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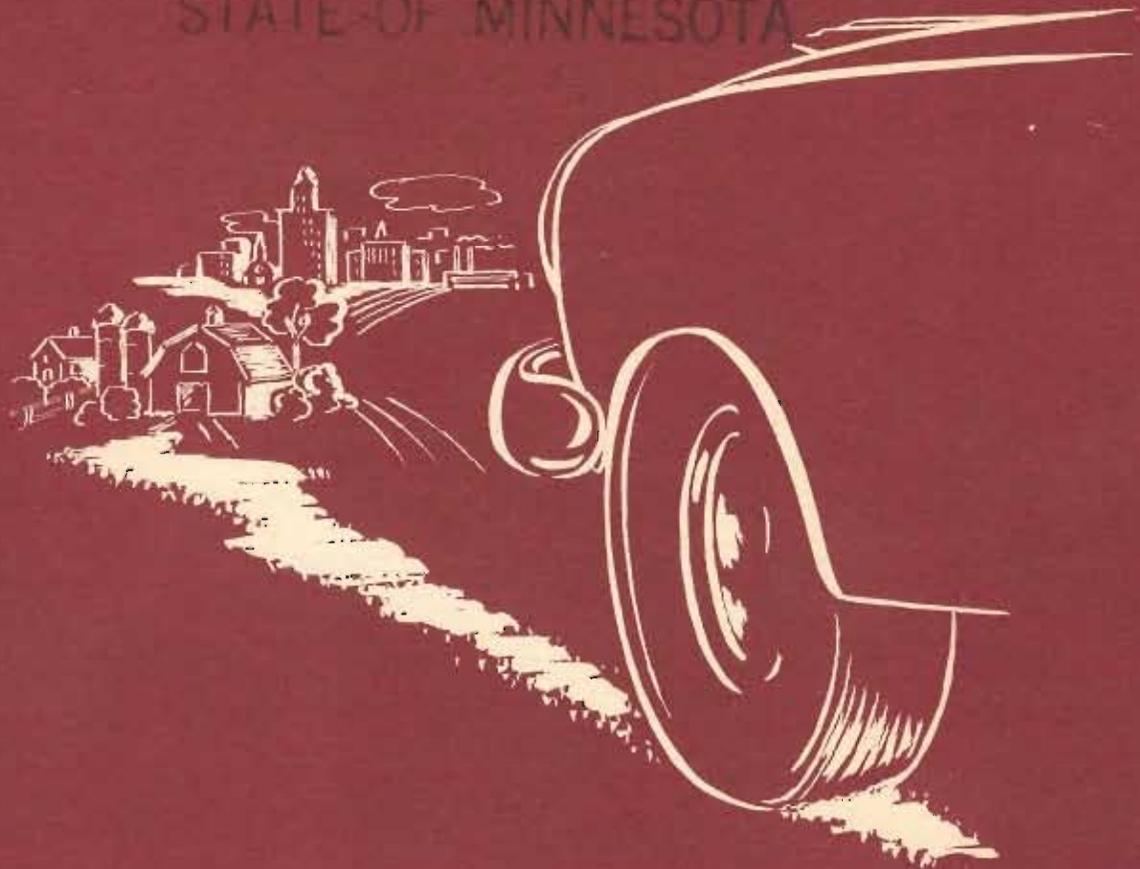


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MINNESOTA'S

Highway Needs

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A Summary Report of the Engineering Study

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Preface

THIS IS a summary of the engineering report, "Highway Transportation in Minnesota", which was prepared for the Minnesota Highway Study Commission by the Automotive Safety Foundation.

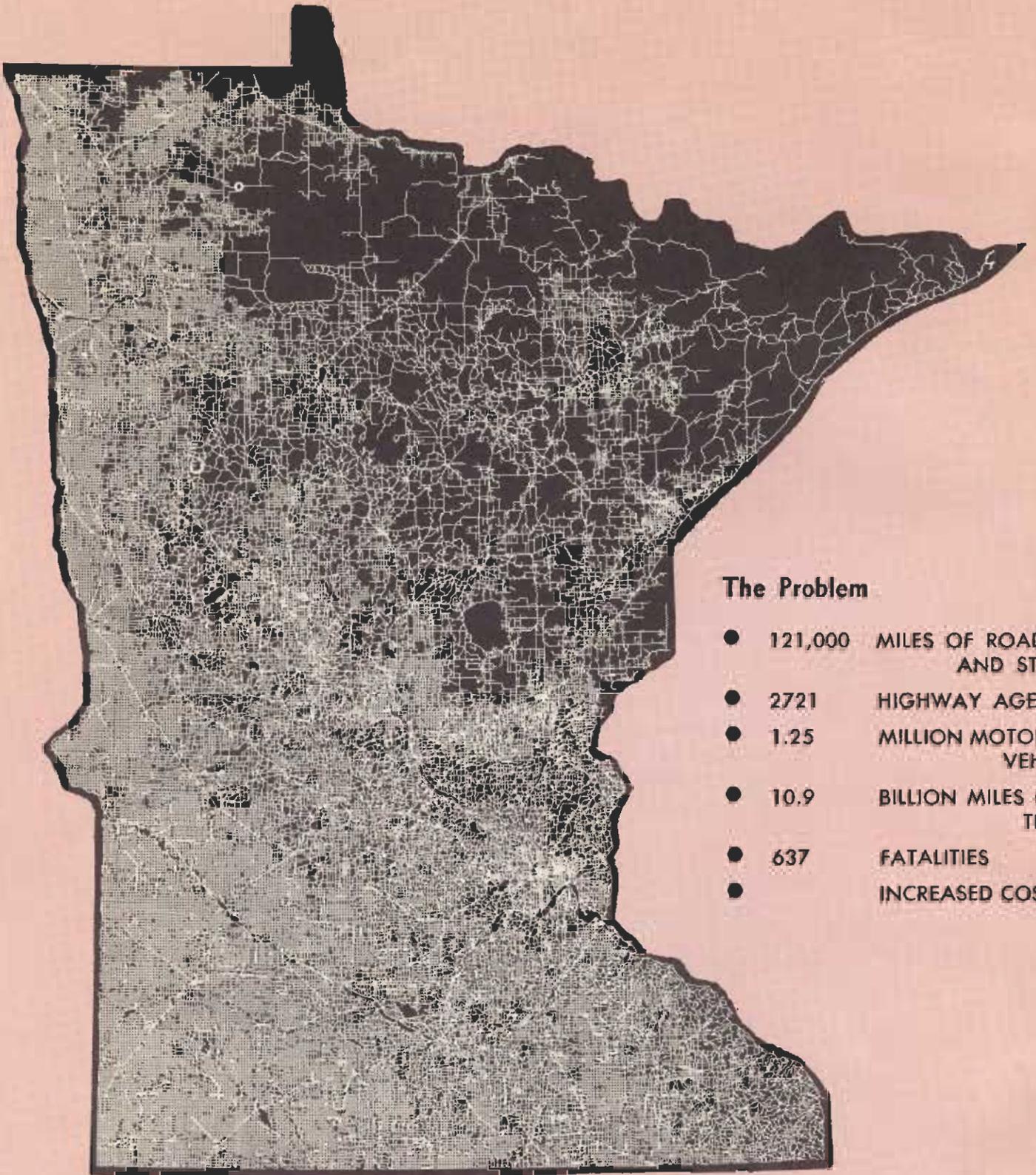
Since the study was a comprehensive state-wide analysis of Minnesota highway needs, this summary has the purpose of presenting major findings so as many citizens as possible may know of the state's total needs.

