TRAFFIC GROWTH TRENDS

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SYNOPSIS

"Will future traffic be concentrated upon a relatively small mileage of the present primary highway network?" This paper entitled "Traffic Growth Trends" attempts to answer the question as authoritatively as possible with the data available insofar as it applies to the State of Ohio Ohio offers a productive field for traffic research For analytical purposes the State has been divided into rural and urban areas

For the study representative mileage on the State highway system of roads of both primary and secondary importance were selected. Rates of changes of traffic volume on selected roads as compared with a base year, 1936, were computed. From these computations indices were computed and applied to five geographical areas These areas were established on the basis of traffic and economic importance, comprising the entire State

In four of the five divisions, analysis indicates that traffic will increase on primary and secondary roads in approximately the same ratio In the remaining fifth division, the trend apparently tends towards an increase on primary roads

To further the analysis the five divisions of the State were divided into industrial and agricultural divisions. Four areas signify that traffic probably will increase in industrial counties in about the same ratio as in agricultural counties but with possibly a slight increase in concentration in the latter. One area was not thoroughly investigated because of paucity of information on secondary roads in agricultural counties. In industrial counties if traffic concentration develops, it probably will occur on primary roads

A close correlation between traffic and economic welfare is denoted Due to fragmentary data it is impossible to determine if primary and secondary roads are affected differently.

Analysis of several important parallel primary roads in the State shows that mileage tends to influence traffic concentration to a greater degree than surface types, grades, or curvature.

With reference to parallel roads, population trends will, of course, continue to be one of the chief factors, but highway construction and maintenance programs of improvement will prove of equal importance since traffic will continue to seek out the shortest and best road.

Knowledge of traffic growth trends as related to past, present and future highway usage is of fundamental importance to the road builder. It provides a basis for sound, economic planning and assists in the solution of such specific problems as roadway location and relocation, pavement and structural design The importance of knowing if future traffic increase will be concentrated upon a relatively small mileage of the present highway network is, therefore, obvious.

It is the purpose of this paper to indicate what this answer may be inasmuch as a definitive answer cannot yet be given from the volume of information available.

The State of Ohio with its widespread system of rural State roads offers a productive field in which a study of traffic growth trends may be undertaken. Its 110 municipalities of more than 5,000 population are geographically distributed throughout the State, its principal urban areas being concentrated in eight cities of more than 100,000 population. location with respect to other states necessarily results in a comparatively large out-of-state traffic flow over its primary road net, and its rural agricultural areas, with their related farm-tomarket demands, are serviced by State routes of secondary as well as primary importance There is only one area in the entire State located farther than five miles from a State route.

How traffic growth has been distributed in the past in Ohio can be determined quite accurately from various traffic surveys made on the State highway The first step toward an answer to the question of traffic growth trends was to compute a traffic index. To this end a representative mileage of the State system was selected and classified into roads of primary importance and roads



Figure 1. Industrial and Agricultural Counties of Ohio by Division

system during the period 1925 to 1936 by both the Traffic Bureau of the Ohio State Highway Department and by the Ohio Highway Planning Survey, a cooperative project of the Ohio State Highway Department and the United States Public Roads Administration. of secondary importance and the state was divided into five areas or divisions on the basis of traffic and economic importance as illustrated in Figure 1 Rates of change upon the base year of 1936 traffic volume were then computed for the years 1925, 1930, 1931, 1932 and 1934 for each traffic survey station on these particular roads. A weighted geometric average of these relatives was then taken for the several years, the weight assigned being the mileage for which each individual rate was held to The resulting indices are be applicable given in Table 1.

TABLE 1

TRAFFIC INDICES FOR PRIMARY AND SECONDARY STATE ROADS IN OHIO Re

used o	n 1936	= 100
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Classification	1925	1930	1931	1932	1934	1936
Division 1						
Primary	42	95	104	94	98	100
Both	43	98	105	94	102	100
Secondary	44	101	107	95	106	100
Division 2						
Primary	28	91	104	82	101	100
Both	28	92	105	85	100	100
Secondary	34	105	119	96	99	100
Division 3						
Primary	37	93	96	84	103	100
Both	45	95	96	86	103	100
Secondary	67	99	96	90	103	100
Division 4						
Primary	34	86	90	87	96	100
Both	34	86	89	86	97	100
Secondary	34	85	87	85	98	100
Division 5						
Primary	37	89	91	85	101	100
Both	39	88	93	83	100	100
Secondary	42	86	95	81	99	100
All State						
Primary	36	90	96	88	99	100
Both	38	91	96	87	100	100
Secondary	40	91	96	87	101	100

Indices for primary and secondary roads within each division were computed as well as for the State as a whole.

