population of the immediate retail trade area; (2) assessed valuation; (3) a measure of banking resources; (4) newspaper circulation; and (5) retail trade of the place.

With minor exceptions due to inconsistencies in the indices the populated places fell in the same groups as with using the traffic attraction index.

The study in highway classification concluded that place Classes I, II, and III are of sufficient statewide importance to be served by the state trunkline system. Class IV and Class V are locally important and can be served by county primary roads. Studies in Illinois (2) and Maine (3) following similar principles have reached the same conclusion.

A minimum mileage highway transportation system can be laid out for each place group by connecting the places with desire lines and the selection of routes to serve the connecting desire lines. This task done in order of diminishing importance provides the basic framework to guide system selection and to judge the merits of each route designated in an integrated system.

The principles of that study in road and street classification were adopted and used in 1947 by the Highway Study Committee of the Michigan Good Roads Federation for the classification of roads and streets. The results were incorporated as a fundamental part of the 1948 report "Highway Needs in Michigan."

The work performed and the leadership exercised by the 1947-1948 Highway Study Committee, resulted in the 1951 Michigan Legislature enacting Act 51 of the Public Acts of 1951—an act to: Provide for the classification of all roads, streets and highways; establish a motor vehicle highway fund; provide for the allocation of money therefrom and the administration thereof for highway purposes. The act stipulated an annual progress report to the governor and the state legislature. The administrative features of this act are considered among the most progressive.

The state highway commissioner designated his special assignment engineer to administer for him, all clauses of the act pertaining to counties and incorporated cities and villages. A local government section was organized in the executive division to do the work.

This paper describes the results of that work in the area of road and street classification. The Michigan procedures are founded on the premise that the agency, group, or individual jurisdictionally responsible for a system of roads or streets should initiate all actions pertaining to their administration, operation and improvement. The administration requires that the local government section give guidance and review and approve specific actions. The local officials are expected to justify each action where approval is sought.

To conform with the requirements of the act and provide system mileage figures for allocation purposes, it was necessary to classify by July 1, 1952, all of the public roads and streets in the 83 counties and the 488 incorporated cities and villages.

In nine months, the local officials designated, certified and submitted their road and street systems and mileages. The systems and mileages were reviewed by the staff of the local government section. Adjustments of differences were made with local officials and the mutually agreed upon systems were approved for the state highway commissioner so that the mileage figures could be used for all purposes of the act after July 1, 1952.

Further adjustments have been made in subsequent annual recertifications and approvals when reconsideration is given to each road and street system.

The mileages of the road and street systems are used in the formulas to allocate the motor vehicle highway funds to the counties and to the cities and villages. The funds

are restricted to use on the respective road and street systems for construction and maintenance. Each county, city, and village is required to submit for approval each year a biennial construction program for each system based on a long range development plan. They are required to report the progress made each year in the development of the respective systems and the mileage and condition of each system. Furthermore, they are required to submit an annual report of all receipts and disbursements for highway purposes for each system. The road and street systems are the means of administering the local government phases of the act.

### County Primary Road Systems

The county road officials had experience with highway classification. The original county road act of 1893 had generated many model county primary road systems. There had been several selections of federal aid secondary systems. They had selected a system of county primary roads for the 1946 highway study. They had been furnished all the information available: (1) a classification of all the populated places in the county; (2) a map of a possible minimum highway transportation system in the county; (3) available traffic information on the transportation, roads; and (4) an explanation of highway classification and its objectives with qualifying criteria including reasonable spacing.

They were familiar with the principles. They had selected a county primary road system for the highway study. They certified these systems with additions, some of which were not justified. Where these were identified they were reviewed with local officials and many deletions were made before the systems were approved. Some of the road commissions felt they should be conservative in the selection and certification of primary roads taking additional roads into the system as they could be improved. Other commissions felt that they could better satisfy their constituents by expansion of the primary road system.

The results of some 15 years of rural road classification are given in Table I. Comparisons are made of county primary road mileages for each county in county groups of similar economy.