In addition to the engineering analysis, the Minnesota Highway Study Commission in fulfilling its legislative directive had a separate study made of highway finance by the Public Administration Service. Both studies composed a Federal-aid Highway Planning Project with costs shared by the U. S. Bureau of Public Roads.

Altogether, some 400 Minnesota State, county and city engineers assisted through advisory committees and actively participated in many ways. Much of the basic data was provided by the State Highway Planning Survey of the Minnesota Department of Highways.

October 1, 1954

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The Problem

- 121,000 MILES OF ROADS AND STREETS
- 2721 HIGHWAY AGENCIES
- 1.25 MILLION MOTOR VEHICLES
- 10.9 BILLION MILES OF TRAVEL
- 637 FATALITIES
- INCREASED COSTS

Minnesota's Highway Needs

Meeting Minnesota's highway transportation needs is a big business. Most of Minnesota's 3 million people are daily highway users. They travel on 121,000 miles of roads and streets. In just one day, they burn up 2.5 million gallons of gasoline in traveling 30 million miles.

Most of that travel is for business and other essential purposes. Only a small part is for social and recreational reasons.

The daily transportation needs of the people impose, dollarwise, one of the largest responsibilities faced by the State and local governments.

And the responsibility is growing. Population is increasing, so is the ownership of motor vehicles. Today's roads are inadequate; today's attack on the problem cannot meet the needs of even the near future. Traffic is estimated to increase 50 per cent in the next 20 years.

Recognition of the need for positive action led the legislature to establish the Highway Study Commission to investigate all phases of the highway problem. Hence this engineering study of highway and street needs. Fiscal aspects of the highway problem are covered separately by another agency for the Commission.

Analysis has revealed that no single action can solve the problem; a variety of things must be done. Essential steps are presented in this summary.

Reorganizing Highway Systems

Most of the laws governing Minnesota's highway systems were adopted many years ago when the highway needs and management problems of the State and local governments were far less complex than they are today. The population and motor vehicle increases, and the sharpened economic needs make it timely to examine existing statutes and constitutional provisions to determine their fitness for modern requirements.

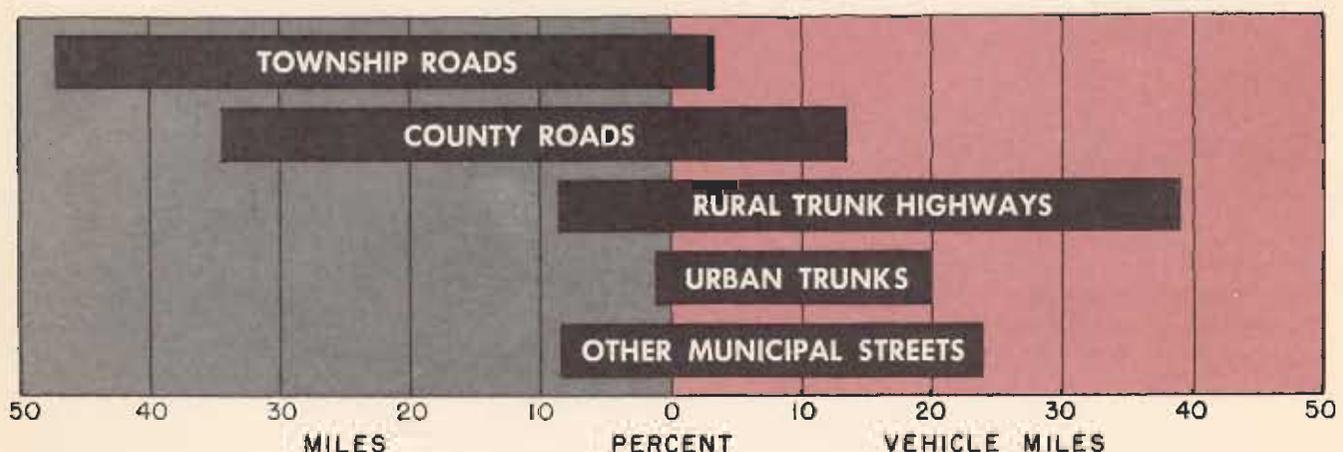
Roads and streets should be developed in keeping with the service each route should provide. By grouping into systems highways which give similar service, it is possible to assign responsibility to the unit of government principally concerned, and to establish a financing plan suited to each system's needs.

Rural State Trunk System

Back in 1921 most of the State Trunk Highway System, 6,877 miles, was set up by constitutional amendment. Later, actions of the legislature, however, increased the mileage so that now the system consists of 11,850 miles, of which 1,460 are urban extensions.

According to criteria established for the study, discussed in the Classification chapter, there are 38,000 miles of rural roads which are of community interest. Of these, 7,500 miles were found

TRAVEL VARIATIONS BY SYSTEMS





Today trucks are standard farm equipment, enabling the farmer to quickly obtain supplies or market produce.

to be of state-wide character, carrying 64 per cent of all rural traffic. These heavier traffic volume roads, only seven per cent of the total rural mileage, form a completely integrated network which gives excellent circulation from rural areas to the industrial, commercial and marketing centers. They connect cities of the first, second and third class population groups and substantially all communities of 1,000 or more. They are recommended as the Proposed Rural State Trunk Highway System, created wholly by constitutional amendment or by legislation depending on where basic fiscal policies are established.

Primary County Roads

Next in rural importance to highways of state-wide character are other roads of county-wide community interest—those that connect smaller communities and in general serve major farming, mining and lumbering areas. The study determined that there are 30,500 miles of such roads. They are recommended as the Proposed Primary County Road System, replacing the present State-aid and County-aid Systems. Composing 30 per cent of the rural mileage, they carry 28 per cent of all rural travel, averaging 145 vehicles per day. These, together with the Proposed State Trunk System, connect every incorporated place in the State, serve all rural areas, and carry 92 per cent of all rural travel.

Included in the Proposed Primary County Road System are approximately 3,000 miles of present but lesser used rural State Trunk Highways. Were those roads to continue as trunk highways, they would logically receive lowest priority in construction and maintenance. As county roads, they would hold high priority.

Local Rural Roads

The balance of rural roads, totaling 68,681 miles, are primarily of local interest. Included are about 10,000 miles of trails and infrequently traveled roads. County engineers report some 4,500 miles are not needed to serve farms or other establishments. Also classed as local roads are about 14,000 miles of presently designated State-aid and county-aid roads which have a daily traffic of only about 25 vehicles.