Necessity rather than choice dictated the use of 1936 as a base year. The most complete traffic survey ever made in Ohio was completed in that year. Because of this it is understandable if the tabulated indices do not bring out clearly the desired emphasis. If, however, each index number for primary roads of, for example, Division 1 were to be expressed as a multiple of the 1925 index for primary roads in this division as given in Table 2, and if the same procedure is followed for secondary roads of Division 1, the two series of multiples then being compared, it is obvious that insofar as this particular division is concerned no definite trend yet has been established;

TABLE 2

TRAFFIC INDEX NUMBERS FOR "PRIMARY" AND "Secondary" Roads of the Divisions and OF THE STATE EXPRESSED AS MULTIPLES OF THEIR 1925 INDEX NUMBERS

	1	925	1	930	1	931	1	932	1	934	1	936
Division 1	_ -		-		-		-		-		-	
Primary	1	00	2	26	2	48	2	24	2	33	2	38
Secondary	1	00	2	30	2	43	2	16	2	41	2	27
Division 2												
Primary	1	00	3	25	3	71	2	96	3	61	3	57
Secondary	1	00	3	09	3	50	3	11	2	91	2	95
Division 3			1									
Primary	1	00	2	51	2	59	2	27	2	78	2	70
Secondary	1	00	1	48	1	43	1	34	1	54	1	49
Division 4												
Primary	1	00	2	53	2	65	2	56	2	82	2	94
Secondary	1	00	2	50	2	82	2	50	2	88	2	94
Division 5		-										
Primary	1	00	2	41	2	46	2	30	2	73	2	70
Secondary	1	00	2	05	2	26	1	93	2	36	2	38
The State			_		-							
Primary	1	00	2	50	2	67	2	44	2	75	2	78
Secondary	1	00	2	28	2	40	2	18	2	52	2	50

which would seemingly indicate that traffic increase is concentrating upon those roads in the primary classification.

Following the same procedure for the remaining four divisions (Table 2) it will be found that the conclusion arrived at for Division 1 also holds for Division In Division 2 a trend toward con-4 centration of traffic increase upon primary roads seems fairly well established. In Divisions 4 and 5 the disparity between the two series of multiples since 1930 has remained comparatively con-

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stant indicating that future increases in traffic will be distributed among the two road classes in approximately the same ratio as in the past. However, further concentration of traffic increase upon primary roads should not be precluded. This conclusion holds likewise for the State as a whole.

TABLE 3

TRAFFIC INDICES FOR PRIMARY AND SECONDARY STATE ROADS IN THE INDUSTRIAL

COUNTIES OF OHIO

Based on 1936 = 100

Classification	1925	1930	1931	1932	1934	1936
In Division 1						_
Primary	40	93	105	95	99	100
Both	44	98	106	95	103	100
Secondary	50	103	106	96	108	100
In Division 2						
Primary	28	90	104	82	102	100
Both	28	90	105	85	102	100
Secondary	34	105	119	106	99	100
In Division 3						
Primary	38	94	96	83	101	100
Both	45	96	98	85	101	100
Secondary	79	104	108	88	100	100
In Division 4						
Primary	41	89	96	92	99	100
Both	37	82	93	89	99	100
Secondary	33	77	89	96	99	100
In Division 5						
Primary	45	90	88	80	99	100
Both	47	94	88	82	97	100
Secondary	51	102	88	84	94	100
All Industrial Counties						
Primary	38	91	99	88	100	100
Both	41	92	99	89	101	100
Secondary	46	95	100	91	103	100

the State were classified into two groups, 54 agricultural and 34 industrial Index numbers were computed not only for each of these two classes of counties within each division but also for the two road classes within each county group of each division (Table 3 and 4).