The greatest variations occur between administrative mileages for 1956 and the general purpose highway formula. The latter is a formula using available social-economic data. It was adopted to limit the mileages of federal secondary routes in any county. The least variation occurs between the 1955 highway study mileages and the 1956 administrative mileages. The latter is evidence that there is very close agreement of transportation highways identified for highway study purposes and for the administration of the county primary road systems. The two sets of mileage figures were formulated with the same basic principles and were designated by engineers and administrators with similar backgrounds. The comparison between the administrative system figures and the historic figures are evidence that land area and population are the principal factors contributing to the need for rural roads. They provide excellent indices to guide system selection and for other phases of county road administration.

The following excerpt from the Michigan administrative procedure serves to define the transportation routes that comprise the 83 county primary road systems. Section 2, Public Acts of 1951, as amended, provides that the primary roads shall be selected on the basis of their greatest general importance to the county. Roads which meet these qualifications and promote the general over-all economy of the county conform to the following definitions.

Primary roads connect the centers of traffic interest (such as cities, villages, unincorporated communities or trade centers, rural industries, consolidated schools and other public institutions, and large auction centers) with each other, with other more important regional trading centers, with other important primary roads and with state trunklines

In rural agricultural areas the centers of traffic interest should be connected by extending the roads in the four cardinal directions from these centers. In sparsely populated areas, the routes may follow existing diagonal roads but should be so located as to provide a minimum of mileage and still serve the existing and potential uses of the land.

TABLE 1  
MICHIGAN RURAL COUNTY PRIMARY ROAD SYSTEM MILEAGE IN 1952 AND 1956 COMPARED WITH FORMULA AND  
HIGHWAY STUDY MILEAGES BY COUNTIES IN GROUPS OF SIMILAR ECONOMY