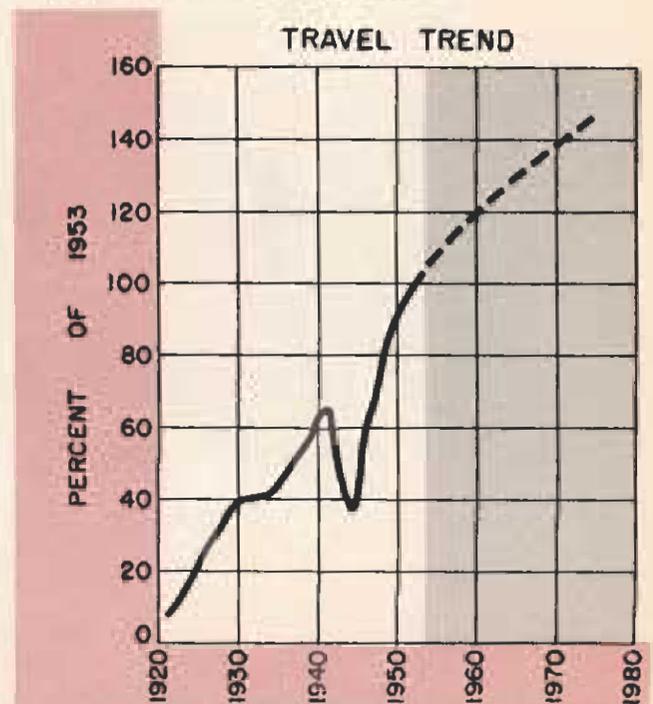
City Streets

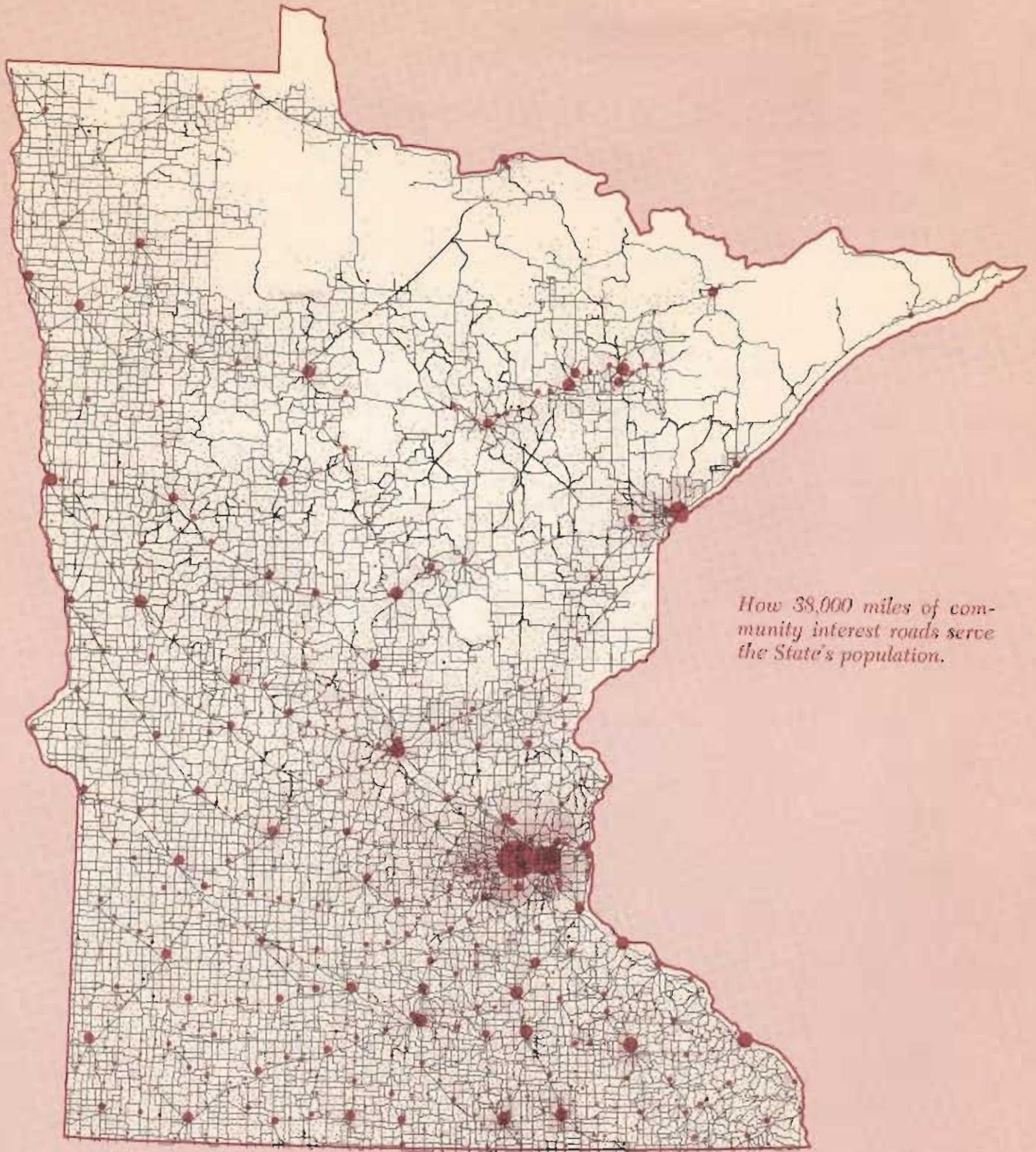
City streets, while relatively low in mileage, carry 44 per cent of all traffic. Because of the concentrated traffic, often resulting in delay and congestion, and because of the high costs of urban construction and right of way, proper grouping of streets is extremely important.

The State has properly assumed principal responsibility for the development of the many streets which are continuations of trunk highways. As shown in the table below, urban extensions of the Proposed Rural State Trunk System total about 1,250 miles. This brings the Proposed State Trunk System to a total of 8,750 miles.

Based on criteria established for the study, city streets including trunk highway extensions, were classified into the groups shown below:

	Streets in Cities Over 5,000 Population (Miles)	Streets in Cities Under 5,000 Population (Miles)
Extensions of Proposed State Trunk Highways . . .	444	808
Extensions of Proposed Primary County Roads and other arterial streets	844	1,835
Business access streets	176	269
Residential access streets . . .	3,697	3,692
Total	5,161	6,604





How 38,000 miles of community interest roads serve the State's population.

Physical Needs

Deficiencies are scattered over the entire highway and street network. Sections of highways and streets totaling 39,592 miles are below tolerable or acceptable standards and 2,800 bridges are inadequate. Since many facilities are on the verge of needing replacement and since new needs will arise in the future, separate estimates were made of present needs and future needs within 5, 10, 15 and 20 year periods.

The estimated total cost of improvements needed now on all roads and streets is \$681 million, two-thirds in rural areas and one-third in cities.

Trunk System Needs

Rural Needs

Present needs on the 10,390 miles of rural trunk highways are for 994 miles of high type pavement and 1,752 miles of intermediate and low type pavement. In addition to roadway deficiencies, construction or reconstruction of 309 bridges and separation structures and installation of 54 railroad grade crossing protection devices is needed. Estimated cost, including right of way, grading, structures and engineering is \$181,431,000.

