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Newly Discovered Facts about Our Highway System

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Ever since the League of American Wheelmen won its first converts to the cause of "good roads" in the early 90's, there has been a common tendency to regard the problem of the highways too simply. Seen from the restricted viewpoint of the average observer, a limited aspect of the problem often appears as the whole; and ideas conceived from such a partial view have continuously embarrassed and retarded the evolution of a consistent national policy for dealing with the problem in its entirety.

In the early years of the century there were many people who believed, with D. Ward King of Missouri, that a solution of the problem was no more difficult than the faithful use of a split log drag after every rain.

Later the surfacing of roads claimed the largest measure of attention; and what had been a united band of apostles split and proliferated into sects, each firmly assured that there could be no Way but one, and that surfaced with the pavement of its particular preference.

There were in those days also many who felt that there was really nothing to the road-building problem except the single question of whether "to bond" or "pay-as-you-go," and who were convinced that with a proper answer to that question the rest would be easy.

And it was in those days, too, that we heard the first mutterings of the controversy between the advocates of intercity and farm-to-market roads - two limited-vision groups that today include as their extremist elements those, on the one hand, who would have us do nothing else until we have all-weather surfaced every mile of road traveled by a rural free delivery carrier and, on the other, those who insist that we drop everything else and build a number of transcontinental superhighways, straight as a string and uniformly broad in every section.

Divergent partial views of the highway problem account for the conflict of claims of State, county, and city governments in the apportionment of motor vehicle revenue. It is a partial view that convinces worried legislators that the improvement of roads is so far advanced that they may safely divert to other purposes large sums of the highway's own earned revenue. Other such partial views are responsible for the warring opinions currently advanced about the regulation and taxation of motor trucks; and still another for the belief - widely held today - that the existing road system is almost a total loss because of a short-sighted failure of highway engineers to provide in its creation against the generation of various kinds of traffic friction.

A variety of conditions determined the form of the existing highway improvements and these account for such as there is of present inadequacy: conditions of limited available revenue and widespread, urgentneed; of the unrevealed potentiality of the motor vehicle; of the fixity of long-life roads and the changing requirements of short-life motor cars; of the sanctity of property lines and impediments, legal, selfish, and financial, to new right of way acquisition. A knowledge of all these conditions explains most of the present inadequacies of the improved highways and relieves the highway engineer of the charge of uncommon short-sightedness.

Yet, it is true that highway officials also have viewed their job partially rather than as a whole. An understandable early pre-occupation with physical problems, associated with the design and materials of roads and their construction and maintenance, has tended to become a habit, causing roadbuilders in some instances to lose sight of the ultimate economic and social purposes of their road building. They have tended to regard the building of roads as an end in itself and not, as it really is, a means toward the facilitation of highway transportation, which, in turn, is only a part of the general system of transportation. By reason of official attachment their attention has been centered upon the roads or streets under the administration of a particular political subdivision

or government agency and, not unnaturally, they have sometimes acted as if the portion of the highway system under their care were in fact the whole highway system.

Preferential attention accorded the main highways, included in the State and Federal-aid systems, has been and remains a sound policy. While large sections of these systems remained without even a pioneer improvement it was unnecessary to look elsewhere for the most useful expenditure of road revenues; and an exclusive concentration of the principal thought and effort upon them resulted in no important error. However, as we approach a reasonably satisfactory state of the main roads, the necessity grows to think of them as the parts of the whole highway system that they actually are, and the need increases to formulate new policies comprehending a balanced development of the whole system and all its parts, both rural and urban.

It is due to a perception of these important changes in the highway situation and to a recognition of the need of a more secure factual basis upon which to found the new policies that State-wide highway planning surveys, suggested by the Bureau of Public Roads, have been undertaken by the highway departments of 46 States. In various stages of progress, these surveys are now under way in all States except New York and Delaware.

The scope of the surveys covers the entire rural highway system. For the first time an accurate inventory is being taken of all roads - recording the length and condition of all sections, and all significant roadside culture, including houses, churches, schools, stores, hotels, factories, mills, mines, quarries - everything, in fact that is associated with the origination and destination of highway traffic. For the first time also an effort is being made to estimate the flow of traffic over all rural roads and to determine the relative usage of the main and local roads, respectively, by urban and rural residents, and by what may be described, respectively, as local, and general or through traffic.

The inventory is extended into cities to cover only the condition of the streets that serve as cross connections of the principal rural highways, and to record the number of, and conditions existent at, all railroad grade crossings, completing in this respect the record previously taken at all rural grade crossings. The proportions of the task and the limited funds available have prohibited a complete inventory of city streets, and have prevented an actual count of traffic on the streets; but the immediate factual needs are being supplied as fully as possible by an assembly of all available city maps and by an estimate of the total volume of city street usage, arrived at by sampling methods that have proved their reliability.

The financial studies, which, after the inventory and traffic determinations, constitute the third major department of the surveys, cover both city street and rural road administration, and include a determination of all income collected and expenditure made for road and street purposes, the tax sources of the income, and the purposes of the expenditure. For relational purposes, the financial studies also seek to establish the total measure and classification of all tax income and expenditure for all public purposes, both urban and rural. Consideration of the street and highway figures in comparison with such totals will, it is hoped, assist the formation of a judgment of the relative adequacy or inadequacy of the highway finances.

Without attempting further to detail the complex, interrelated group of studies that compose the surveys, an idea of their usefulness may be given by a brief recital of some of the results that are now beginning to emerge and by reference to a few of the interesting facts and relations uncovered by early analyses of the field data.

One of the early results in most of the States is the production of the first really informative and reliable maps of the entire rural highway system. Drawn for each county to a scale of

one inch or more to the mile, these maps (Figure 1) show by uniform symbols the existing surface type of all roads, the location of all railroads, all navigable streams, all houses, churches, schools, and industrial establishments (also identified by uniform symbols) and a variety of other features important as information not only for highway planning but for most other public purposes, and for many of the purposes of private industry. A particularly interesting feature, to be found on no other maps, are the limits that have been drawn about the larger unincorporated urban communities. These limits have been determined, with the cooperation of the United States Census Bureau, in consideration of the actual aggregation of the population forming the community. They will be employed by the Bureau in the 1940 census for a first separate recording of the population in such communities. Faster than these maps can be completed the widespread realization of their usefulness grows, and the demand for copies is exceeding all anticipations.

Following closely the completion of these first General Highway and Transportation Maps, as they are called, another series of maps is being produced, to the same lineal scale, which will present a clear picture of the distribution and flow of traffic over the whole rural road system. (Figure 2) These are the country's first complete highway traffic maps, and they permit a

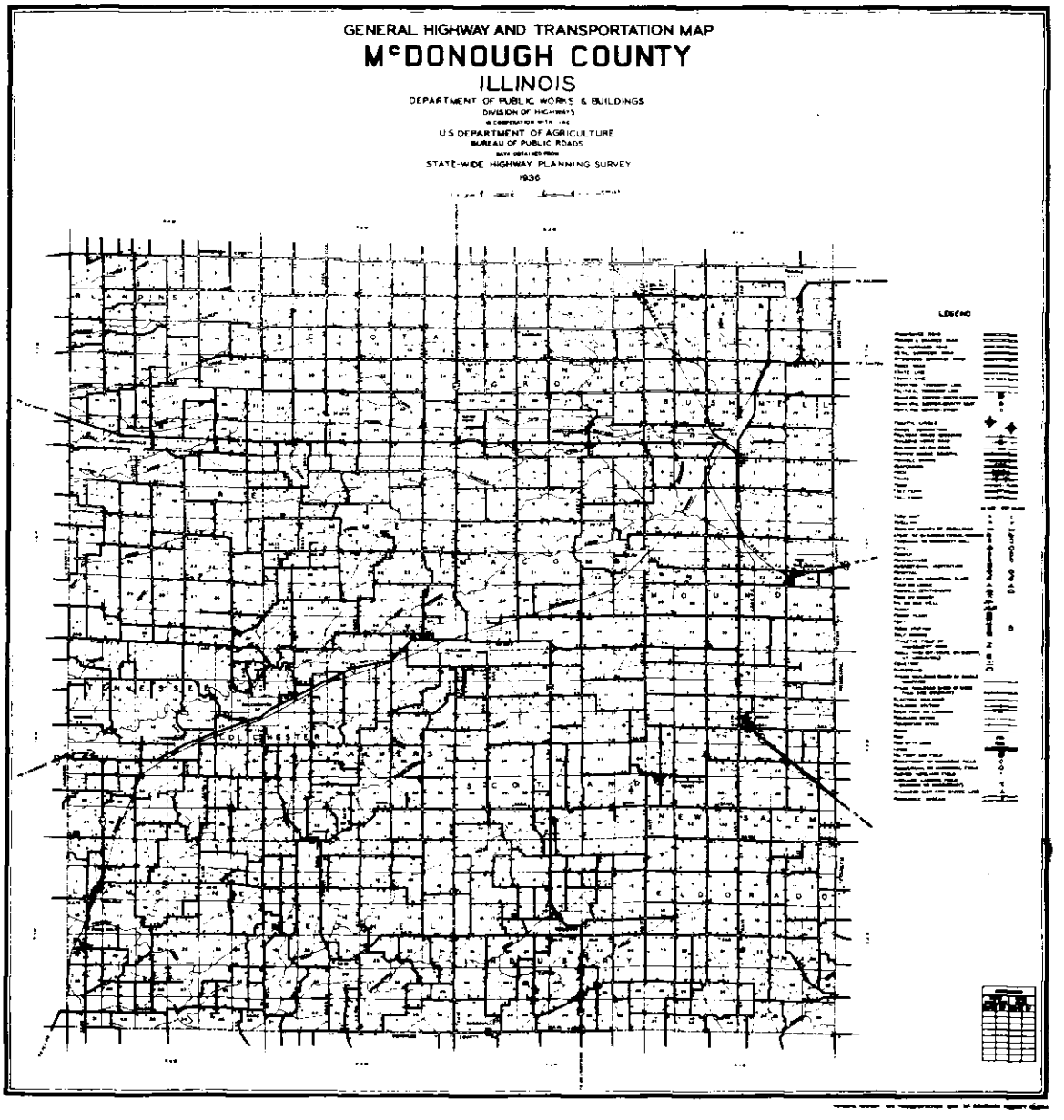

GENERAL HIGHWAY AND TRANSPORTATION MAP
McDONOUGH COUNTY
ILLINOIS
DEPARTMENT OF PUBLIC WORKS & BUILDINGS
DIVISION OF HIGHWAYS
IN COOPERATION WITH THE
U.S DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS
DATA OBTAINED FROM
STATE-WIDE HIGHWAY PLANNING SURVEY
1936