Because it could be argued that insofar

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TRAFFIC INDICES FOR PRIMARY AND SECONDARY STATE ROADS IN THE AGRICULTURAL COUNTIES OF OHIO

Based on 1936 = 100

Classification	1925	1930	1931	1932	1934	1936
In Division 1						
Primary	46	98	103	93	98	100
Both	40	98	104	93	99	100
Secondary	33	98	109	92	101	100
In Division 2				-		
Primary	29	102	105	101	90	100
Both						
Secondary						
In Division 3						
Primary	27	83	95	88	113	100
Both	46	93	90	91	110	100
Secondary	58	96	88	93	108	100
In Division 4			•••			-00
Primary	30	86	87	85	94	100
Both	32	87	87	85	95	100
Secondary	35	89	86	85	97	100
In Division 5						
Primary	35	88	92	86	101	100
Both	37	86	94	84	100	100
Secondary	40	84	97	81	99	100
All Agricultural Counties						
Primary	35	90	93	87	98	100
Both	36	89	93	86	99	100
Secondary	37	89	93	85	90	100
		00		~		100

In lieu of 1940 detailed Census information and basing conclusions upon 1930 data concerning the number of persons gainfully employed in agriculture as related to the total number of persons gainfully employed in each county (using a ratio of 25 per cent employed in agriculture as cut-off point) the 88 counties of as all five divisions are concerned a breakdown by road classes within each county classification is too fine, it will be sufficient to determine how roads of both primary and secondary classes within industrial counties fare as compared to those of agricultural counties in each division (Table 5). Proceeding similarly, comparisons of the series of multiples reveal that in Divisions 1, 4, and 5 the disparity between the series has remained quite constant since 1930 or 1931, thus indicating that for these three divisions future increases in traffic will probably be distributed between agricultural and industrial counties in almost the same ratio as in the past. However, there appears that a tendency toward concentration is not definitely precluded —and if it occurs, concentration appears

TABLE 5

TRAFFIC INDEX NUMBERS FOR INDUSTRIAL AND AGRICULTURAL COUNTIES OF THE DIVISIONS AND OF THE STATE EXPRESSED AS MULTIPLES OF THEIR 1925 INDEX NUMBERS

	1	925	19	930	1	931	1	932	1	984	11	936
Division 1												
Industrial	1	00	2	23	2	41	2	16	2	34	2	27
Agricultural	1	00	2	45	2	60	2	32	2	48	2	50
Division 3					ŀ							
Industrial	1	00	2	13	2	18	1	89	2	24	2	22
Agricultural	1	00	2	02	1	96	1	98	2	39	2	17
Division 4							ŀ					
Industrial	1	00	2	22	2	51	2	41	2	68	2.	.70
Agricultural	h	00	2	72	2	72	2	66	2	97	3	12
Division 5					1							
Industrial	1	00	2	00	1	87	1	74	2	06	2	13
Agrıcultural	1	00	2	32	2	54	2	27	2	70	2	70
The State			Γ		Γ				Γ		Γ	
Industrial	1	00	2	24	2	41	2	17	2	46	2	44
Agricultural	1	00	2	47	2	58	2	39	2	75	2	.78

more likely upon roads in agricultural counties, since this series of multiples is above the series for industrial counties

In Division 3 no definite trend toward concentration upon the roads of either group of counties is pronounced. In Division 2 no comparison in this respect can be determined inasmuch as data for the secondary roads in the single agricultural county of this division were analysed.

The conclusion stated for Divisions 1,

4, and 5 holds also for the State as a whole, excepting that a slight trend toward concentration of future traffic increase upon roads of agricultural counties is somewhat more evident

It is possible for the State as a whole to make the breakdown into road classes within each county grouping (Table 6). In the industrial counties the disparity between the series of multiples for primary and secondary roads is considerably greater than for the agricultural counties. In both instances the primary road series lies above the series for secondary roads and in both instances the disparity

TABLE 6

TRAFFIC INDEX NUM	BERS FO	r "Prim	ARY" AND
"Secondary" Ro	ADS IN	THE IN	DUSTRIAL
AND AGRICULTUR	AL COU	UNTIES,	Respec-
TIVELY, OF OHIO I	Express	ED AS M	ULTIPLES
OF THEIR 1925 INC	DEX NUM	IBERS	

	1	925	1	930	1	931	1	932	1	934	1	936
Industrial coun- ties of Ohio Primary Secondary Agricultural coun- ties of Ohio	1	00 00	22	39 07	22	61 17	2 1	32 98	2	63 24	2 2	63 17
Primary	1	00	2	57	2	66	2	49	2	80	2	86
Secondary	1	00	2	41	2	51	2	30	2	68	2	70

between the primary and secondary series is quite constant since 1930, indicating again that future traffic increase is likely to be distributed in the same ratio as in the past. If a trend toward concentration should develop it will probably occur upon primary roads of industrial counties as compared with secondary roads of the same counties.