Present Needs, State Rural Trunk Highways

Roadway	\$154,478,000
Structures	26,953,000
Total	\$181,431,000

Total construction requirements for a 10-year period are estimated to be \$339,199,000 for work on 7,428 miles.

Urban Extension Needs

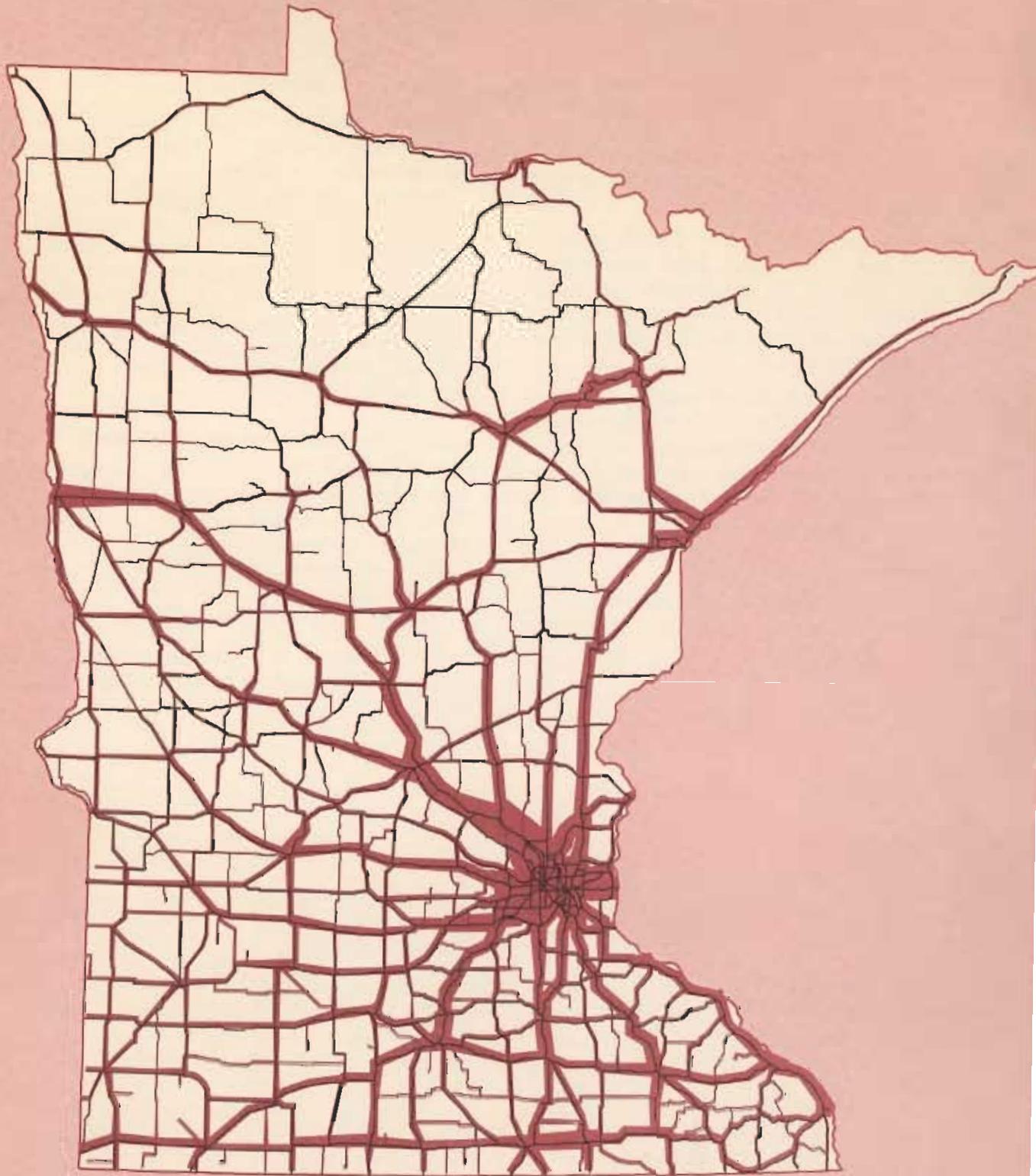
Of the 1,460 miles of present urban extensions, 24 per cent or 345 miles are in need of immediate improvement. Some of these needs constitute the highest priority of needs of all systems. An additional 40 miles not now existing are required for adequate service. Work required ranges from resurfacing to construction of expressways and construction or reconstruction of bridges and highway separation structures.

Cost of Urban Extension Needs

New Construction	\$ 86,530,000
Reconstruction	1,215,000
Resurfacing and Other	22,428,000
New Structures	23,130,000
Recondition Present Structures	5,528,000
Railroad Protection and Traffic Control	556,000
Total	\$139,387,000



New facilities must be designed to accommodate the traffic of the future as well as the present. Otherwise, traffic increases will render them obsolete all too soon, as experience over the years has demonstrated.



This map shows the present Trunk Highway System superimposed on a traffic flow map. The heavy black lines are the routes selected by the engineering staff as the Proposed Trunk Highway System. The fine black lines show routes which should be included in the Proposed Primary County Road System.

Total construction requirements for a 10-year period are estimated to be \$284,810,000 for work on 1,066 miles.

County and Township Roads

Of the 15,489 miles of State-aid rural roads, about half need improvement now. In addition to roadway deficiencies, construction or reconstruction of 531 bridges and separation structures and installation of protection devices at 16 railroad grade crossings should be done.

Forty-four per cent of the 26,158 miles of county-aid and county roads need improvement now. This includes the construction or reconstruction of 792 bridges and separation structures and installation of 10 protection devices at railroad grade crossings.

There are 14,037 miles of existing township roads deficient now and in need of improvement. In addition to roadway deficiencies, construction or reconstruction of 970 bridges including a few railroad separation structures should be done.

Cost of Present Needs

	State-aid	County-aid and County	Township
Roadway ...	\$82,686,000	\$82,576,000	\$54,091,000
Structures ..	15,501,000	14,813,000	11,484,000
Total	\$98,369,000	\$97,389,000	\$65,575,000
Grand Total	\$261,333,000		

Total construction requirements for a 10-year period are estimated to be \$142,026,000 for State-aid roads, \$129,464,000 for county-aid and county roads and \$72,402,000 for township roads.

Other City Streets

Streets outside the Trunk Highway System total 10,305 miles, of which 3,013 miles or 29 per cent are deficient.

Principal deficiencies on streets are surface type and condition. A limited mileage of arterials and business access streets are deficient in capacity and in need of widening. Current needs on many residential access streets are for curb and gutter. Included in municipal deficiencies is the need for construction or reconstruction of 115 bridges and railroad grade separation structures and protection devices.

Construction Needs, Other Streets

New Construction	\$20,936,000
Reconstruction	4,368,000
Resurfacing and Other	57,882,000
Structures, Railroad Protection and Traffic Control	16,045,000
Total	\$99,231,000

Total construction requirements for a 10-year period are estimated to be \$208,702,000 for work on 6,338 miles.