FIGURE 1

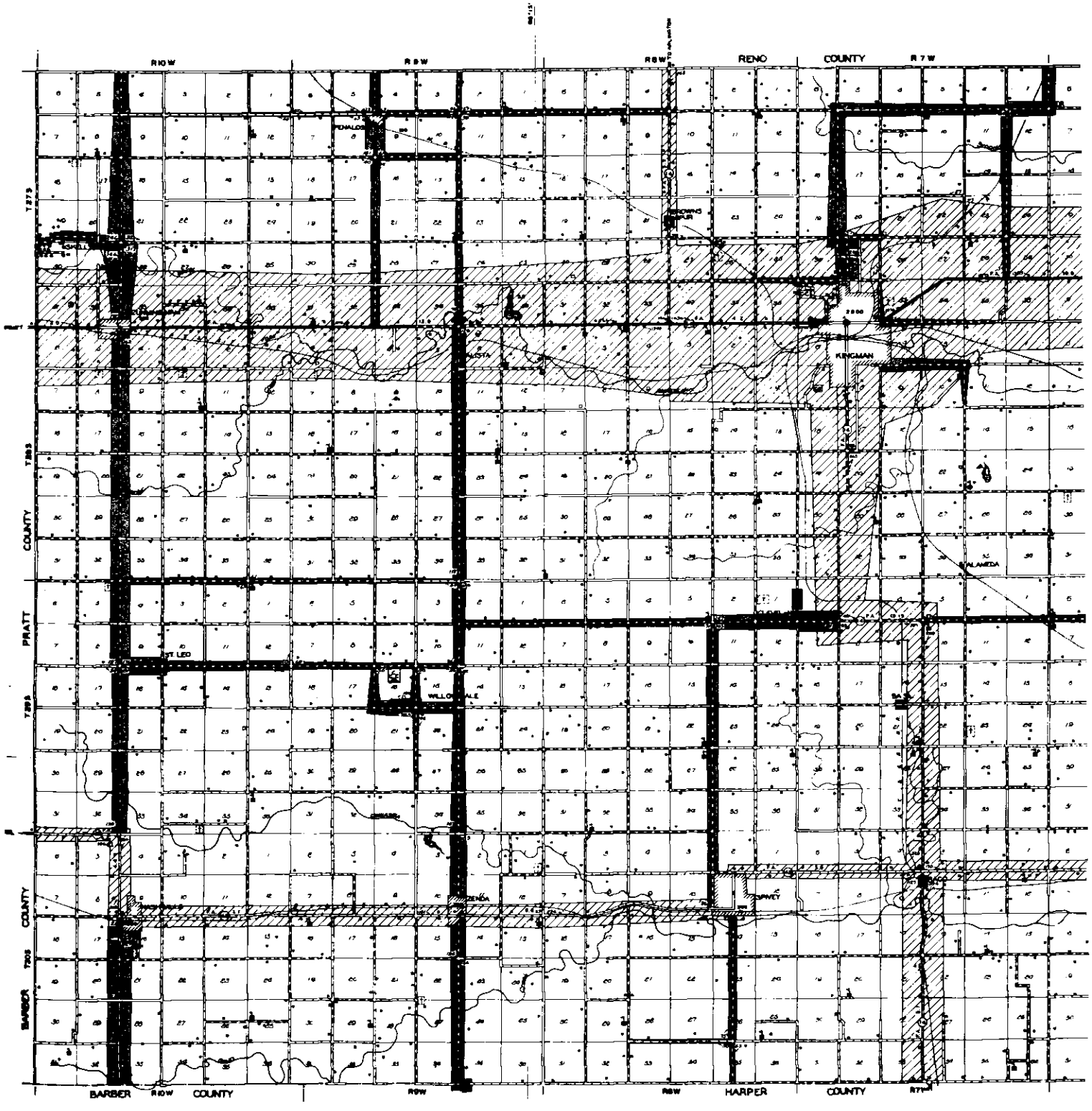
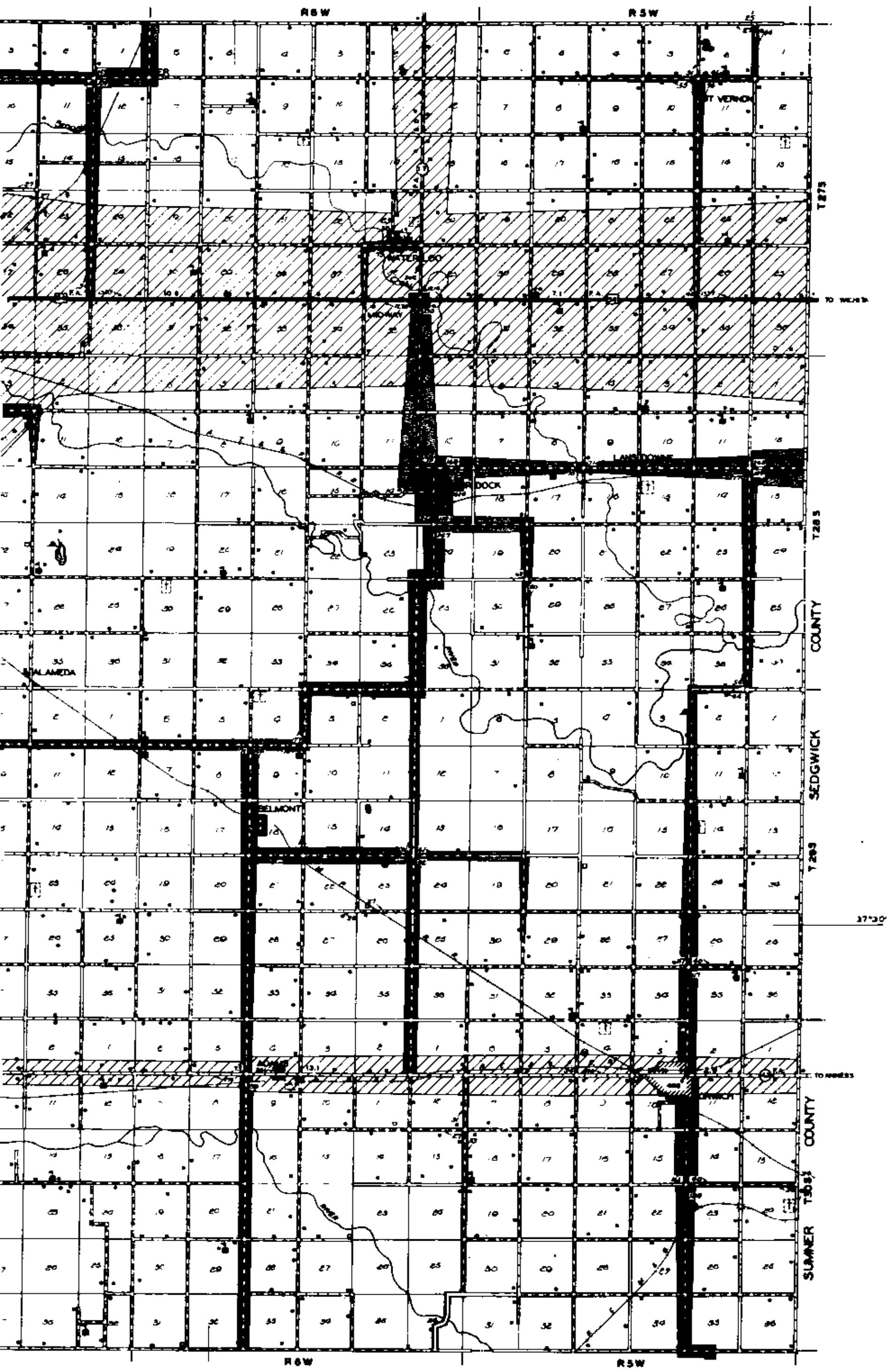

R10W
R9W
R8W
RENO
COUNTY
R7W
KINGMAN
PRATT
COUNTY
BARBER
COUNTY
HARPER
COUNTY

FIGURE 2



LEGEND

RAILWAYS

RAILROAD (ANY NUMBER OF TRACKS) USED BY SINGLE OPERATING COMPANY
RAILROAD (ANY NUMBER OF TRACKS) USED BY MORE THAN ONE OPERATING COMPANY ON SAME OR ADJACENT RIGHTS OF WAY (NOT TRACKAGE RIGHTS)
NARROW GAUGE RAILROAD
ELECTRIC INTERURBAN OR SUBURBAN RAILROAD
RAILROAD STATION

RAILROAD CROSSINGS

GRADE CROSSING
RAILROAD ABOVE
RAILROAD BELOW

AIRWAYS

ARMY NAVY OR MARINE CORPS FIELD
DEPARTMENT OF COMMERCE INTERMEDIATE FIELD
COMMERCIAL OR MUNICIPAL AIRPORT
MARKED AUXILIARY FIELD
AIRPLANE LANDING FIELD MARKED OR EMERGENCY