Whenever two given centers of population can be reached by two different but more or less parallel routes the question soon arises as to which route is used more frequently. To answer this question the traffic indices as shown in Table 7 were computed for several parallel routes From this table it will be seen that for the period 1925-1936

- Between Mansfield and Delphos, Ohio the increase in traffic has tended to concentrate upon Route US 30 North in preference to Route US 30 South.
- Between Columbus and Chillicothe, Ohio the increase in traffic has tended to concentrate on Route US 23 in preference to Route 104.
- Between the Cuyahoga County line and Fremont, Ohio the increase in traffic has tended to concentrate upon Route US 6 in preference to Route US 20.

The chief factors tending to influence traffic trends may reasonably be stated as follows

1. Population shifts and related or unrelated economic changes.

2. Construction of parallel or by-pass roads.

3. Condition and length of the road. In view of the fact that the 1940 Census reports will be published in the near future, an estimate of the shift in population in the last decade cannot at this time be accurately determined and therefore no attempt will be made to determine the effect of this factor upon traffic trends Concerning economic changes,

TABLE	7

TRAFFIC INDICES-SELECTED PARALLEL ROADS

Routes	Between •	1925	1930	1931	1932	1934	1936
US 30 N	Mansfield and Delphos	13	72	97	97	106	100
US 30 S	_	66	108	101	89	131	100
US 23	Columbus and Chillicothe	41	79	102	100	119	100
SR 104		52	107	152	84	73	100
US 20	Cuyahoga Co Line and Fre-	80	124	127	113	104	100
US 6	mont	22	63	76	74	80	100
US 42—SR 61	Medina and Sunbury	14	67	77	68	86	100
SR 3	-	45	103	114	86	97	100
US 40-SR 142-US 42	Columbus and Cincinnati	23	103	119	92	102	100
SR 3		29	59	63	73	94	100

- Between Medina and Sunbury, Ohio the increase in traffic has tended to concentrate upon Route US 42 and Route 61 in preference to Route 3.
- Between Columbus and Cincinnati, Ohio the increase in traffic has tended to concentrate upon Route 3 in preference to combined Route US 40—Route 142 and Route US 42.

These statements that given trends are seemingly indicated for the future, rest of course, on the tacit assumption that conditions producing these trends will continue to be in operation in the future with the same force as during the period covered by the data. it is clear that there is close correlation between traffic and prosperity or depression. Due chiefly to the fragmentary nature of the traffic data, it is difficult to discern clearly whether the traffic on primary roads fluctuates less than on secondary roads, or whether the fluctuations of traffic on roads in industrial areas are more severe than those applicable to traffic on roads in agricultural areas.

On the other hand a study of Table 6 of multiples for primary versus secondary roads reveals that where the former series is appreciably above the latter economic fluctuations do not cause the series to cross It may be safely stated that once a tendency toward concentration has set in economic fluctuations probably no longer exert a dominating influence.

Several of the yearly traffic flow maps of Ohio show it to be obvious that roads of primary importance serve as communication arteries between urban centers and their surrounding economic areas. Hence, taking the behavior of the multiple series into consideration along with this observation it seems reasonable to infer that shifts in population rather than changes in economic conditions exert the major influence upon traffic trends of primary roads as compared with those of secondary roads.

TABLE 8

PERSONS PER VEHICLE IN INDUSTRIAL AND AGRICULTURAL COUNTIES, RESPECTIVELY, BY DIVISIONS AND FOR THE STATE

	Industrial Counties	Agricul- tural Counties
Division 1	3 72	2 97
Division 2	3 93	3 40
Division 3	4 12	4 07
Division 4	340	3 12
Division 5	4 29	383
The State	3 76	3 41

For roads in industrial counties as compared with those in agricultural counties, the behavior of the series of As noted before, multiples is the same whenever a tendency toward traffic concentration appeared it was in favor of roads in the former county grouping. At first this might appear to be unexpected; however, the following facts bear out such a tendency. First, primary roads being in their nature principally transstate and interurban usually traverse agricultural as well as industrial counties. Secondly, as may be seen in Table 8 which gives the number of persons per car in industrial counties as compared to the number of persons per car in agricultural counties, there are fewer persons per car in agricultural countues, by divisions as well as for the State as a whole thereby indicating a higher degree of car ownership in agricultural areas. In addition a road use survey made by the Ohio Highway Planning Survey found that rural car owners show a decided preference for roads on the State highway system and that trip lengths are relatively short, that is of local nature. From this it appears that this tendency of roads in agricultural areas is no longer a paradox.