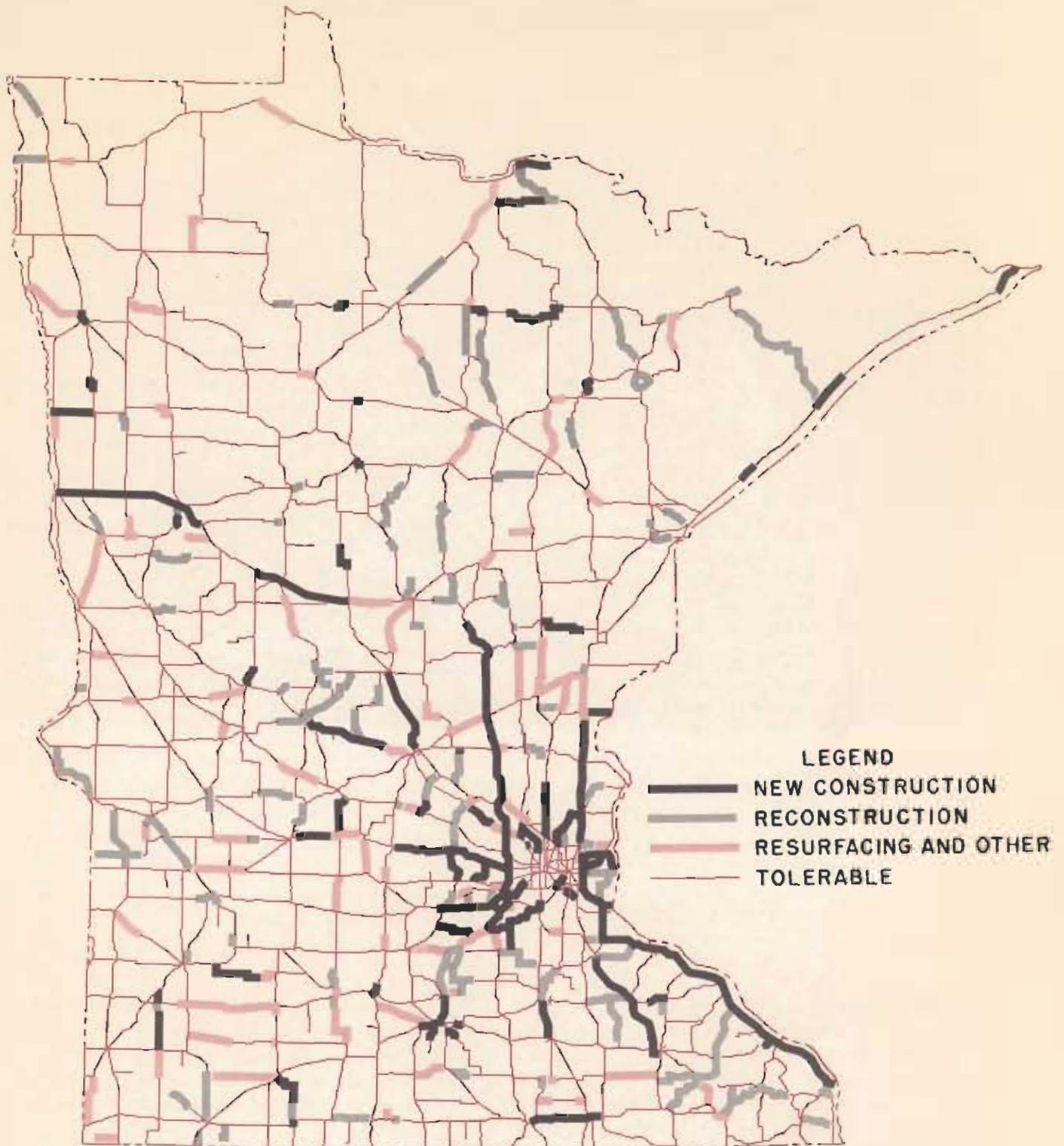
Traffic Operations and Physical Needs

The procedural manuals for the engineering appraisal of city streets required consideration of various traffic engineering techniques as possible solutions to congestion problems. The techniques included parking prohibitions, signal timing and coordinating, restriction of turning movements, truck routes, pairs of one-way streets, intersection channelization, and other accepted measures as related to street capacity, congestion and accident relief. Consideration was given to the proven methods which can facilitate traffic movement before submitting new construction projects to relieve congestion. Dur-

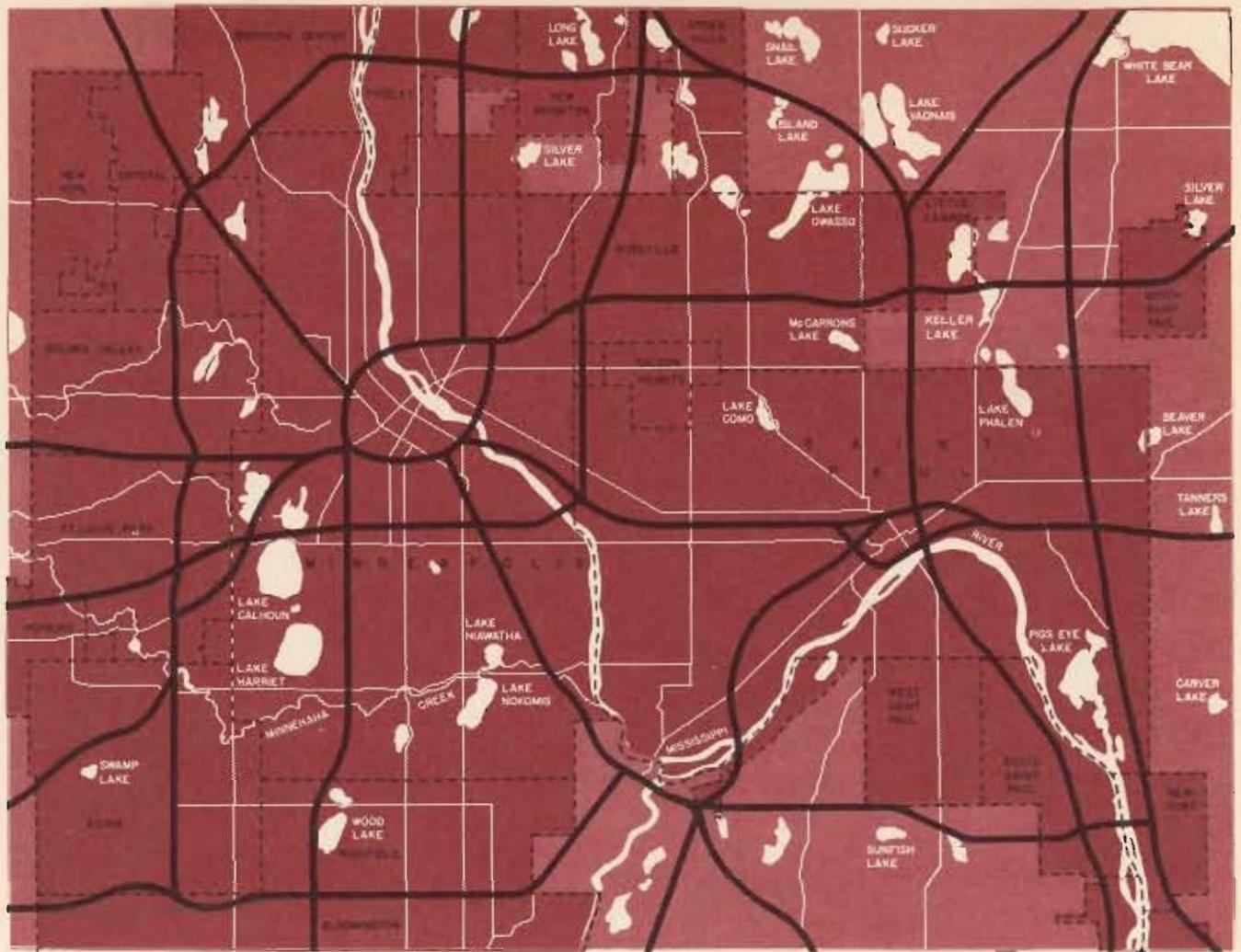
ing the engineering review of the work sheets, city projects were modified or eliminated wherever traffic engineering measures could solve or help meet the problem.