DRAINAGE

INTERMITTENT STREAM (NARROW)
INTERMITTENT STREAM (WIDE)
NARROW STREAM
NAVIGABLE STREAM (INTERMITTENT NAVIGATION)
DRAINAGE DITCH (MAIN) - (ARROWS POINT IN DIRECTION OF FLOW)
IRRIGATION DITCH (ARROWS POINT IN DIRECTION OF FLOW)

BRIDGE STRUCTURES

HIGHWAY BRIDGE (SHORT RIVER CROSSING)
HIGHWAY BRIDGE (LONG RIVER CROSSING)
ARCH
TRUSS (W-WOOD S-STEEL G-GIRDER)

OTHER STRUCTURES

DAM WITH ROAD
DAM WITHOUT ROAD
LEVEE
LEVEE WITH ROAD
FORD - ROAD ESTABLISHED

BOUNDARIES

STATE
COUNTY
SECTION LINE
CORPORATE LINE

CITY AND VILLAGE CENTERS

STATE CAPITAL
COUNTY SEAT
OTHER CITIES AND VILLAGES

ROAD SYSTEM DESIGNATION

UNITED STATES HIGHWAY
STATE HIGHWAY SYSTEM
FA FEDERAL AID HIGHWAY SYSTEM

PARKS AND OTHER RESERVATIONS

NATIONAL OR STATE PARK
NATIONAL INDIAN RESERVATION
NATIONAL MONUMENT
MONUMENT (SMALL)
GC GOLF COURSE OR COUNTRY CLUB
A ATHLETIC FIELD OR AMUSEMENT PARK
SP SMALL PARK (SP-STATE CP-COUNTY MP-MUNICIPAL)
FAIRGROUNDS SPEEDWAY RACE COURSE
CEMETERY

NATURAL FEATURES

PROMINENT ELEVATION

HOUSES, ETC

VACANT IN USE
FARM UNIT
DWELLING (OTHER THAN FARM)
ROW OR GROUP OF DWELLINGS CLOSELY SPACED
STORE OR SMALL BUSINESS ESTABLISHMENT
TOWNHALL GRANGE OR COMMUNITY HALL
CHURCH OR OTHER RELIGIOUS INSTITUTION
SCHOOL OR OTHER EDUCATIONAL INSTITUTION
CORRECTIONAL INSTITUTION
HOSPITAL
FACTORY OR INDUSTRIAL PLANT
CAMP OR LODGE
MINE OR QUARRY OF ANY KIND OR OPEN CUT
OIL OR GAS WELLS
TANKS
POWER PLANT
RADIO STATION
BEET DUMP
MUNICIPAL GARBAGE OR RUBBISH DUMP
STATE ROAD GARAGE OR PORT OF ENTRY
SEASONAL INDUSTRY (CANNERY OR SMALL GRAIN MILL)
FRESH AIR FARM OR REST HOME
TRIANGULATION STATION
SCENIC SITE
BIRD SANCTUARY
GAME FARM
GAME PRESERVE
GAUGING OR PUMPING STATION

SURFACE TYPE

UNIMPROVED EARTH
IMPROVED EARTH
METAL SURFACED (SAND-GRAVEL, CHATS, ETC.)
BITUMINOUS SURFACED (OIL PEN., BIT. MAT.)
PAVED SURFACE (CONCRETE, BRICK, BIT. MAC.)

MILEAGE

27.6
BETWEEN INCORPORATED CITIES
BETWEEN INCORPORATED CITIES AND JUNCTION POINTS
BETWEEN JUNCTION POINTS

TRAFFIC FLOW

COUNTY AND TOWNSHIP ROADS
FEDERAL AND STATE HIGHWAYS
SCALE 400 VEHICLES PER DAY

· TRAFFIC FLOW INDICATED WHEN IN EXCESS OF 25 VEHICLES PER DAY

N

24 HOUR ANNUAL AVERAGE

TRAFFIC FLOW MAP
KINGMAN COUNTY
KANSAS

PREPARED BY THE
KANSAS STATE HIGHWAY DEPARTMENT
IN COOPERATION WITH THE
U.S. DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS
DATA OBTAINED FROM
STATE-WIDE HIGHWAY PLANNING SURVEY

SCALE
4 MILES

1936

REVISED
REVISED
REVISED

POLYCONIC PROJECTION

clear conception of the relative traffic use of all parts of the entire road system, particularly a comparison of the usage of the State and local highways, that it has not been possible previously to obtain. Besides the indication of traffic volume, these maps also show the surface type of the highways, the location of houses and other features of the first series, and so depict a number of relations important in highway planning, particularly (1) the existing state of road improvement in relation to that indicated as desirable by traffic volume, and (2) the volume of traffic in relation to the location of traffic sources, including rural homes and industries as well as urban communities.

As the county traffic maps discover to us the relative importance of all roads in the intimate sphere of the local community, so, in the larger sphere of the State, the State traffic maps are useful, in that they present a clear picture of the location of heaviest traffic burden within the main road system of the State. (Figure 3) This is the type of traffic map made familiar by earlier traffic surveys. Viewed in the light of the far more extensive information produced by the current studies we see how limited are the concepts obtainable from the State maps; and we find much more interest in the first national traffic map which, tentatively, we have been able to construct from the still