Turning now to the effect of parallel or by-pass roads, of condition, and of mileage upon the traffic trends, it will be recalled that Route US 30 South showed a trend of traffic concentration as compared to Route US 30 North between the cities of Mansfield and Delphos. A considerable portion of the section of Route US 30 North did not come under State administration until 1930, and other sections were subsequently improved from low type to high type surfaces Furthermore, Route US 30 South has a total length of 91.3 miles as compared with 89.3 for US 30 North. Route 104 between Columbus and Chillicothe by-passes the town of Circleville. vet the traffic increase has tended to concentrate upon that section of Route US 23 between Columbus and Chillicothe. From 1933 to 1935 most of Route 104 was improved from low type surfacing to high type surfacing. Both roads are two lanes in width with the exception of a few miles on Route US 23 in the vicinity of Columbus. The mileage outside of corporations is 391 for Route US 23 as compared with 42 0 miles for Route 104.

Between the Cuyahoga County line and the city of Fremont traffic increase has tended to concentrate upon Route US 6 as compared with Route US 20. From 1928 to 1934 Route US 6 was improved in width from two to three lanes for considerable mileage whereas on Route US 20 two lanes predominate. Both roads have high type surfacing. Mileage outside of corporations 1s 47 3 miles for Route US 6 as compared with 52.5 miles for Route US 20.

From Medina to Sunbury the traffic increase has tended to concentrate upon Route US 42 and Route 61 in preference to Route 3 Route 3 is predominantly two lanes in width and has a high type surface but in certain sections predominates in excessive grades and curves. Route US 42 is likewise predominantly two lanes in width but in the early nineteen thirties sections with low type surfacing were given high type surface treatment. Route 61 likewise has easy grades and curves between Mt. Gilead and Sunbury. The northern half of this section was given a high type surface in the early thirties, the remainder, as of 1936. still remains low type. Width is two lanes throughout. For Route US 42 and Route 61 the mileage outside of corporations is 77.5 miles as compared with 83.1 miles for Route 3.

From Columbus to Cincinnati traffic density has tended to concentrate upon Route 3 in preference to Route US 40, Route 142 and Route US 42. From 1929 to 1934 Route 3 was improved in surfacing from low to high type. Two lanes predominate on both. Mileage outside of corporations is 86.2 miles for Route 3 as compared with 81.6 miles for Route US 40, Route 142 and Route US 42.

Lacking detailed local origin and destination studies it would seem that traffic between such points has increased in the same proportion as the average density for these road sections. Analysis of the specific routes in question indicates that for parallel routes the factors governing the trend toward concentration of traffic increase generally are first, mileage, and second, surface types, grades and curvature To summarize, past history indicates that as between primary and secondary roads there have been (1) no trends toward concentration of traffic either way or, (2) it has occurred upon primary roads but seems to have reached a condition of stability.

Whether or not this condition continues, will, it seems, depend primarily upon the problematical nature of population shifts.

In comparing roads in agricultural and industrial areas the above statement concerning concentration of traffic increase also holds true, such concentration as has occurred being found in agricultural areas. The 1940 Census information thus far indicates a tendency toward greater population growth in rural or agricultural areas rather than in urban or industrial areas. If the disparity between degree of car ownership in agricultural areas versus industrial areas should continue or increase, it seems entirely possible that traffic in agricultural areas will increase at a greater rate than in industrial areas of Ohio.

With reference to parallel roads, population trends will, of course, continue to be one of the chief factors, but highway construction and maintenance programs of improvement will prove of equal importance since traffic will continue to seek out the shortest and best road.