It is sound business to expect maximum use to be made of all street facilities. Unless State and local officials, with the full support of their citizens, are willing to apply proven methods of traffic operation to their accident and congestion problems, costs of providing adequate street facilities will be much higher than those included in this engineering study.

Present Needs on the Rural State Trunk System



Some 2,700 miles of the Rural State Trunk System are in need of improvement now. Three-fourths of the system is tolerable for today's traffic.



Construction of the expressway facilities portrayed on this map offers the most practical means of providing the additional capacity to relieve the heavy traffic congestion in the Twin City area.

Twin City Major Thoroughfare Plan

The map displayed above shows the major thoroughfare plan developed for the Twin City Metropolitan Area for a 20-year period. The routes shown are general locations required to serve major traffic flows. Determination of exact locations for each route must be based on detailed engineering and economic investigations.

The routes shown total 191 miles in length, including the necessary connections in rural areas. Of this mileage, 61 miles exist now and with modifications will fit into the major thoroughfare system. The remaining 130 miles are new facilities. The estimated cost, including structures, is \$274,151,000, an average cost of about \$1,435,000 per mile. Of this amount, \$18,473,000 is for improve-

ments in rural areas and the remainder is for portions of the plan in the incorporated areas of St. Paul, Minneapolis and adjacent suburban communities. These costs are included in the summaries of cost for rural and urban State trunk highways.

All of the routes included in the thoroughfare plan are now, or should be, a part of the State Trunk System. The primary responsibility for their construction should rest with the Department of Highways. However, because of the regional character of the plan and the interests of the many political subdivisions which it would serve, there is need for cooperative effort in planning and long-range financing.

Alternative Plans

The capital investment needed to bring all roads and streets up to standards adequate for today's traffic is \$681 million. To carry out this program with present revenues would require many years. Even if funds could be made available, it would be physically impossible to do this work within a few years.

In planning any long-range program, other needs beside present deficiencies must be considered. Many roads and streets that are adequate today will become deficient as time passes. In addition to normal wear, traffic increases will make many facilities obsolete.

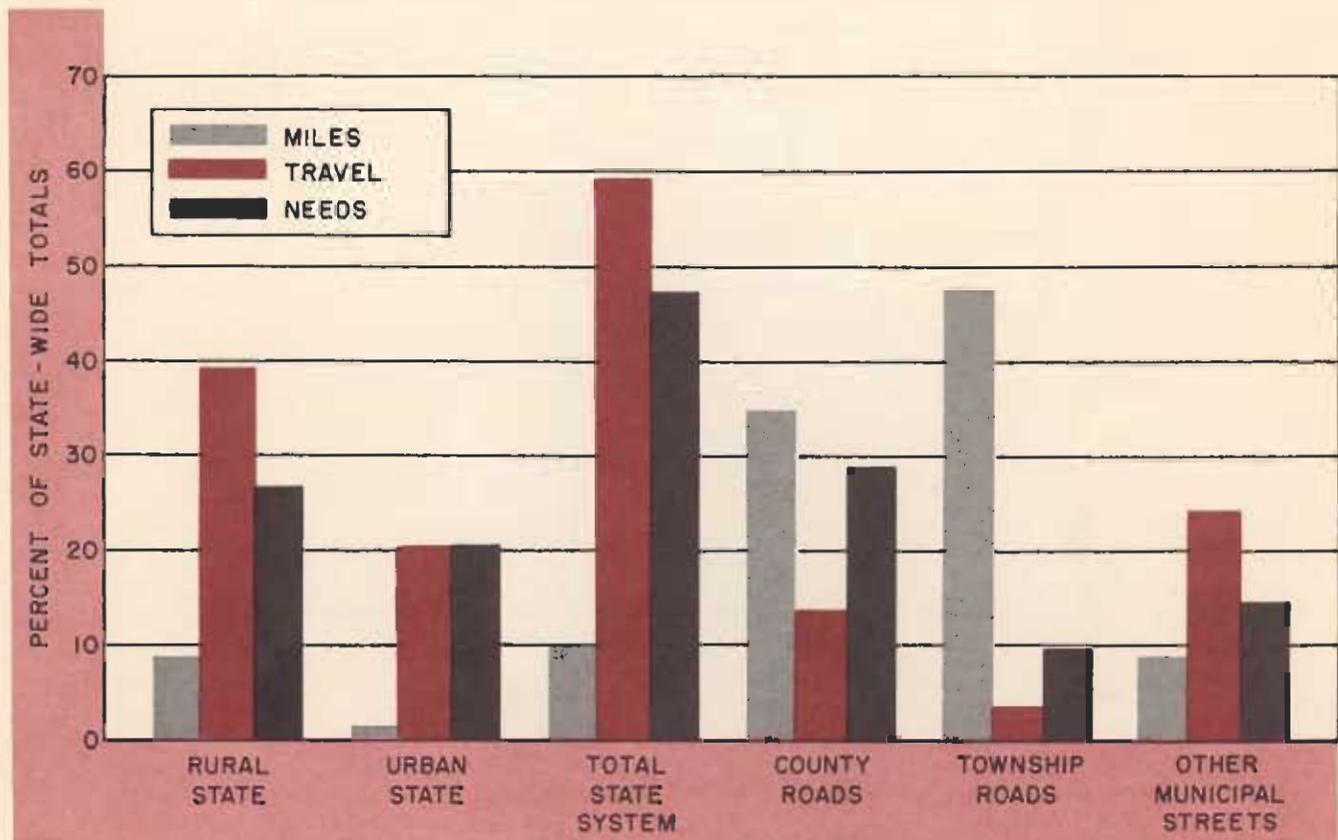
Allowance must also be made for maintenance costs. Expenditures for upkeep of trunk highways amount to almost \$12 million a year, for State-aid and county-aid roads \$17 million, for township roads \$6 million and for city streets \$14 million. Total maintenance expenditure is almost \$50 million a year, or about 35 per cent of the total annual expenditure.