Group and County	Total County Rural Road Mileage	1956 Actual		1952 Actual		Formula Based on Highway Needs Study				Inverse Ratio of Actual 1956 County Primary Road Mileage			
		% Total	Miles	Averages	Social	Economic	1947	1955	1952 Actual		Formula Based on Highway Study		
									Averages	Social	Economic	1947	1955
(a) UPPER PENINSULA COUNTIES													
Alger	450	31	141	161	142	157	142	142	1 14	1 01	1 11	1 01	1 01
Baraga	455	27	123	108	121	68	62	119	88	98	55	50	97
Chippewa	1,230	25	307	320	320	433	433	303	1 04	1 04	1 41	1 41	99
Delta	838	41	341	340	326	330	323	318	1 00	96	97	95	93
Dickinson	534	31	167	157	164	186	185	166	94	98	1 11	1 11	99
Gogebic	497	41	204	195	193	213	200	209	96	95	1 04	98	1 02
Houghton	911	33	303	306	311	283	251	312	1 01	1 03	87	83	93
Iron	598	40	240	235	238	239	141	239	98	99	99	98	1 00
Keweenaw	154	55	84	81	82	92	91	116	96	98	1 10	1 08	1 38
Luce	354	36	128	121	129	149	123	128	95	1 01	1 16	96	1 00
MacKinnac	613	28	171	171	172	187	121	164	1 00	1 01	1 09	71	96
Marquette	1,263	22	275	270	275	270	275	276	98	1 00	98	1 00	1 00
Menominee	1,199	36	432	424	431	388	368	419	98	1 00	90	90	97
Ontonagon	533	44	235	184	193	195	198	214	78	82	83	84	91
Schoolcraft	377	42	160	180	157	174	186	161	1 13	98	1 09	1 16	1 01
Total	10,006	33	3,311	3,253	3,254	3,344	3,119	3,288	98	98	1 01	94	99
(b) NORTHERN MICHIGAN COUNTIES													
Alcona	685	19	133	132	168	179	159	123	99	1 26	1 35	1 20	92
Alpena	615	29	181	165	227	172	176	168	91	1 25	95	97	93
Antrim	817	24	194	191	157	179	179	195	98	81	92	92	1 01
Arenac	585	23	133	132	154	133	134	130	99	1 16	1 00	1 01	98
Benzie	592	27	161	148	118	162	160	153	92	73	1 01	99	95
Charlevoix	726	22	182	161	166	208	204	162	99	1 02	1 28	1 26	1 00
Cheboygan	1,026	18	188	223	214	229	234	189	1 19	1 14	1 22	1 25	1 01
Clare	888	24	210	200	188	182	179	199	95	90	87	85	95
Crawford	647	20	131	155	115	144	138	152	1 18	88	1 10	1 04	1 16
Emmet	805	25	198	197	182	184	199	179	99	92	92	91	99
Gladwin	739	25	184	160	183	151	152	170	87	99	82	83	92
Grand Traverse	834	25	211	197	194	201	197	201	93	92	95	93	95
Iosco	813	20	160	132	190	196	198	139	83	1 19	1 23	1 24	87
Isabella	1 138	28	320	317	302	315	286	312	99	94	98	89	98
Kalamazoo	885	24	215	220	163	216	222	189	1 02	76	1 00	1 03	88
Lake	921	24	225	211	176	236	237	217	94	78	1 05	1 05	98
Leelanau	615	26	162	142	156	150	145	138	88	78	93	90	85
Manistee	1,067	21	222	221	204	225	231	226	1 00	92	1 01	1 04	1 02
Mason	917	19	177	173	229	207	210	176	98	1 29	1 17	1 19	99
Mecosta	1,157	23	270	262	243	270	271	273	97	90	1 00	1 00	1 01
Midland	790	32	253	264	284	237	222	255	1 04	1 12	94	88	1 01
Missaukee	972	19	188	189	210	215	217	189	1 01	1 12	1 14	1 15	1 01
Montcalm	1,491	23	336	325	303	340	340	338	97	90	1 01	1 01	1 01
Montmorency	648	23	148	144	174	155	157	150	97	1 18	1 05	1 06	1 01
Newaygo	1,589	17	267	261	327	344	325	263	98	1 23	1 29	1 22	99
Oceana	1,118	21	232	221	252	250	237	217	98	1 00	1 08	1 02	98
Ogemaw	765	30	227	223	203	236	217	226	98	89	1 04	98	1 00
Oscoda	920	19	179	172	188	180	181	173	96	1 05	1 00	1 01	97
Oscoda	659	19	124	118	160	141	134	119	95	1 29	1 14	1 08	96
Otsego	742	23	172	172	176	171	158	171	1 00	1 02	99	92	99
Presque Isle	712	25	178	177	185	192	221	178	99	1 04	1 08	1 24	1 00
Roscommon	804	15	118	123	133	134	112	105	1 04	1 13	1 14	99	89
Wexford	944	17	162	153	190	141	142	158	94	1 17	87	88	96
Total	28,626	22	6,421	6,287	6,484	6,675	6,549	6,253	98	1 01	1 04	1 02	97
(c) SOUTHERN MICHIGAN AGRICULTURAL COUNTIES													
Allegan	1,814	24	443	415	415	424	411	419	94	94	96	93	95
Barry	1,068	27	286	269	245	280	280	275	94	86	1 01	98	96
Branch	947	31	299	297	262	284	279	294	1 00	88	95	94	99
Cass	969	25	245	234	225	300	199	233	96	92	1 22	81	95
Clinton	1,107	27	297	288	321	262	268	299	97	1 06	88	90	1 01
Eaton	1,043	29	304	293	257	297	316	300	96	85	98	1 04	99
Gratiot	1,194	29	351	349	287	289	293	351	99	82	82	83	1 00
Hillsdale	1,117	26	292	290	253	312	313	290	99	87	1 07	1 07	99
Huron	1,594	17	269	269	309	333	329	268	1 00	1 15	1 24	1 22	1 00
Ionia	1,086	30	328	310	263	301	320	264	95	80	92	87	98
Lapeer	1,231	24	301	298	314	288	279	298	99	1 04	96	93	99
Lenawee	1,497	30	448	435	348	406	389	450	97	78	91	87	1 00
Livingston	1,061	28	296	294	278	303	280	297	99	94	1 02	95	1 00
Sanilac	1,776	14	251	253	315	384	374	251	1 01	1 28	1 53	1 49	1 00
Shuawassee	1,043	28	295	305	287	238	249	299	1 03	97	81	84	1 01
St Joseph	972	33	317	363	217	247	249	298	1 15	69	78	79	94
Tuscola	1,593	18	279	266	340	333	318	269	95	1 22	1 19	1 14	96
Van Buren	1,254	25	313	312	289	320	283	327	1 00	92	1 02	90	1 04
Total	22,364	25	5,613	5,540	5,225	5,611	5,393	5,538	99	93	1 00	96	99
(d) SOUTHERN MICHIGAN INDUSTRIAL COUNTIES													
Bay	996	29	291	294	299	224	221	288	1 01	1 03	77	76	99
Berrien	1,298	34	439	410	382	271	278	389	93	87	82	63	89
Calhoun	1,326	34	452	458	435	417	484	448	1 01	96	92	1 07	99
Jackson	1,412	35	493	459	413	445	438	468	93	84	90	89	99
Kalamazoo	1,210	34	407	414	435	331	330	417	1 01	1 07	81	81	1 02
Monroe	1,197	30	356	320	356	265	247	335	90	1 00	74	69	94
Muskegon	1,203	31	369	335	359	280	285	367	91	97	76	77	99
Ottawa	1,399	26	380	340	377	356	353	361	94	1 05	99	98	1 00
St Clair	1,499	28	415	411	381	395	346	422	99	92	95	83	1 02
Washtenaw	1,350	32	434	428	433	463	498	433	99	1 00	1 07	1 15	1 00
Total	12,890	31	4,016	3,869	3,870	3,447	3,480	3,946	96	96	86	87	98
Genesee	1,402	30	415	374	494	370	350	397	90	1 19	89	84	96
Ingham	1,154	31	382	333	401	300	286	348	92	1 11	83	79	96
Kent	2,010	30	599	590	533	548	546	592	98	89	91	91	99
Macomb	1,270	27	341	317	441	281	287	311	93	1 29	82	84	91
Oakland	2,391	25	595	602	678	524	503	676	1 01	1 14	88	85	1 14
Saginaw	1,647	24	393	383	427	353	362	371	97	1 09	90	92	94
Total	9 874	27	2,705	2,599	2,974	2,376	2,334	2,695	96	1 10	88	86	1 00
(e) MISCELLANEOUS													
Wayne	1,557	30	463	448	577	468	459	495	97	1 25	1 01	99	1 07
Grand Total	85,317	26	22,529	21,996	22,384	21,921	21,334	22,213	98	99	97	95	99