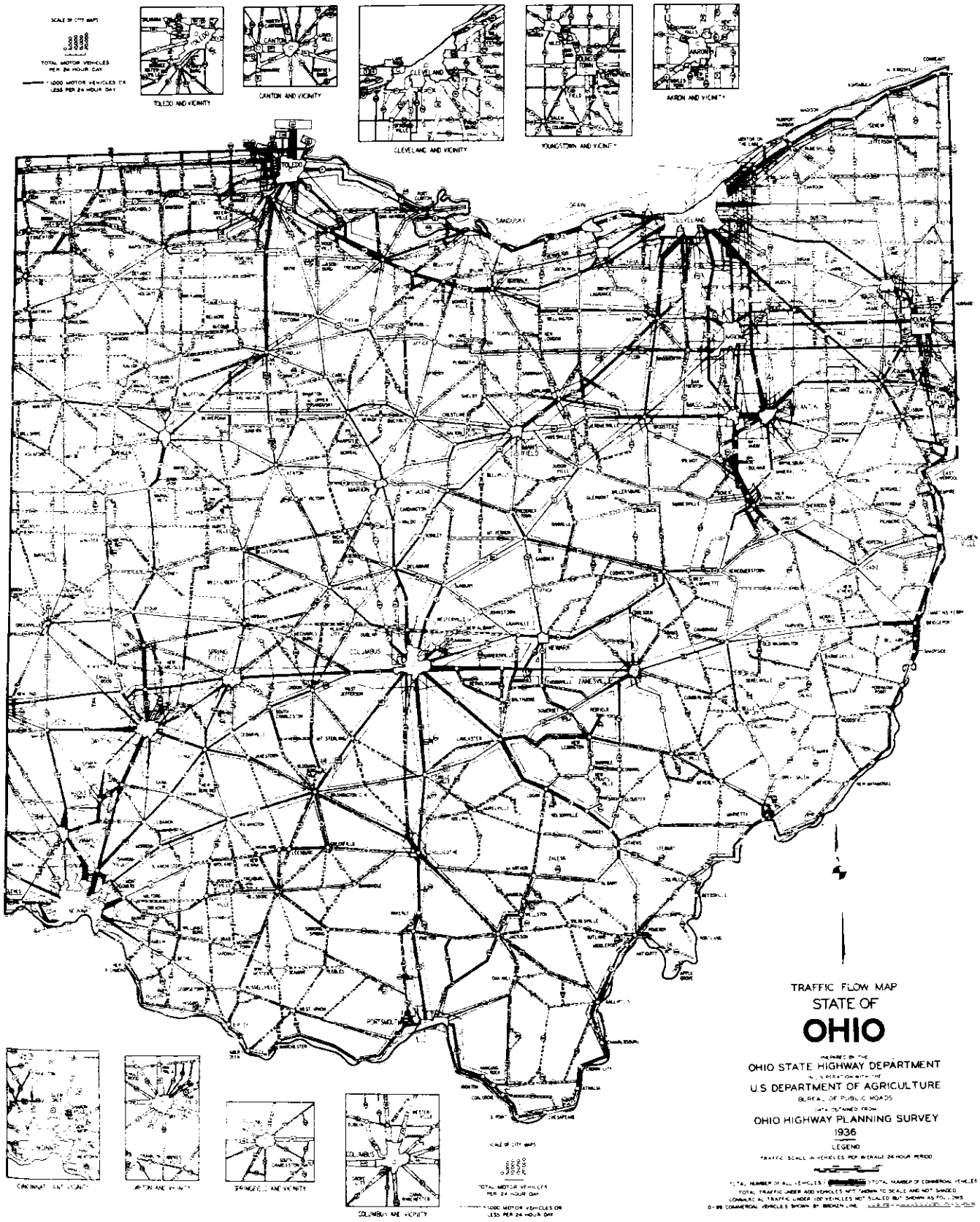
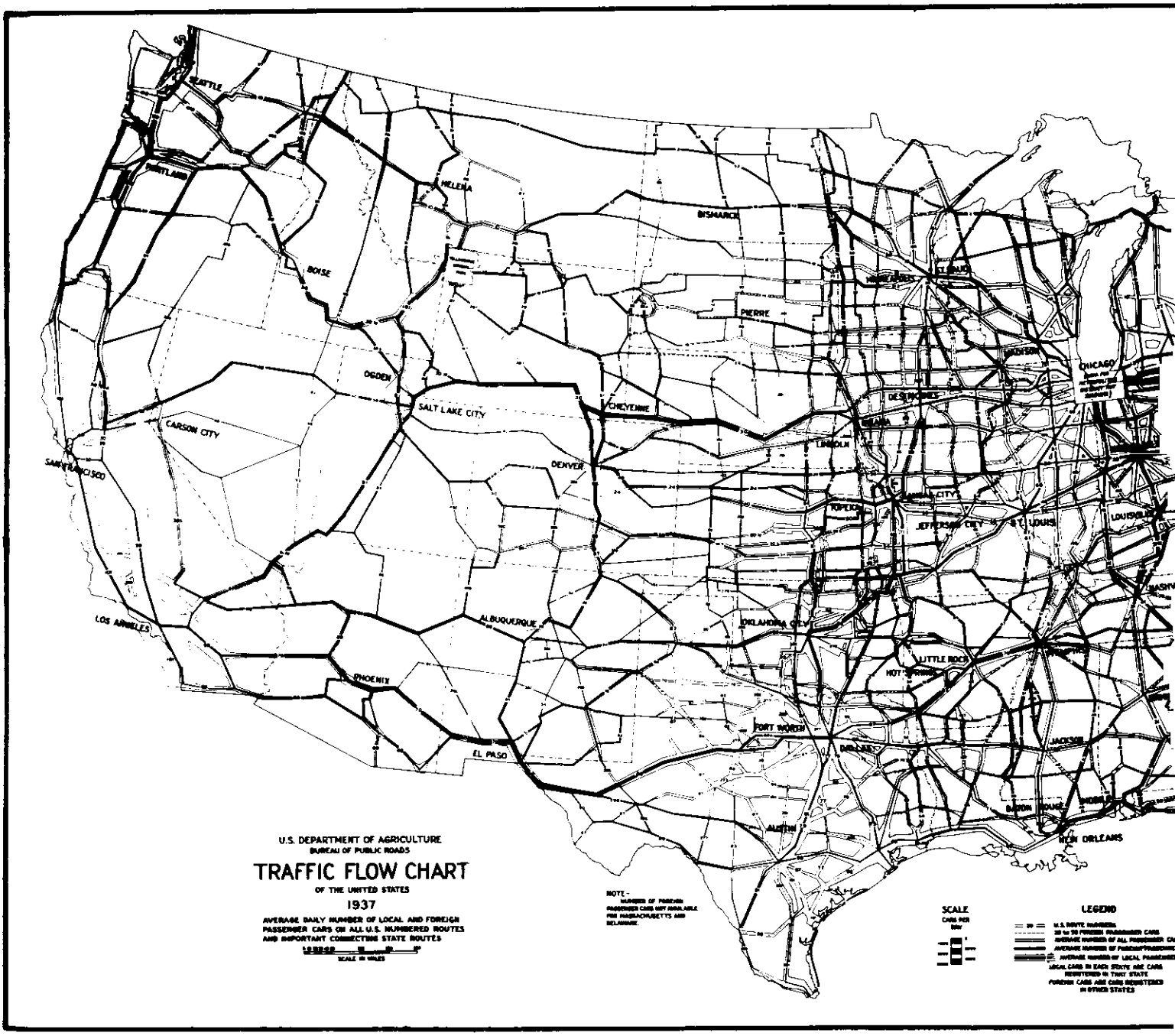
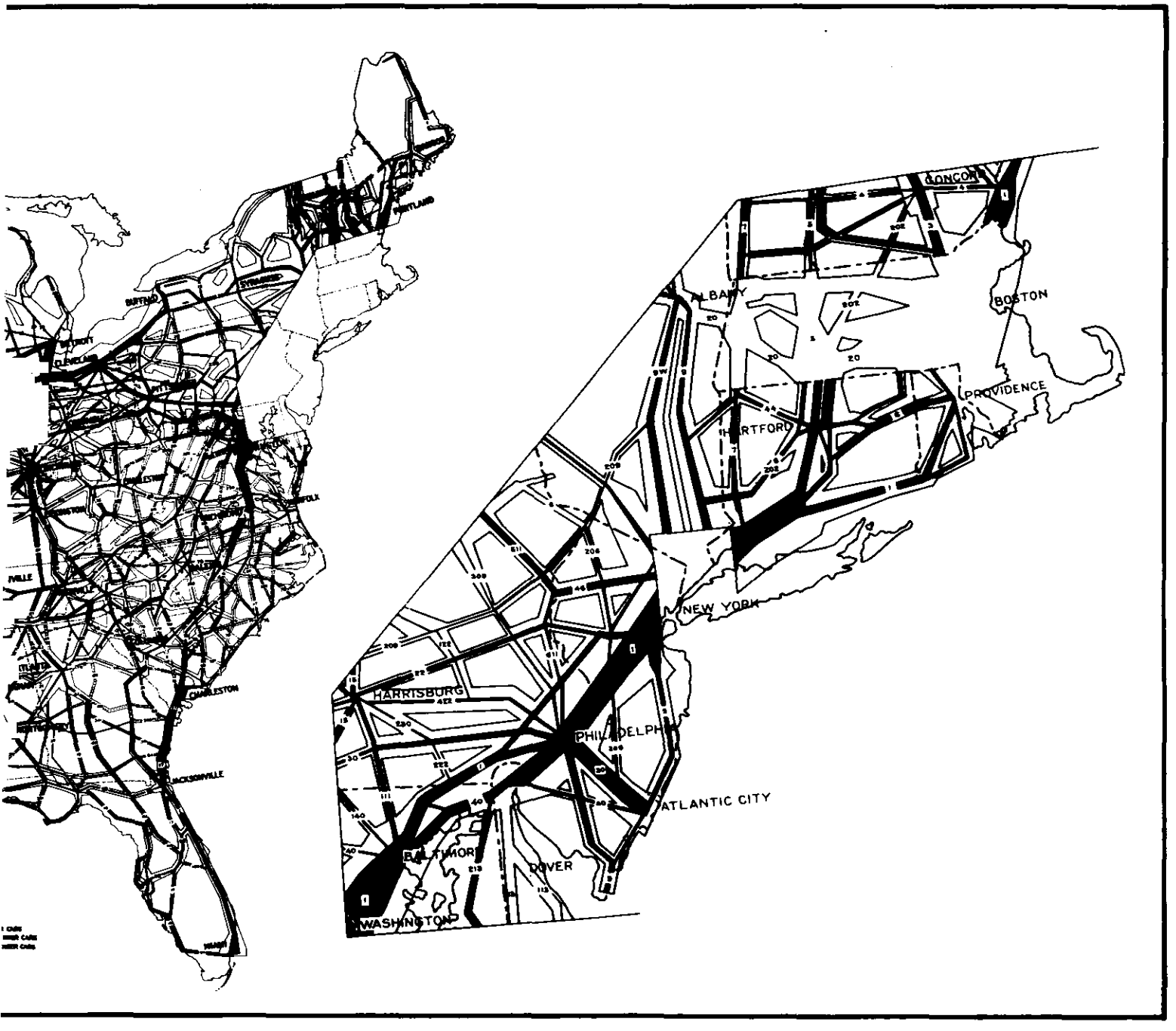

TOLEDO AND VICINITY
CANTON AND VICINITY
CLEVELAND AND VICINITY
YOUNGSTOWN AND VICINITY
AKRON AND VICINITY
TRAFFIC FLOW MAP
STATE OF
OHIO
PREPARED BY THE
OHIO STATE HIGHWAY DEPARTMENT
IN COOPERATION WITH THE
U.S. DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS
DATA OBTAINED FROM
OHIO HIGHWAY PLANNING SURVEY
1936
LEGEND
TRAFFIC SCALE IN VEHICLES PER AVERAGE 24 HOUR PERIOD

FIGURE 3

incomplete results of the planning surveys (Figure 4). Although it is subject to some correction of detail there is no doubt that this map presents a picture of the flow of traffic on the principal highways of the nation that is substantially correct in the relative sense. As customary, the open bands represent the total traffic, except that the humps that would otherwise appear at the cities have been deliberately shaved off. The black, interior bands represent, on the roads of each State, the portion of the traffic carrying the license tags of other States - the so-called foreign traffic - except that, again, we have cut off the small enlargements that would otherwise appear at each State line, where over-the-line local movements are numerous. The clear conception of the relative highway needs and relative traffic difficulties of the various sections of the United States, which this map for the first time affords, shows how unreasonable it is to assume that any single type of provision or single solution will properly meet the situation existing in all States. By long odds the country's heaviest traffic is found in the Middle Atlantic and New England States. The traffic bands in these sections were so wide that they could not be crowded into the small-scale map. It was necessary to show them in the inset which is drawn to a lineal scale 4 times as great as that of the general map. But the width


SEATTLE
PORTLAND
HELENA
BISMARCK
BOISE
PIERRE
OGDEN
SALT LAKE CITY
CHEYENNE
CARSON CITY
SAN FRANCISCO
DENVER
LINCOLN
TOPEKA
JEFFERSON CITY
ST. LOUIS
LOUISVILLE
LOS ANGELES
ALBUQUERQUE
OKLAHOMA CITY
LITTLE ROCK
PHOENIX
FORT WORTH
EL PASO
AUSTIN
BATON ROUGE
NEW ORLEANS
U.S. DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS
TRAFFIC FLOW CHART
OF THE UNITED STATES
1937
AVERAGE DAILY NUMBER OF LOCAL AND FOREIGN PASSENGER CARS ON ALL U.S. NUMBERED ROUTES AND IMPORTANT CONNECTING STATE ROUTES
SCALE IN MILES
NOTE - NUMBERS OF FOREIGN PASSENGER CARS NOT AVAILABLE FOR MASSACHUSETTS AND DELAWARE.
SCALE
CARS PER DAY
LEGEND
U.S. ROUTE NUMBERS
20 to 30 THOUSAND PASSENGER CARS
AVERAGE NUMBER OF ALL PASSENGER CARS
AVERAGE NUMBER OF FOREIGN PASSENGER CARS
AVERAGE NUMBER OF LOCAL PASSENGER CARS
LOCAL CARS IN EACH STATE ARE CARS REGISTERED IN THAT STATE
FOREIGN CARS ARE CARS REGISTERED IN OTHER STATES

FIGURE


BOSTON
PROVIDENCE
NEW YORK
HARRISBURG
ATLANTIC CITY
BALTIMORE
DOVER
WASHINGTON

RE 4

scale of the traffic bands is unchanged. Outside of this relatively small area of greatest traffic concentration the principal volumes are found in the East North Central States and on a few outstanding interstate routes elsewhere, particularly along the east and west coasts and two or three of the prominent east-west routes.