Alternate program periods of 5, 10, 15 and 20 years are shown on pages 12 and 13. The estimated amounts include costs of construction needed now, future needs and replacements, maintenance and operations. The higher annual costs make the feasibility of a five-year program questionable. On the other hand, needed improvements cannot wait 20 years. The choice lies somewhere between the two extremes and depends largely on the ability and willingness of the people to pay the costs.

As an example, for the existing Trunk Highway System the cost for a 10-year program covering present and future needs, maintenance and operation, would entail an expenditure of \$80,036,000 annually.

On the same basis, the annual cost for the present State-aid System would be \$22,368,000 for a 10-year program. For the County-aid System, the annual cost would be \$22,562,000 for a 10-year program. For present township roads, the cost would be \$13,734,000 on a 10-year basis.

COMPARISON OF MILES, TRAVEL AND PRESENT NEEDS ON THE VARIOUS CLASSES OF ROADS AND STREETS



For municipal streets other than trunk extensions, total annual costs are estimated at \$37,161,000 for a 10-year program. These costs are divided approximately 35 per cent for arterials, five per cent for business access streets and 60 per cent for residential access streets.

Except for the State Trunk System, actual programs will, of course, vary widely from county to county, from city to city, and from township to township, depending upon the ability and desire of local people to finance needed work.

Adoption of the recommended reclassification of roads and streets would cut the Proposed Trunk Highway System cost to \$70,297,000 for a 10-year program. For the Proposed County Primary System, the added cost due to transfer of trunk highway mileage would about offset the reduction due to transfer of State-aid and county-aid mileage to the local system. Annual costs based on a 10-year program period for the proposed local rural roads would be about \$8 million more than the estimates for the present township system.

Program Costs State Trunk Highways

System	Annual Costs for			
	5-Year Program	10-Year Program	15-Year Program	20-Year Program
Existing State Trunk				
Rural				
Present Needs	\$ 36,286,000	\$18,143,000	\$12,095,000	\$ 9,072,000
Future Needs & Replacements	16,193,000	15,777,000	14,572,000	12,808,000
Maintenance & Operations	13,594,000	12,574,000	12,223,000	11,958,000
Total Rural	\$ 66,073,000	\$46,494,000	\$38,890,000	\$33,838,000
Urban				
Present Needs	\$ 27,878,000	\$13,939,000	\$ 9,293,000	\$ 6,970,000
Future Needs & Replacements	16,317,000	14,542,000	13,798,000	12,987,000
Maintenance & Operations	5,882,000	5,061,000	4,861,000	4,793,000
Total Urban	\$ 50,077,000	\$33,542,000	\$27,952,000	\$24,750,000
Total				
Present Needs	\$ 64,164,000	\$32,082,000	\$21,388,000	\$16,042,000
Future Needs & Replacements	32,510,000	30,319,000	28,370,000	25,795,000
Maintenance & Operations	19,476,000	17,635,000	17,084,000	16,751,000
Total Rural and Urban	\$116,150,000	\$80,036,000	\$66,842,000	\$58,588,000
Proposed State Trunk				
Rural				
Present Needs	\$ 31,173,000	\$15,587,000	\$10,391,000	\$ 7,793,000
Future Needs & Replacements	11,329,000	12,250,000	12,037,000	10,848,000
Maintenance & Operations	11,146,000	10,357,000	10,117,000	9,912,000
Total Rural	\$ 53,648,000	\$38,194,000	\$32,545,000	\$28,553,000
Urban				
Present Needs	\$ 27,286,000	\$13,643,000	\$ 9,095,000	\$ 6,822,000
Future Needs & Replacements	15,297,000	13,807,000	13,276,000	12,585,000
Maintenance & Operations	5,438,000	4,653,000	4,471,000	4,414,000
Total Urban	\$ 48,021,000	\$32,103,000	\$26,842,000	\$23,821,000
Total				
Present Needs	\$ 58,459,000	\$29,230,000	\$19,486,000	\$14,615,000
Future Needs & Replacements	26,626,000	26,057,000	25,313,000	23,433,000
Maintenance & Operations	16,584,000	15,010,000	14,588,000	14,326,000
Total Rural and Urban	\$101,669,000	\$70,297,000	\$59,387,000	\$52,374,000

Program Costs County and Township Roads

System	Annual Costs For			
	5-Year Program	10-Year Program	15-Year Program	20-Year Program
State-aid Roads				
Present Needs	\$19,674,000	\$ 9,837,000	\$ 6,558,000	\$ 4,918,000
Future Needs & Replacements	4,061,000	4,366,000	4,746,000	5,111,000
Maintenance & Operations	8,261,000	8,165,000	8,146,000	8,149,000
Total	\$31,996,000	\$22,368,000	\$19,450,000	\$18,178,000
County-aid and County Roads				
Present Needs	\$19,478,000	\$ 9,739,000	\$ 6,493,000	\$ 4,869,000
Future Needs & Replacements	3,434,000	3,208,000	3,311,000	3,491,000
Maintenance & Operations	9,731,000	9,615,000	9,595,000	9,600,000
Total	\$32,643,000	\$22,562,000	\$19,399,000	\$17,960,000
Township Roads				
Present Needs	\$13,115,000	\$ 6,558,000	\$ 4,372,000	\$ 3,279,000
Future Needs & Replacements	822,000	682,000	651,000	645,000
Maintenance & Operations	6,558,000	6,494,000	6,477,000	6,470,000
Total	\$20,495,000	\$13,734,000	\$11,500,000	\$10,394,000
Proposed Primary County Roads				
Present Needs	\$37,407,000	\$18,703,000	\$12,469,000	\$ 9,352,000
Future Needs & Replacements	12,134,000	10,852,000	10,321,000	10,271,000
Maintenance & Operations	15,840,000	15,415,000	15,277,000	15,227,000
Total	\$65,381,000	\$44,970,000	\$38,067,000	\$34,850,000
Proposed Local Rural Roads				
Present Needs	\$19,973,000	\$ 9,986,000	\$ 6,658,000	\$ 4,993,000
Future Needs & Replacements	1,047,000	932,000	922,000	936,000
Maintenance & Operations	11,153,000	11,076,000	11,047,000	11,038,000
Total	\$32,178,000	\$21,994,000	\$18,627,000	\$16,967,000