Also of primary road importance are the collector-distributor routes which supplement the basic grid network to provide complete access to centers of traffic interest and to provide adequate intra-county and inter-county mobility. These roads should be laid out on a rectangular grid pattern. Although traffic volumes should serve as a guide in the selection of a route, they are not necessarily a controlling factor.

In the rural agricultural areas, the routes should be spaced from three to four miles apart. In the highly developed residential areas surrounding metropolitan centers, routes spaced one mile apart may be justified. In the sparsely settled areas, the uses made of the land should be the controlling factor in establishing the need for collector-distributor routes.

Topographical conditions must be considered in the location analysis of each road-way section. In general, large developed lakes may require additional primary routes around their shores and wide rivers may require routes along both sides. The location of large industries, auction centers, public institutions, parks, etc., may also increase the need for additional routes.

### City and Village Major Street Systems

Most of this paper is devoted to the principles of rural road classification, related studies and a 5-year experience with the administration of 83 county primary road systems. In general, the same principles can be applied to the task of identifying and segregating the city and village streets that are the more important for transportation service.

In 1951 the city officials, governing bodies, mayors, directors of public work, city engineers, and village clerks had little background in the field of street classification. There was very little information available and few cities had traffic information or city plans to guide them.

The city officials were given instructions and criteria for selecting their major street systems and establishing their street mileage. They were obliged to furnish their own maps and establish new mileage records. They were requested to designate, certify and submit a system of major streets with the mileage of the certified major streets and the local streets along with all supporting data available.