That the response of the roadbuilders is reasonably consistent with the traffic demand is shown by the map (Figure 5) which charts, as of January 1938, the location of all existing 4-lane highways and the further lines along which a similar type of improvement is likely to be needed in the near future, as estimated by State and Federal highway officials. Note that the solid lines, indicating existing 4-lane pavements, are most numerous and most nearly continuous in the Middle Atlantic and New England and East North Central areas where the traffic map shows the greatest traffic concentration; and note also how remarkably the judgment of the practical roadbuilders agrees with the indications of the traffic map in the matter of needed extensions of 4-lane pavement, as shown by the dotted lines. For a full appreciation of the significance of this close agreement, it should be added that the traffic map here shown was not available to the State and Federal engineers and officials at the time they were called upon for their opinions.

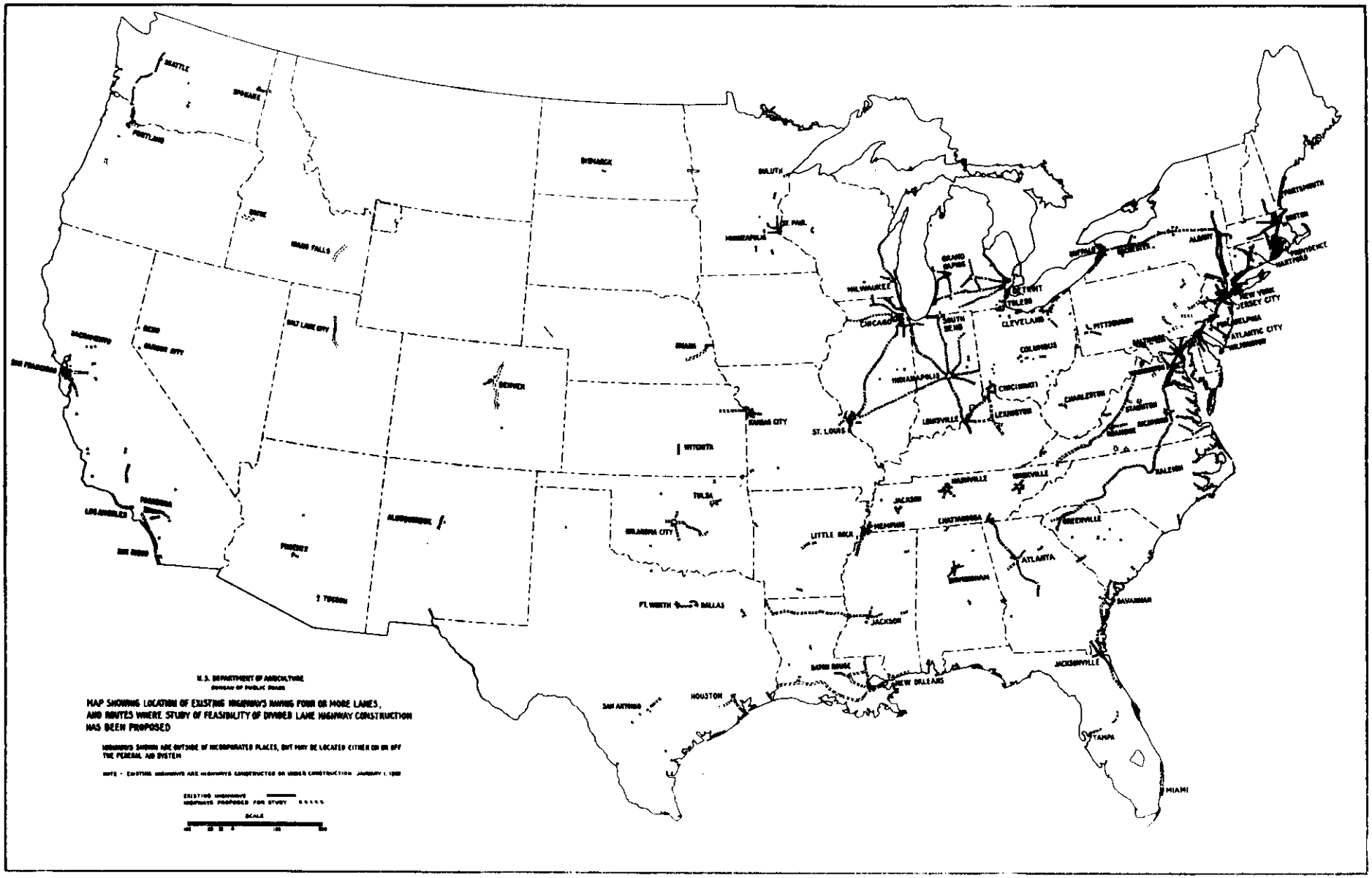

U.S. DEPARTMENT OF AGRICULTURE
MAP SHOWING LOCATION OF EXISTING HIGHWAYS HAVING FOUR OR MORE LANES, AND ROUTES WHERE STUDY OF FEASIBILITY OF DIVIDED LANE HIGHWAY CONSTRUCTION HAS BEEN PROPOSED
SEATTLE
PORTLAND
BISMARCK
DULUTH
MINNEAPOLIS
ST. PAUL
BUTTE
GRAND FALLS
SALT LAKE CITY
DENVER
OMAHA
KANSAS CITY
WICHITA
ST. LOUIS
MILWAUKEE
CHICAGO
SOUTH BEND
GRAND RAPIDS
DETROIT
TOLEDO
CLEVELAND
BUFFALO
ROCHESTER
ALBANY
NEW YORK
JERSEY CITY
PHILADELPHIA
ATLANTIC CITY
WILMINGTON
BALTIMORE
PITTSBURGH
COLUMBUS
INDIANAPOLIS
CINCINNATI
LEXINGTON
LOUISVILLE
CHARLESTON
RICHMOND
RALEIGH
GREENSBORO
GREENVILLE
ATLANTA
BIRMINGHAM
MEMPHIS
LITTLE ROCK
JACKSON
VICKSBURG
SHREVEPORT
TULSA
OKLAHOMA CITY
FT. WORTH
DALLAS
HOUSTON
SAN ANTONIO
NEW ORLEANS
SAVANNAH
JACKSONVILLE
TAMPA
MIAMI
LOS ANGELES
PASADENA
SAN DIEGO
PHOENIX
TUCSON
ALBUQUERQUE
SAN FRANCISCO
SACRAMENTO
RENO
CARSON CITY
EXISTING HIGHWAYS
HIGHWAYS PROPOSED FOR STUDY
SCALE

FIGURE 5

Facts developed by the planning surveys show the extent to which the building of the wider roads has lagged behind the need for them. In 10 representative States the surveys show, as detailed in Table 1, that the mileage of roads on which the average traffic is 4,000 vehicles a day or greater is 1,138. A daily average traffic of 4,000 vehicles is close to the maximum for which a 2-lane pavement will suffice. On this basis, then, there should be in these 10 States at present, 1,138 miles of the wider pavements, preferably 4 lanes wide or wider. On January 1, 1938, the mileage actually existing in these States, 4 lanes wide or wider, was 1,333.

In the 10 States the total mileage of all rural highways is about 28 percent of the national total. If, therefore, traffic in these States may be assumed to be fairly representative, it is reasonable to estimate that the roads in all States now serving 4,000 or more vehicles daily and, by that test, now requiring pavements 4 lanes wide or wider, total about 4,000 miles. The mileage of pavement of such width actually existing on January 1 last was 3,452. By the test applied, it is apparent that there is some present deficiency, and the actual deficiency is more substantial than the simple mileage figures indicate, because a very considerable part of the existing multiple-lane mileage is improved with undivided pavements, which experience has shown to be definitely unsatisfactory.