Analysis of existing traffic survey data applicable for the year 1940 as based on recordings of automatic traffic counters installed throughout the state and on a representative distribution of special survey locations indicates that in industrial counties traffic growth has continued the predicted tendency towards concentration of an increase upon primary roads in preference to secondary roads. This holds true for primary roads in not only agricultural counties but throughout the state as a whole. There appears the additional indication that traffic growth has been distributing itself upon roads in both agricultural and industrial counties

Considering the high, medium, and low traffic groups as classified for 1936 for the state as a whole, a distinct tendency has appeared in 1940 towards concentration of traffic growth in the medium and high groups. Up to 1936 the low group was practically equal in rate of growth to the medium group. However, there still is no definite proof that would tend to indicate that traffic growth in the future will be concentrated upon roads in the high density group in preference to roads in the medium traffic group.

In analysing existing traffic data by volume groups it becomes necessary to consider the State as a unit inasmuch as a breakdown of the five divisions previously referred to indicates that area analyses are insufficient for positive conclusions. On the basis of the average 24-hour daily density traffic groups have been arranged into low, medium, and high brackets as follows.

1936 Density per average day	Group
0- 999 vehicles	Low
1000-2499 vehicles	Medium
2500 and over vehicles	High

For each of these three groups the traffic index is computed so that it is possible to trace the history of the respective survey locations that fall into the vehicular classifications

For agricultural counties the traffic indices reveal that on primary roads during the period 1925-1930, the low group of 0-999 vehicles per average 24hour day had the greatest rate of increase; the medium group was second and the high group, third. From 1930 to 1936 the rate of growth receded for all three groups, most pronounced of which was apparent in the 0-999 classification, and least for the medium and high groups for which the rate was about equal. If conditions now affecting the rate of growth continue, it is reasonable to expect future growth to concentrate

upon primary highways having densities of more than 1000 vehicles per day in agricultural counties It is noteworthy that the effect of the recent depression apparently was reflected more severely in the high density group

On secondary roads in the agricultural counties during the same period, 1925-1930, the high group had the greatest rate of increase, the low group was second and the medium group, last The rate of growth in the high and medium brackets seemingly was severely affected during the 1930-1932 period, the high group suffering the greatest set-back. By 1936, both of these groups recovered sufficiently to indicate that for the future traffic growth will tend to concentrate in the high and medium groups, in such order, with very little growth expected of the low volume group, 0-999 vehicles.

In the industrial counties of Ohio the traffic indices show that on primary roads during the period 1925–1930, the medium volume group had the greatest rate of growth, the high group, second, and the low group, third. The depression evidently was most severely felt by the high group of 2500 and more vehicles, and least by the low group of less than 1000 vehicles. Although recovery was made by both the high and medium groups, for the future the high group alone forecasts indication of continuing growth.

On secondary roads the rate of growth during the period 1925-1930 was highest for the 0-999 group, the medium group ranked second, and the high group, third. All three groups reflect the results of the depression with the high group alone failing to recover ground lost by 1936. For the future a slight growth at the best is indicated for the 1000-2499 vehicle group.

For the State as a whole it may be stated that on primary roads during the period 1925–1930, the rate of growth for low and medium traffic density groups was practically identical whereas the the extent that this group ranks first in high group ranked lowest. Again, the rate of growth and shows promise of

TABLE 9

TRAFFIC INDICES

For Agricultural and Industrial Counties of Ohio and the State as a Unit by Road Classes for Stated Density Groups