TABLE 2

COMPARISON OF MAJOR STREET MILEAGE ON JULY 1, 1952 AND ON JULY 1, 1956 BY POPULATION GROUPS

Population Group	Number of Places		Major St Mileage		Total St Mileage		Percent Major St		Difference
	1952	1956	1952	1956	1952	1956	1952	1956	
State Totals	488	501	3,329 74	3,734 05	12,252 15	13,514 39	27 2	27 6	0 4
1,000,000 and over	1	1	574 98	608 04	2,447 53	2,630 10	23 5	23 1	0 4
100,000-250,000	2	2	229 99	238 55	858 56	871 75	26 8	27 4	0 6
Group Average			115 00	119 28	429 29	435 88	26 8	27 4	
50,000-100,000	7	7	364 93	399 94	1,392 46	1,451 58	26 2	27 6	1 4
Group Average			52 13	57 13	198 92	207 38	26 2	27 6	
25,000-50,000	10	10	289 56	313 64	1,055 09	1,105 06	27 4	28 4	1 0
Group Average			28 96	31 36	105 51	110 51	27 4	28 4	
20,000-25,000	4	5	47 11	62 05	183 84	268 52	25 6	23 1	-2 5
Group Average			11 78	12 41	45 96	53 70	25 6	23 1	
15,000-20,000	19	20	331 96	380 84	1,268 60	1,517 77	26 2	25 1	-1 1
Group Average			17 47	19 04	66 77	75 89	26 2	25 1	
10,000-15,000	13	13	175 48	193 44	615 48	709 12	28 5	27 3	-1 2
Group Average			13 50	14 88	47 35	54 55	28 5	27 3	
5,000-10,000	37	37	344 00	384 01	1,197 77	1,365 39	28 7	28 1	-0 6
Group Average			9 30	10 38	32 37	36 90	28 7	28 1	
2,500-5,000	47	50	255 14	308 16	869 70	976 22	29 3	31 6	2 3
Group Average			5 43	6 16	18 51	19 52	29 3	31 6	
2,000-2,500	29	30	107 66	122 88	374 05	426 06	28 8	28 8	--
Group Average			3 71	4 10	12 90	14 20	28 8	28 8	
1,500-2,000	41	43	125 10	152 98	448 73	502 79	27 9	30 4	2 5
Group Average			3 05	3 56	10 94	11 69	27 9	30 4	
1,000-1,500	57	58	128 86	153 16	452 32	500 51	28 5	30 6	2 1
Group Average			2 26	2 64	7 94	8 63	28 5	30 6	
500-1,000	101	104	188 34	230 80	599 80	682 22	31 4	33 8	2 4
Group Average			1 86	2 22	5 93	6 56	31 4	33 8	
0-500	120	121	166 63	185 56	488 22	507 30	34 1	36 6	2 5
Group Average			1 39	1 53	4 07	4 19	34 1	36 6	

The initially submitted street systems were reviewed in the office by the staff. It was found desirable to check each major street system in the field and where necessary make adjustments with the local officials. Upon the return to the office, each adjusted major street system was reviewed by the section head with the field representative. These reviews supplemented with staff conferences accomplished a consistent treatment of large cities, small cities, and villages.

The field work included a general inventory of principal land uses. These were recorded on a map of the village with supplemental notes. This information was background and the justification for the designation of major streets. This information in files has been useful in judging the merits of proposed changes in and additions to the major street system. In many instances proposed changes can be approved without a field investigation.

Table 2 is a comparison by population groups of the average major street mileage, approved in 1956. The figures show the expansion of cities and the evidence that the extent of major street systems can be limited through good administrative procedures using sound basic principles. From 1952 to 1956 the major street systems have only increased by 0.4 percent. The detail of the figures shows that this increase occurred in the smaller places.