Table 1.--Mileage of Rural Highways Carrying Annual Average 24-Hour Traffic of 1,000 or More Vehicles. Arranged by Traffic Volume Groups

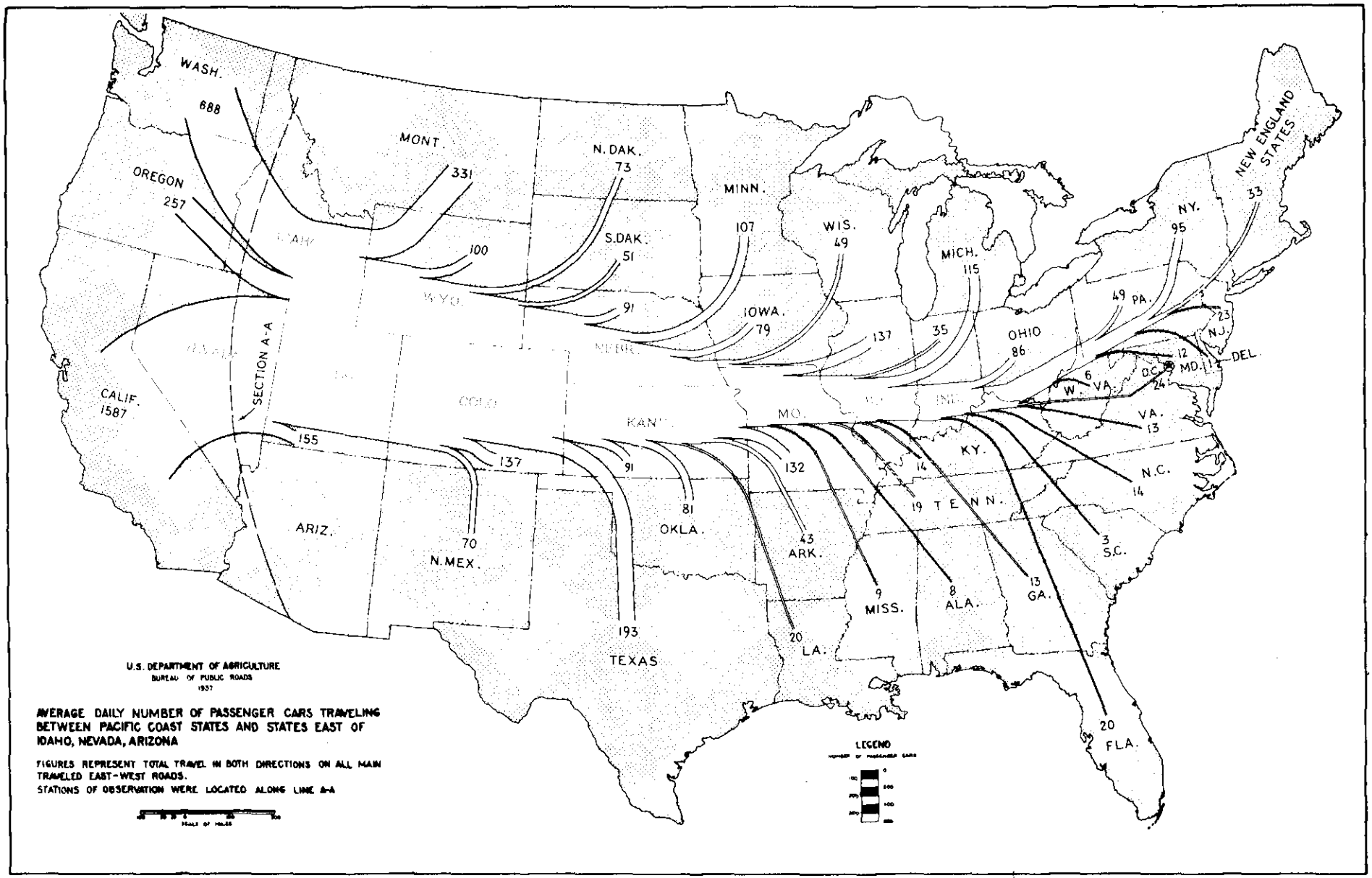
State	Annual Average 24-Hour Traffic										Total Mileage	Percent of total mileage with total traffic		
	1,000 to 1,499	1,500 to 1,999	2,000 to 2,999	3,000 to 3,999	4,000 to 4,999	5,000 to 9,999	10,000 and over	Total 1,000 and over	Total 2,000 and over	Total 4,000 and over		1,000 and over	2,000 and over	4,000 and over
	Mileage, Rural State Highways													
Alabama	587.0	233.6	99.2	17.6	-	-	-	937.4	116.8	-	5,707	16.4	2.0	0.0
Florida	1,203.0	577.0	326.0	65.0	24.0	-	-	2,195.0	415.0	24.0	9,737	22.5	4.3	0.2
Illinois	1,941.9	1,156.7	800.2	157.8	98.8	87.5	3.0	4,245.9	1,147.3	189.3	10,342	41.1	11.1	1.8
Iowa	1,422.1	473.0	201.5	22.0	5.0	-	-	2,123.6	228.5	5.0	8,278	25.7	2.8	0.1
Kansas	649.4	390.1	232.4	61.7	12.2	3.5	-	1,349.3	309.8	15.7	9,103	14.8	3.4	0.2
Michigan	830.0	498.0	711.0	245.0	116.0	187.0	13.0	2,600.0	1,272.0	316.0	9,275	28.0	13.7	3.4
Missouri	1,105.0	675.0	364.0	151.0	41.0	74.0	12.0	2,422.0	642.0	127.0	14,458	16.8	4.4	0.9
Ohio	1,781.8	831.9	931.8	334.7	139.9	87.0	-	4,107.1	1,493.4	226.9	12,200	33.7	12.2	1.9
Virginia	1,000.2	470.1	371.5	86.5	7.1	80.6	6.5	2,022.5	552.2	94.2	8,239	24.6	6.7	1.1
Wisconsin	1,242.0	464.0	265.0	60.0	55.0	22.0	-	2,108.0	402.0	77.0	9,769	21.6	4.1	0.8
Total Rural State Highways	11,762.4	5,769.4	4,302.6	1,201.3	499.0	541.6	34.5	24,110.8	6,579.0	1,075.1	97,108	24.8	6.8	1.1
	Mileage, Other Rural Roads													
Alabama	26.2	9.4	5.6	-	2.4	0.5	-	44.1	8.5	2.9	55,180	0.1	0.0	0.0
Florida	-	-	-	-	-	-	-	-	-	-	20,717	0.0	0.0	0.0
Illinois	91.4	24.7	39.4	13.5	3.8	7.4	0.7	180.9	64.3	11.9	96,637	0.2	0.1	0.0
Iowa	-	-	0.6	0.4	-	-	-	1.0	1.0	-	94,354	0.0	0.0	0.0
Kansas	8.7	2.1	1.3	-	0.5	-	-	12.6	1.8	0.5	122,044	0.0	0.0	0.0
Michigan	188.0	85.0	71.0	19.0	1.0	9.0	-	373.0	100.0	10.0	83,317	0.5	0.1	0.0
Missouri	8.0	3.0	10.0	4.0	10.0	16.0	6.0	57.0	46.0	32.0	102,371	0.1	0.0	0.0
Ohio	69.8	18.7	0.8	1.5	6.0	-	-	96.8	8.3	6.0	73,506	0.1	0.0	0.0
Virginia	200.0	124.0	48.0	28.0	-	-	-	400.0	76.0	-	38,447	1.0	0.2	0.0
Wisconsin	56.0	11.0	29.0	2.0	-	-	-	98.0	31.0	-	76,299	0.1	0.0	0.0
Total, Other Rural Roads	648.1	277.9	205.7	68.4	23.7	32.9	6.7	1,263.4	337.4	63.3	762,872	0.2	0.0	0.0
	Mileage, Entire Rural Highway System													
Alabama	613.2	243.0	104.8	17.6	2.4	0.5	-	981.5	125.3	2.9	60,887	1.6	0.2	0.0
Florida	1,203.0	577.0	326.0	65.0	24.0	-	-	2,195.0	415.0	24.0	30,454	7.2	1.4	0.1
Illinois	2,033.3	1,181.4	839.6	171.3	102.6	94.9	3.7	4,426.8	1,212.1	201.2	106,979	4.1	1.1	0.2
Iowa	1,422.1	473.0	202.1	22.4	5.0	-	-	2,124.6	229.5	5.0	102,632	2.1	0.2	0.0
Kansas	658.1	392.2	233.7	61.7	12.7	3.5	-	1,361.9	311.6	16.2	131,147	1.0	0.2	0.0
Michigan	1,018.0	583.0	782.0	264.0	117.0	196.0	13.0	2,973.0	1,372.0	326.0	92,592	3.2	1.5	0.4
Missouri	1,113.0	678.0	374.0	155.0	51.0	90.0	18.0	2,479.0	688.0	159.0	116,829	2.1	0.6	0.1
Ohio	1,851.6	850.6	932.6	336.2	145.9	87.0	-	4,203.9	1,501.7	232.9	85,706	4.9	1.7	0.3
Virginia	1,200.2	594.1	419.5	114.5	7.1	80.6	6.5	2,422.5	628.2	94.2	46,686	5.2	1.3	0.2
Wisconsin	1,298.0	475.0	294.0	62.0	55.0	22.0	-	2,206.0	433.0	77.0	86,068	2.6	0.5	0.1
Total, Entire Rural Highway System	12,410.5	6,047.3	4,508.3	1,269.7	522.7	574.5	41.2	25,374.2	6,916.4	1,138.4	859,980	2.9	0.8	0.1

It has been estimated that present traffic will be approximately doubled by 1960. Incomplete studies, made as part of the planning surveys, indicate that this estimate is generous. If it be assumed to be correct, then it may be supposed that the mileage of roads now carrying 2,000 or more vehicles daily will, by 1960, be serving at least the 4,000-vehicle volume indicative of the need of 4-lane improvement. As shown by Table 1, the mileage in the 10 States represented on which the traffic volume is now 2,000 or more vehicles daily is 6,916, indicating the probability of a national total of about 25,000 miles. On the basis of these figures it seems evident that construction of divided multiple-lane highways must proceed during the next 22 years, in the country as a whole, at an average rate in excess of 1,000 miles per year.

With less than 3 percent of the roads in these representative States now serving 1,000 or more vehicles daily and less than 1 percent serving 2,000 vehicles or more, it is clear that 2 lanes will long remain the standard of pavement width for the vast majority of the rural roads of the country.

One fact more should be mentioned before we leave this very informative table. That is the striking evidence it furnishes that the roads comprising the State highway systems of these 10 States have been well chosen. Of their total of 859,980 miles of rural roads only 25,374 miles carry a traffic averaging 1,000 vehicles a day or more, and 24,111 of these miles are in the State highway systems. In the entire group of States, as the table shows, only a fifth of one percent of the local road mileage carries traffic that averages as much as 1,000 vehicles daily; and only in Virginia does this percentage rise to as much as 1 percent.