Agricultural Counties Primary I.ow 30 95 93 92 98 100 Becondary I.ow 36 91 96 88 93 83 100 100 Secondary I.ow 36 91 96 88 100 100 Both I.ow 34 82 85 76 97 100 Both I.ow 34 92 95 89 100 100 Both I.ow 34 92 95 89 100 100 Medium 36 86 90 83 97 100 High 47 88 92 82 99 100 Industrial Counties I.ow 36 102 106 98 100 100 Secondary { Low 56 102 106 98 100 100 Both { Low	Road Class	Density Groups	1925	1930	1931	1932	1934	1936
Primary Iow 30 95 93 92 98 100 Medium 34 88 92 86 97 100 High 49 88 93 83 100 100 Secondary Iow 36 91 96 88 90 83 100 100 Both Iow 34 92 95 89 100 100 Both Industrial Counties X 92 95 89 100 100 Medium 36 86 90 83 97 100 Medium 36 86 90 83 97 100 Industrial Counties Industrial Counties Ion 100 100 100 Secondary Iow 56 101 93 107 100 Medium 34 95 101 93 107 100 Secondary Iow 46 97 103 95 104 100 Both Iow <td< th=""><th>· · · · · · · · · · · · · · · · · · ·</th><th>Agricultural Cou</th><th>nties</th><th></th><th></th><th></th><th></th><th><u> </u></th></td<>	· · · · · · · · · · · · · · · · · · ·	Agricultural Cou	nties					<u> </u>
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		Low	30	95	93	92	98	100
$ \left\{ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Primary	{ Medium	34	88	92	86	97	100
Secondary Iow Medium 36 41 41 22 91 82 85 96 85 85 85 97 100 100 Both Iow Medium 34 36 86 92 85 89 92 89 81 92 100 95 89 99 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 101 100 101 100 101 100 101 100 102 100 102 100 102 100 102 100 102 100 Both Low Medium 56 34 94 102 95 95 101 193 107 100 <b< td=""><td>(High</td><td>49</td><td>88</td><td>93</td><td>83</td><td>100</td><td>100</td></b<>		(High	49	88	93	83	100	100
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		(Low	36	91	96	88	100	100
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Secondary	{ Medıum	41	82	85	76	97	100
Both Iow Medium High 34 36 47 92 88 92 82 99 99 100 100 Industrial Counties Primary Low Medium 56 34 91 101 90 102 102 100 98 100 102 100 Secondary Low High 43 41 87 95 95 82 96 100 100 102 100 Both Low Medium High 43 53 99 107 98 100 100 100 100 100 100 100 100 100 100 98 100 100 100 100 100 Both Low Medium High 35 97 97 97 94 99 100 <b< td=""><td></td><td>(High</td><td>22</td><td>87</td><td>75</td><td>65</td><td>80</td><td>100</td></b<>		(High	22	87	75	65	80	100
Both Image: Medium High 36 High 86 High 90 High 83 High 97 Hogh 100 High Industrial Counties Industrial Counties Primary Image: Medium High 34 High 91 Hol 90 Hogh 100 Hogh 100 Hogh Secondary Image: Medium High 41 Hogh 87 Hogh 95 Hogh 100 Hogh 100 Hogh Secondary Image: Medium High 43 Hogh 95 Hogh 101 Hogh 93 Hogh 100 Hogh Both Image: Medium High 53 Hogh 107 Hogh 98 Hogh 100 Hogh 100 Hogh Both Image: Medium High 53 Hogh 99 Hogh 100 Hogh 100 Hogh Both Image: Medium High 43 Hogh 95 Hogh 104 Hogh 100 Hogh Both Image: Medium High 43 Hogh 99 Hogh 100 Hogh 100 Hogh High 43 Hogh 99 Hogh 99 Hogh 100 Hogh 100 Hogh 100 Hogh Frimary Image: Medium High 43 Hogh 90 Hogh 94 Hogh 92 Hogh 100 Hogh		Low	34	92	95	89	100	100
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Both	{ Medium	36	86	90	83	97	100
Industrial Counties Primary Image: Counties Image: Counties Image: Counties Image: Counties Image: Counties Primary Image: Counties Imag	·····	(High	47	88	92	82	99	100
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	Primary	{ Medium	34	91	101	90	102	100
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		(High	41	87	95	82	96	100
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$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	Secondary	{ Medium	46	93	97	87	99	100
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$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Both	Medium	37	92	100	89	101	100
The StatePrimary $\begin{cases} & Low & 35 & 97 & 97 & 94 & 99 & 100 \\ Medium & 34 & 90 & 96 & 88 & 100 & 100 \\ High & 43 & 87 & 94 & 82 & 97 & 100 \\ & 43 & 87 & 94 & 82 & 97 & 100 \\ & Medium & 43 & 87 & 91 & 82 & 98 & 100 \\ High & 49 & 98 & 104 & 93 & 99 & 100 \\ & Medium & 36 & 89 & 95 & 86 & 99 & 100 \\ & High & 44 & 89 & 96 & 84 & 98 & 100 \\ & High & 44 & 89 & 96 & 84 & 98 & 100 \\ \hline \end{tabular}$		[] High	43	89	97	84	97	100
Primary $\begin{cases} Low \\ Medium \\ High \\ \end{cases}$ $35 \\ 97 \\ 90 \\ 96 \\ 88 \\ 90 \\ 96 \\ 88 \\ 100 \\$		The State						
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Image: Non-Secondary Image: Non-Secondary <th< td=""><td>Primary</td><td> Medium</td><td>34</td><td>90</td><td>96</td><td>88</td><td>100</td><td>100</td></th<>	Primary	Medium	34	90	96	88	100	100
Secondary Image: Constraint of the second secon	l	(Hıgh	43	87	94	82	97	100
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High 49 98 104 93 99 100 Both Low 37 93 97 91 100 100 High 36 89 95 86 99 100 High 44 89 96 84 98 100	Secondary	Medium	43	87	91	82	98	100
Both Iow 37 93 97 91 100 100 High 36 89 95 86 99 100		(Hıgh	49	98	104	93	99	100
Both Medium 36 89 95 86 99 100 High 44 89 96 84 98 100		(Low	37	93	97	91	100	100
High 44 89 96 84 98 100	Both	{ Medium	36	89	95	86	99	100
		l High	44	89	96	84	98	100