In the initial submission in 1951, the smaller cities and villages had difficulty in dividing their streets into major and local street systems. This resulted in over emphasis of the importance of many local streets and submission of nearly 100 percent major street systems. To accomplish the tasks of completing the review of 488 city and village street systems required the services of additional personnel who had to be trained in the classification procedures. These field representatives were instructed to hold the percentage of major streets to a minimum. In many instances these instructions were over applied and resulted in some inequities which have been gradually corrected.

Table 3 is a comparison of arterial street mileage by population groups, July 1, 1952 and July 1, 1956 and shows more clearly the changes that have occurred in the 5-year period. Arterial street mileage is the combined mileage of state trunklines, county primary roads, and major streets. When all the arterial streets are taken into account, it appears that the percentage has decreased by 0.2 since 1952.

TABLE 3  
COMPARISON OF ARTERIAL STREET MILEAGE ON JULY 1, 1952 AND ON JULY 1, 1956 BY POPULATION GROUPS

Population Group	Number of Places		Arterial St. Mileage		Total St. Mileage		Percent Arterial St.		Difference
	1952	1956	1952	1956	1952	1956	1952	1956	
State Totals	488	501	4,855 25	5,274 10	13,798 34	15,085 28	35 2	35 0	-0 2
1,000,000 and over	1	1	743 47	779 30	2,616 02	2,802 59	28 4	27 8	-0 6
100,000-250,000	2	2	276 59	280 27	905 16	913 47	30 6	30 7	0 1
Group Average			138 30	140 14	452 59	456 74	30 6	30 7	
50,000-100,000	7	7	509 35	533 39	1,536 88	1,586 45	33 1	33 6	0 5
Group Average			72 76	76 20	219 55	226 63	----	33 6	
25,000-50,000	10	10	389 91	410 75	1,155 44	1,203 65	33 7	34 1	0 4
Group Average			38 99	41 08	115 55	120 36	33 7	34 1	
20,000-25,000	4	5	67 27	92 93	204 00	300 30	33 0	30 9	-2 1
Group Average			16 83	18 59	51 01	60 06	33 0	30 9	
15,000-20,000	19	20	510 86	570 31	1,447 80	1,712 44	35 3	33 3	-2 0
Group Average			26 89	28 52	76 19	85 62	35 3	33 3	
10,000-15,000	13	13	252 05	306 27	692 15	822 47	36 4	37 2	0 8
Group Average			19 39	23 56	53 24	63 27	36 4	37 2	
5,000-10,000	37	37	512 59	545 41	1,375 56	1,536 78	37 3	35 5	-1 8
Group Average			13 85	14 74	37 17	41 54	37 3	35 5	
2,500-5,000	47	50	395 26	448 40	1,010 12	1,117 46	39 1	40 1	1 0
Group Average			8 41	9 87	21 49	22 35	39 1	40 1	
2,000-2,500	29	30	171 67	186 21	438 66	489 61	39 1	38 0	-1 1
Group Average			5 92	6 21	15 13	16 32	39 1	38 0	
1,500-2,000	41	43	198 00	224 22	522 03	575 74	37 9	38 9	1 0
Group Average			4 83	5 21	12 73	13 39	37 9	38 9	
1,000-1,500	57	58	288 73	253 93	554 19	604 50	41 3	42 0	0 7
Group Average			4 01	4 48	9 72	10 42	41 3	42 0	
500-1,000	101	104	325 56	358 33	742 12	812 23	43 9	44 1	0 2
Group Average			3 22	3 45	7 35	7 81	43 9	44 1	
0-500	120	121	273 94	284 38	598 21	607 59	45 8	46 8	1 0
Group Average			2 28	2 35	4 98	5 02	45 8	46 8	

The table presented here is a summary. It shows the averaged changes. The detail table giving the mileage values and ratios for each city and village is useful as a guide in controlling the mileage of major streets. Should the percentage of major streets for the place be low, the group figure indicates a liberal attitude can be applied. Should the percentage of major streets be high, a thorough review of the qualifications of all streets in the system should be made.