In Figure 6 we have graphed the results of some early analyses of the planning survey data that bear upon the current discussion of the need for construction of a system of trans-continental superhighways. At the curved line, marked Section A-A, that extends longitudinally through the States of Idaho, Nevada, and Arizona, the width of the trunk of the tentacled band represents the average daily number of all passenger cars passing eastward and westward on trips extending beyond the borders of the three States, on all major east-west highways, from the Canadian line to the Mexican border. The total traffic of passenger cars on all these highways, as represented, was found to be 2,532 vehicles daily.


WASH.
688
MONT.
331
N. DAK.
73
MINN.
107
WIS.
49
MICH.
115
NEW ENGLAND STATES
33
NY.
95
OREGON
257
IDAHO
100
S.DAK.
51
WYO.
91
IOWA.
79
137
35
OHIO
86
PA.
49
23
NJ.
DEL.
MD.
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D.C.
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W. VA.
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VA.
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N.C.
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S.C.
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GA.
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FLA.
20
ALA.
8
MISS.
9
LA.
20
ARK.
43
TENN.
19
KY.
14
MO.
132
KAN.
81
OKLA.
193
TEXAS
N.MEX.
70
ARIZ.
137
155
CALIF.
1587
SECTION A-A
U.S. DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS
1937
AVERAGE DAILY NUMBER OF PASSENGER CARS TRAVELING BETWEEN PACIFIC COAST STATES AND STATES EAST OF IDAHO, NEVADA, ARIZONA
FIGURES REPRESENT TOTAL TRAVEL IN BOTH DIRECTIONS ON ALL MAIN TRAVELED EAST-WEST ROADS.
STATIONS OF OBSERVATION WERE LOCATED ALONG LINE A-A
LEGEND

FIGURE 6

The tentacles show the States to and from which these 2,532 daily passenger cars are bound; and the width of each tentacle represents the number headed toward or coming from each State. All, of course, are going to or from Washington, Oregon, or California, since to the west of the curved line there are no other States. Eastward the band breaks down rapidly and at the Mississippi River has shrunk to a third of its original width. At the eastern seaboard it is a few thin threads, the combined width of which represents just 300 vehicles. That is the measure of the total daily transcontinental passenger car traffic on all major east-west roads in the country - just 300 vehicles. When we think of providing accommodation for transcontinental traffic we can know now very accurately what we are proposing to provide for. It is 300 vehicles a day.

That does not mean, of course, that the passenger car traffic on all our great east-west transcontinental highways, either those we now have or those we may later construct, will at any point be limited to 300 daily vehicles. It means that the traffic going all the way would be limited to that number but the traffic on the roads at any longitudinal section that we might draw would be considerably greater. The point is, that this considerably larger traffic would

consist at all sections mainly of traffic making much less than transcontinental trips. In other words it would be at all points a much more local traffic, a traffic that would swell and shrink locally, influenced mainly by the location and size of cities.

How short the scope of movement on the rural highways actually is, can be seen from Figure 7, which shows, graphically, the range of frequency distribution of the length of all one-way passenger car trips extending outside of cities in 11 typical States. The shaded portions of the bands cover the ranges between the maximum and minimum percentages of the total traffic that compose the various trip-length groups. The graph shows that in one of these 11 States 43.8 percent of all one-way highway trips extending beyond city limits were trips of less than 5 miles. In another State the percentage of this shortest class of trips was only 25.7. In all the other States the percentage was somewhere between those limits. Similarly, the limits of the 5-to-10 mile percentages are 30.9 percent maximum, and 23.0 percent minimum. It is evident that 30 miles is long enough to span the great majority of all trips extending outside of cities in these States. The percentage of trips over 50 miles in length is extremely small; over 100 miles a bare one or two percent. Let me repeat that these figures relate to <u>all</u> one-way

RANGE OF FREQUENCY DISTRIBUTION OF THE LENGTH OF ALL
ONE-WAY TRIPS OF **PASSENGER CARS**
WHICH EXTEND **OUTSIDE OF CITIES** IN ELEVEN STATES

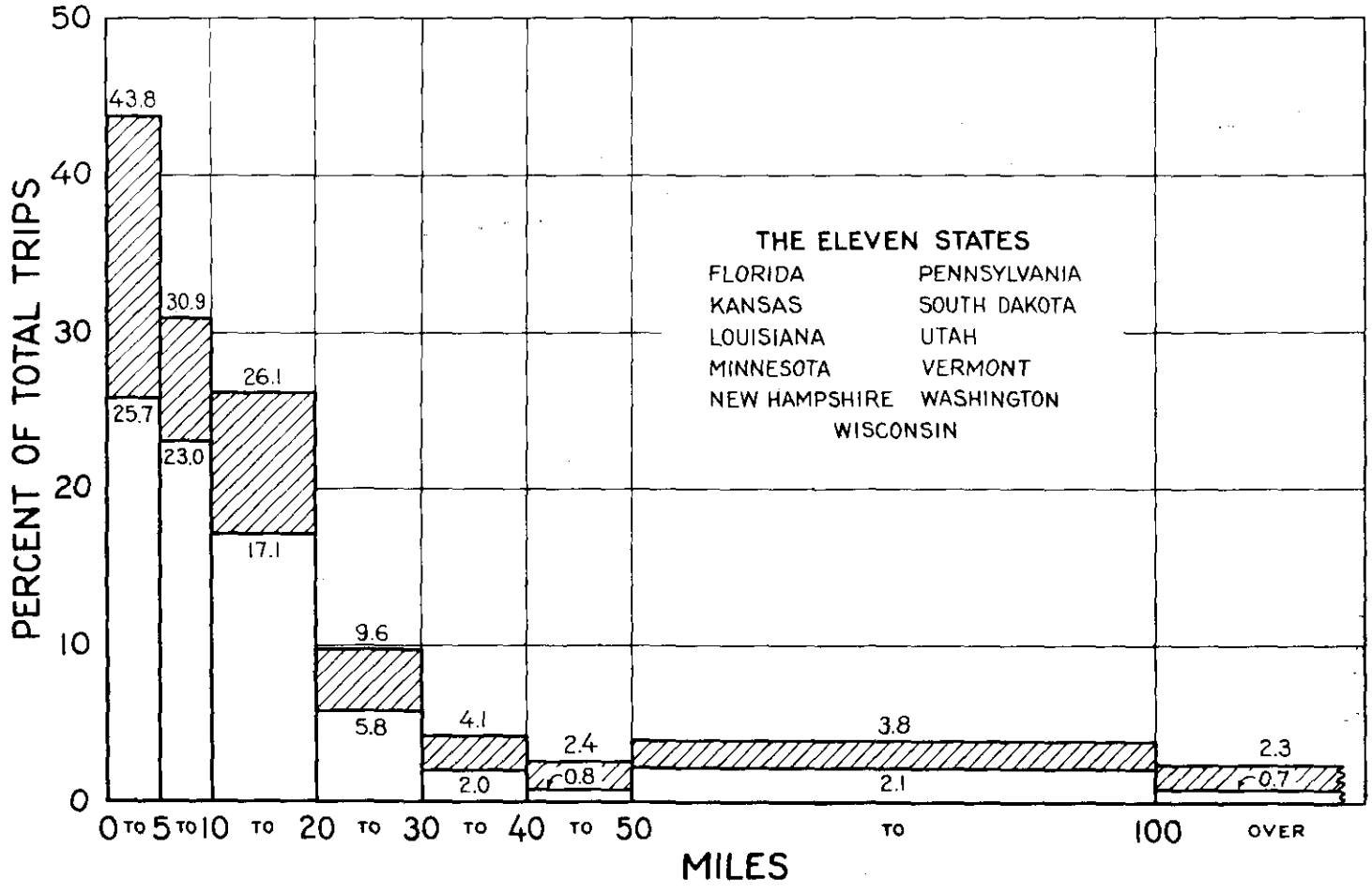
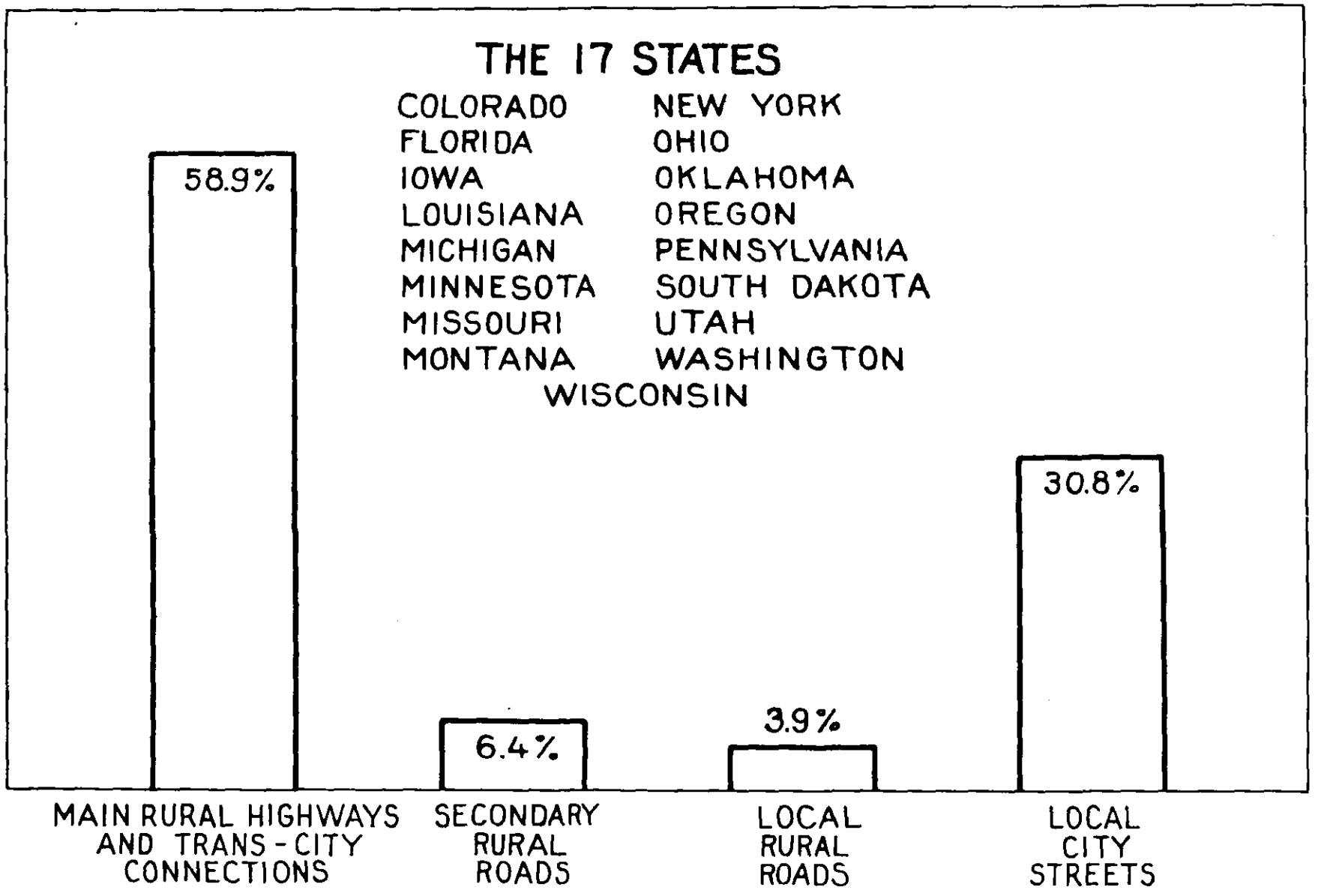