depression apparently was most severely felt by the high group but recovery was evidenced for the period 1930-1936 to continuing growth for the future. The medium group seemingly indicates slight possibilities of continuing growth, and

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little, if any, growth is estimated for the low group of 0-999 daily vehicular density.

On secondary roads, throughout the State as a whole, during the same period, 1925–1930, the low group ranked first in rate of growth The other two group rates of growth were almost identical. Effects of the depression were uniformly pronounced for routes serving traffic of 1000 and more vehicles, and were decidedly severe in the low group. Only the high group failed to recover by 1936 For the future the medium group shows the greatest promise of continued growth.

TABLE 10

1936 DISTRIBUTION OF SAMPLED ROAD MILEAGE IN THE AGRICULTURAL AND INDUSTRIAL COUNTIES AND IN THE STATE BY DENSITY GROUPS AND ROAD CLASSES

	Density Group	Primary Roads Per cent		Second- ary Roads Percent		Both Road Classes Per cent	
(Low	14	30	58	41	45	79
Agricultural	Medium	34	41	20	52	24	50
Counties	Hıgh	51	29	21	07	29	71
l	Total	100	00	100	00	100	00
(Low	9	54	22	38	15	72
Industrial	Medium	34	87	22	93	29	13
Counties	High	55	59	54	69	55	15
l	Total	100	00	100	00	100	00
(Low	11	91	48	57	35	03
E	Medium	34	64	21	18	26	15
Entire State	High	53	45	30	25	38	82
	Total	100	00	100	00	100	00
	5						

Disregarding traffic classifications by volume groups the indices indicate that in agricultural counties the three groups ranked in the order given with reference to rate of growth during the period 1925– 1930, namely, low, medium, and high. Effects of the depression evidently were more pronounced in the high group but were felt equally by the other two groups All groups had recovered by 1936, rating high, medium, and low For the future, continued growth seems most likely to be concentrated first in the high group and, second in the medium group. Industrial counties during the period 1925–1930 reflected a growth rate of medium, low, and high in the order named, the difference between the low and high groups being almost negligible. The effect of subnormal economic conditions is clearly evident in the traffic bracket of 1000 and more vehicles. For the period 1930–1936 no clear trend of growth is indicated for the low group, whereas the growth has continued in the higher classifications with the 2500 and more vehicular group promising a proportionately larger future traffic growth.

Considering the State as a unit the high group of 2500 and more vehicular density ranked lowest in rate of growth for the period 1925—1930, the other two groups being practically equal. All three groups apparently were affected during the depression with equal severity, but by 1936 the high group showed a greater recovery than the other two which again had approximately an equal rate of growth. Such trends seemingly would indicate a concentration of traffic growth in the high group for the future.

On secondary roads the rate of growth during the period 1925-1930 was highest for the 0-999 group, the medium group ranked second, and the high group, third. All three groups reflected the results of the depression with the high group alone failing to recover ground lost by 1936. For the future a slight growth at the best is indicated for the 1000-2499 vehicle group.

A review of the foregoing seemingly indicates a concentration of traffic growth on those highway sections carrying 1000 and more vehicles per average 24-hour day. Table 9 shows the traffic indices for agricultural and industrial counties of Ohio and the State as a unit by road classes for stated density groups. From Table 10, concerning the distribution of the sample's road mileage among the density group, it is possible to note the proportion of the mileage that would be affected.