The following excerpt from the Michigan administrative procedures defines the transportation streets that comprise the 501 major street systems: "Major streets are the streets of greatest general importance in each city and village. They are the streets that serve relatively high traffic volumes and lead to or connect with other streets that lead to areas where people go and congregate for commercial, occupational, industrial, medical, social, recreational and educational activities. These major city and village streets integrate with the state trunkline routes and county primary roads to form in each city and village a system of streets that serve the traffic generating centers and the principal requirements of motor vehicle highway transportation. They are the streets serving the following requirements of motor vehicle highway transportation:

- "1. Extensions of rural state trunklines and county primary roads leading directly to the central business district and to other important traffic generating centers.
- "2. Streets connecting the industrial centers with other major streets and with other related industries and transportation terminal facilities.
- "3. Streets that connect the principal transportation terminals and warehouse areas with other major streets, state trunklines and county primary roads.
- "4. Streets that are designated as truck routes for through traffic and between important traffic centers within the municipality.
- "5. Streets that are operated for a considerable distance as one-way traffic.

"Streets serving the following requirements of motor vehicle highway transportation may be major streets when warranted by the kind and quantity of traffic served:

- "1. Streets that provide direct connections between other major streets and large educational institutions which attract considerable passenger car or school bus traffic.
- "2. Streets that are used by traffic and are closely parallel to traffic congested major streets.
- "3. Streets that provide for the circulation of traffic in and around the central business district.
- "4. Streets providing direct connections between other major streets and hospitals, parking lots, industries, parks and other centers of comparable activity.
- "5. Streets that are judged to be desirable for development as major streets."

### Summary and Conclusion

This discussion has covered a few points in a 15-year experience in the area of road and street classification. The experience began in an effort to find a formula using social economic factors to guide the limitation of federal aid secondary mileage in each county. It was followed by the arbitrary designation of federal aid secondary systems. The initial systems were established without the knowledge or sanction of the jurisdictionally responsible county officials. When the extent and character of the systems became known to the county authorities their protests were so great that approval of the system had to be cancelled.

This pointed to the need for the development of a practical method of road and street classification with principles and criteria that would be accepted and used by county road officials. The method described in this paper was adopted and put into use in the selection of a partial federal aid secondary system in 1945. (4) With the principles, criteria, and visual data the counties selected the FAS systems in cooperation with the department representative. The department representative was a person of outstanding background, highway engineering and administration experience with an excellent ability in the field of government relations. Within a year the county officials reversed their attitude and they became well satisfied with the results. They selected the road

systems with their knowledge of local condition subject to the principles, criteria and guidance furnished by the state.

The basic principles, criteria and methods have been followed in all subsequent selections, reviews and approvals of road and street systems both official and unofficial.

Five years of experience with the administration of principal county road and city and village street systems have demonstrated that the extent of these systems can be controlled and kept with reasonable limits. They can be limited to a reasonable extent in a local environment of pressure to improve local roads and streets and the incentive to increase income through higher street classification.

The interpretation of Table 1 is that a formula is necessary to guide the selection, determination and administration of county primary road systems. It also can be interpreted that in a state of varied economy like Michigan, the local controlling factors are numerous and have not been formulized. When the local controlling factors are not identified and formulized one must resort to knowledge of local conditions. The actual county primary road systems that have proved satisfactory for highway administration have been brought into existence by the application of formula guides, criteria, mapped experiences, and data with a knowledge of local conditions.

In developing and using formulas there is a chance that the factors in the formula are subject to variations that may be as great as the variation with the actual. County boundaries and the subdivision of the included factors are arbitrary rather than natural.

For these and other reasons experience and comprehensive data along with knowledge of local conditions are essential tools to be used for judging the qualifications of routes and extent of county primary road systems.

Cities and villages have arbitrary boundaries originally established for a variety of objectives that are not associated with the social economic base. There are cities within cities, bedroom towns, industrial towns, great variations in population density, etc. It is impractical to identify all of the factors, give them proper weight, and formulize.

The comparisons in Tables 2 and 3 are evidence that accumulated data and a knowledge of local conditions is currently adequate for the selection, determination and administration of major street systems. However, a great deal more should be known about the highway transportation requirements of cities and how the street patterns can be adapted to the transportation requirements.

#### REFERENCES

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