FIGURE 7

trips extending beyond city limits, on all classes of roads, main and local. If all the intra-city trips were included the average ranges would be greatly shortened. If only trips on the main highways were considered the ranges would be lengthened.

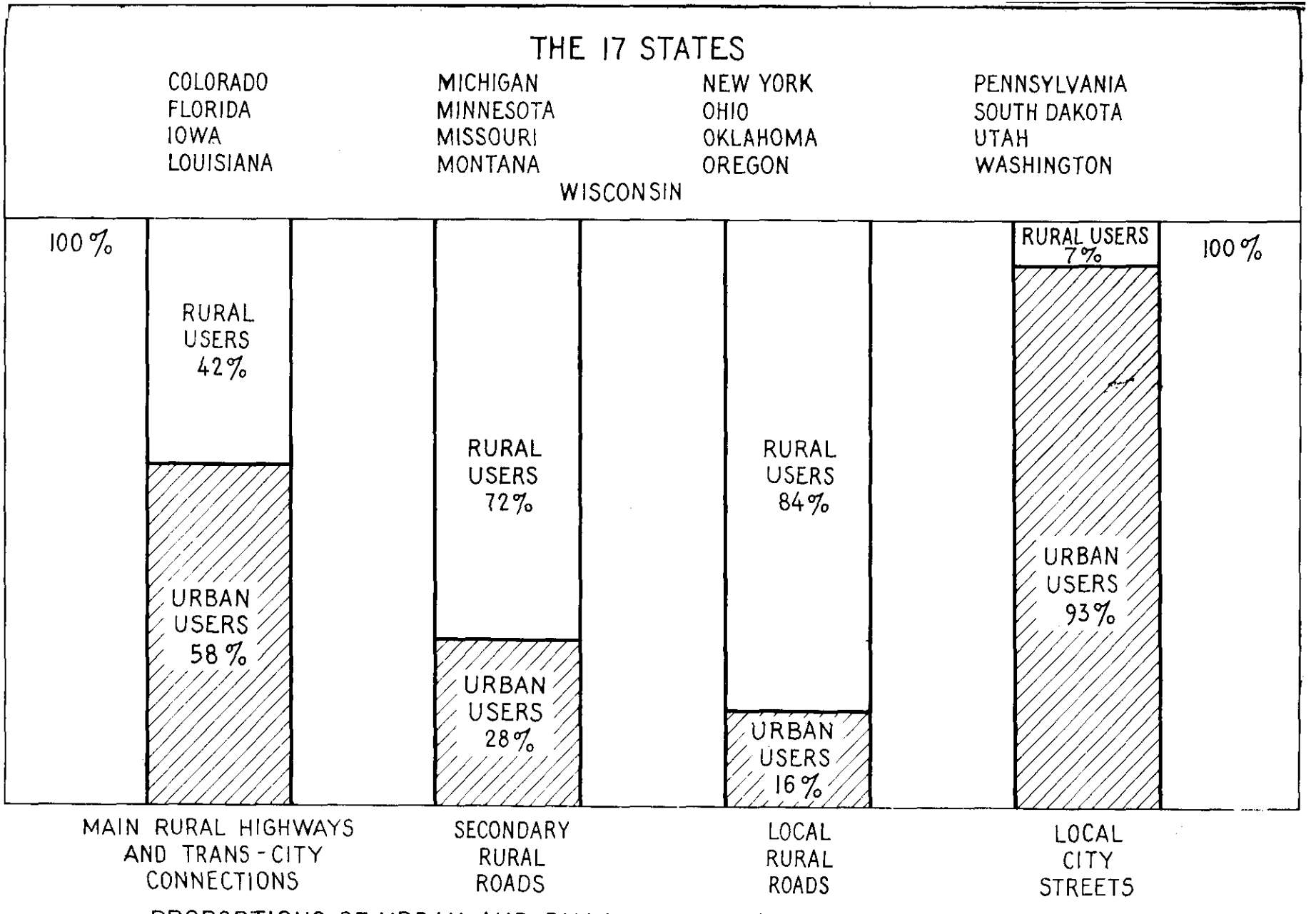
It appears from this evidence, collected by the planning surveys, that most highway movements are very short movements. The surveys also tell us something very definitely about the classes of highways on which these movements occur. These facts are shown in Figure 8 as obtained in 17 States. In these States it is found that 58.9 percent of the total annual motor vehicle travel on all roads and streets occurs on the main rural highways and the streets that connect them across cities. Of the balance of the total movement, the greater part - 30.8 percent of the total - occurs on the large mileage of other city streets, the local or neighborhood streets; and scarcely more than 10 percent of the total occurs on all the secondary and local rural roads, which, in mileage, have eight times the extent of the group of main highways.

Having thus shown where, or on what classes of roads the traffic movement occurs, the facts of the planning surveys go further to show who engages in these movements. They show, for example, that urban and rural users, respectively, are found in different proportions on the several classes of roads. These further facts are shown in Figure 9 for the same 17 States. From



DISTRIBUTION OF TOTAL ANNUAL MOTOR VEHICLE TRAVEL IN 17 STATES ACCORDING TO THE CLASSES OF HIGHWAYS BY WHICH IT IS SERVED

FIGURE 8



PROPORTIONS OF URBAN AND RURAL USERS OF EACH CLASS OF HIGHWAYS IN 17 STATES

FIGURE 9

this graph it will be seen that the main rural highways and their transcity connections are really everybody's highways. Forty-two percent of their use is by rural motor vehicle owners; 58 percent is by urban owners. In these 17 States the population, at the time of the last census, was 38 percent rural, 62 percent urban. It is apparent that country and city people meet on these main arteries in just about the proportion of their relative numbers in the total population. The bar representing the "other city streets" shows a quite different situation. Ninety-three percent of the use of these neighborhood streets is shown to be by urban vehicles; only 7 percent is by rural vehicles. These lesser city streets, in other words, unlike the main rural highways and the principal cross-connecting streets, are not proportionally useful to all classes of the population, but, on the contrary, are of service mainly to city people. And a situation almost the reverse of this is seen to exist on the local rural roads, on which the pertinent bar of the diagram shows that 84 percent of what has previously been shown to be a small total usage, is by rural vehicles and only 16 percent by urban vehicles.

In citing these few newly discovered facts about our highway system, it is the intention merely to give a slight impression of the scope and variety of the information now fast coming to light

as the result of the highway planning surveys in 46 States. The purpose of the surveys is to unearth facts; but I should like to stress the thought that there is no virtue in the facts themselves to build a mile of highway or evolve a single policy.

If the planning surveys are to yield the great benefits of which they are capable the facts they develop must be studied and used for the basis of action in planning the policies and performances of the future road program. This is a responsibility that lies first and most heavily upon the legislatures and upon responsible highway administrative officials. But in part it lies also upon the general public and upon such associations as this of persons especially qualified to understand and aid by their advice and support in the solution of the complex problems involved.

The initial planning surveys in some States are approaching completion. The first reports will shortly be issued. But we are not finished with highway fact finding. There will be continuing need to revise the various classes of data initially collected to keep them currently useful with the passage of time. Maps, correct as of the present time, will have to be revised to preserve their value. Traffic volumes change and the initial counts will quickly lose their validity unless they are regularly revised. In the case of some of the classes of data, now compiled for the first time,

their full usefulness will mature only after much further extension of the record. Many of the basic determinations of the initial surveys will be refined and rendered increasingly accurate and useful by the gradual revision and accretion that will result from continuous further study over a period of years. In the absence of such continuing effort the initial survey data will become rapidly out-of-date, and their usefulness will depreciate. For these reasons the Bureau of Public Roads has urged all State highway departments to make provision for the incorporation of a permanent fact-finding division in their departmental organizations. The Federal appropriations make provision for the financing of such fact-finding operations; and the Bureau has announced its purpose increasingly to require such facts, as only a continuance of the surveys can supply, as a basis for its approval of plans and programs submitted to it in the future.

It is the view of the Bureau that only through such factual guidance can we assure a scientific and business-like administration of the complex and difficult job of operating the modern system of highway transportation; and it will use all its influence to convince its cooperators, the State highway departments, of the necessity of continued study.