Program Costs Municipal Streets

System	Annual Costs For			
	5-Year Program	10-Year Program	15-Year Program	20-Year Program
All Municipal Streets (Except Existing State Trunk Highways)				
Present Needs	\$19,846,000	\$ 9,923,000	\$ 6,614,000	\$ 4,961,000
Future Needs & Replacements	10,308,000	10,947,000	10,574,000	10,429,000
Maintenance & Operations	16,413,000	16,291,000	16,231,000	16,205,000
Total	\$46,567,000	\$37,161,000	\$33,419,000	\$31,595,000
Proposed City Arterials				
Present Needs	\$ 7,091,000	\$ 3,545,000	\$ 2,364,000	\$ 1,773,000
Future Needs & Replacements	6,157,000	5,913,000	4,865,000	4,234,000
Maintenance & Operations	5,072,000	4,977,000	4,914,000	4,897,000
Total	\$18,320,000	\$14,435,000	\$12,143,000	\$10,904,000
Proposed Business Access Streets				
Present Needs	\$ 2,124,000	\$ 1,061,000	\$ 707,000	\$ 532,000
Future Needs & Replacements	657,000	737,000	813,000	863,000
Maintenance & Operations	809,000	789,000	783,000	780,000
Total	\$ 3,590,000	\$ 2,587,000	\$ 2,303,000	\$ 2,175,000
Proposed Residential Access Streets				
Present Needs	\$11,223,000	\$ 5,613,000	\$ 3,741,000	\$ 2,805,000
Future Needs & Replacements	4,514,000	5,032,000	5,418,000	5,733,000
Maintenance & Operations	10,976,000	10,933,000	10,924,000	10,907,000
Total	\$26,713,000	\$21,578,000	\$20,083,000	\$19,445,000

Management

Effectiveness of the attack on the highway problem rests in the hands of management. But management must follow basic policies established by law making bodies, and in the case of Minnesota, also by constitutional provisions. Laws, however, do not and should not cover details of operation. Legally established policies must be broad so that administrative decisions may be made to meet the prerequisites of growth and changing conditions.

In Minnesota legal directives and policies, both constitutionally and legislatively, should be modified to enable the State, counties and cities to better meet and adjust to present and future demands of highway transportation.

A basic recommendation of the engineering study is that the proposed reclassification of highways and streets be adopted as a means of getting more for the highway dollar through better management and orderly highway development. At present, the major part of the Trunk Highway System is established by constitutional amendment, the balance by legislation. Also, fiscal policies are written into the Constitution which prevent legislative and administrative adjustment to current needs. From the standpoint of good management, it would be preferable to establish the revised systems and their jurisdictions by legislative action.

As an essential step in the engineering study, laws were reviewed sufficiently to determine that it would be desirable to examine all State law pertaining to highways as to their adequacy. Action should then be taken to assure a better division

of responsibility between legislative and administrative bodies.

Department of Highways

Directing a state highway department is a huge responsibility. Unless working under sound and sufficiently broad legislative provisions, the job is even more difficult than managing a large corporation. In Minnesota, about 3,500 year round employees are necessary to carry on the far-flung operations which include not only a variety of complex engineering functions, but all of the accounting, purchasing and other routine work encountered in private business.

A first essential is to have a soundly conceived plan of organization, with well-defined responsibilities, for proper balance, in all functions.

Personnel

The Minnesota Department of Highways has the acute problem of insufficient trained personnel. Other types of engineering and private business are competitors. Young engineers are sorely needed. Out of 238 engineers of Civil Engineer Grade II or higher only 13 are under 40 years old. The average age of the 238 is about 53 years.

To correct this alarming situation, it is recommended that incentives be improved by increasing the number of responsible jobs, that Civil Service regulations be changed to permit personnel advances in a manner better serving department needs, and that work with educational institutions include a continuing program of research to stimulate student interest.

Among the many highway jobs is that of removing snow— which on the average costs about a third of all money spent for maintenance on the State Trunk System.





Here is an excellent example of access control along a heavily traveled divided highway, Trunk Highway 7. Minnesota law governing access control, however, should be broadened to provide further benefits to property owners and motor vehicle users.



There are almost twice as many trucks in use in Minnesota today as there were in 1936. Average loaded weight of large trucks increased by nearly two-thirds in the same period. The control of size and weight of vehicles is essential to the protection of the highway investment. One means of control is the roadside weighing station.

Advance Planning

While steps have been taken in Minnesota to initiate advance planning, this most important operation should be promptly placed in effect. Adoption of major elements of the study recommendations would provide a solid base for advance program planning for five-year periods. Doing that has decided advantages—full coordination of such functions as location, right of way, procurement and design; the saving of time and money; and elimination of confusion.

Right of Way Acquisition

Minnesota acquires needed right of way, to a limited extent, by advance purchase. Because this method can save large sums of money, it is recommended that a special revolving fund be established for the purpose. That fund, reimbursed at the time of construction, could be used when the department can develop detailed plans well in advance of construction.

The department should also be given authority to acquire property for exchange purposes. This would be helpful in urban areas where new projects may require removal of buildings to other locations.

Although the department is able to acquire control of access under certain conditions through

court decisions, the law should be broadened to permit more extensive use of the authority on new or existing major highways; provide authority to apply control, protection and regulation of facilities beyond that obtained by mere acquisition of property; and give authority to close existing facilities when necessary. Similar access control authority should be extended local governments.

County and Township Management

In management of county roads Minnesota is among the leading states. This is attributable to recognizing early that management is essentially an engineering function. Since 1921 Minnesota law has required counties to have engineers. Policy formation and over-all controls are exercised by county commissioners.

As a result of sound management the counties are developing road systems of good standards, have established capable maintenance organizations, and have used new procedures and techniques in design and construction.

The 1,846 townships have some degree of responsibility over 56,000 miles of road. The average mileage in their jurisdiction is 33. Management of township roads is done in two ways. In 68 of the 87 counties, all of the townships function to some



In urban areas peak traffic volume is reached during the 5 to 8 p.m. homeward bound rush hour.

Good maintenance is essential in the battle against the ravages of weather and the wear and tear of traffic.

degree in road matters. In the other 19 counties, county highway departments have taken over local road management in unorganized townships.

The trend is for townships to rely more and more on counties to perform maintenance. In 1952, 48 counties maintained 14,500 miles of township roads. In that year, 58 counties removed snow on 25,000 miles. Only 16 per cent of the townships own motorized equipment, and so, many townships must arrange with counties and private owners for equipment.

Townships should take utmost advantage of county management facilities. This would improve their local road functions and at the same time preserve local initiative and support.

Municipal Management

Metropolitan area bottlenecks constitute the most critical of all deficiencies in the highway plant. Solution involves costly readjustments of a bold nature, yet potential returns from such investments are extremely high. Urban highway engineering problems are a major engineering challenge.

Every major city should reassess management requirements in terms of plans, personnel and finances. The State should help and supply initiative, particularly because of its responsibility for urban extensions. Each city, however, must step up to its own responsibilities in development of comprehensive plans and organization to carry out its program.

Management of streets in smaller cities is somewhat similar to the problem of management of townships. Needs of the mileage of streets and the amount of funds necessary to be expended are relatively small and preclude requirement for continuous engineering service. Yet, when capital improvements are required and in the conduct of maintenance programs, engineering direction will result in much more return from the funds available. To provide this service, it is recommended that smaller cities be authorized to obtain the services of county engineers on a reimbursable basis. Further, it is urged that the State extend its advisory services to give aid to cities through the recommended urban division.



Intergovernmental Cooperation

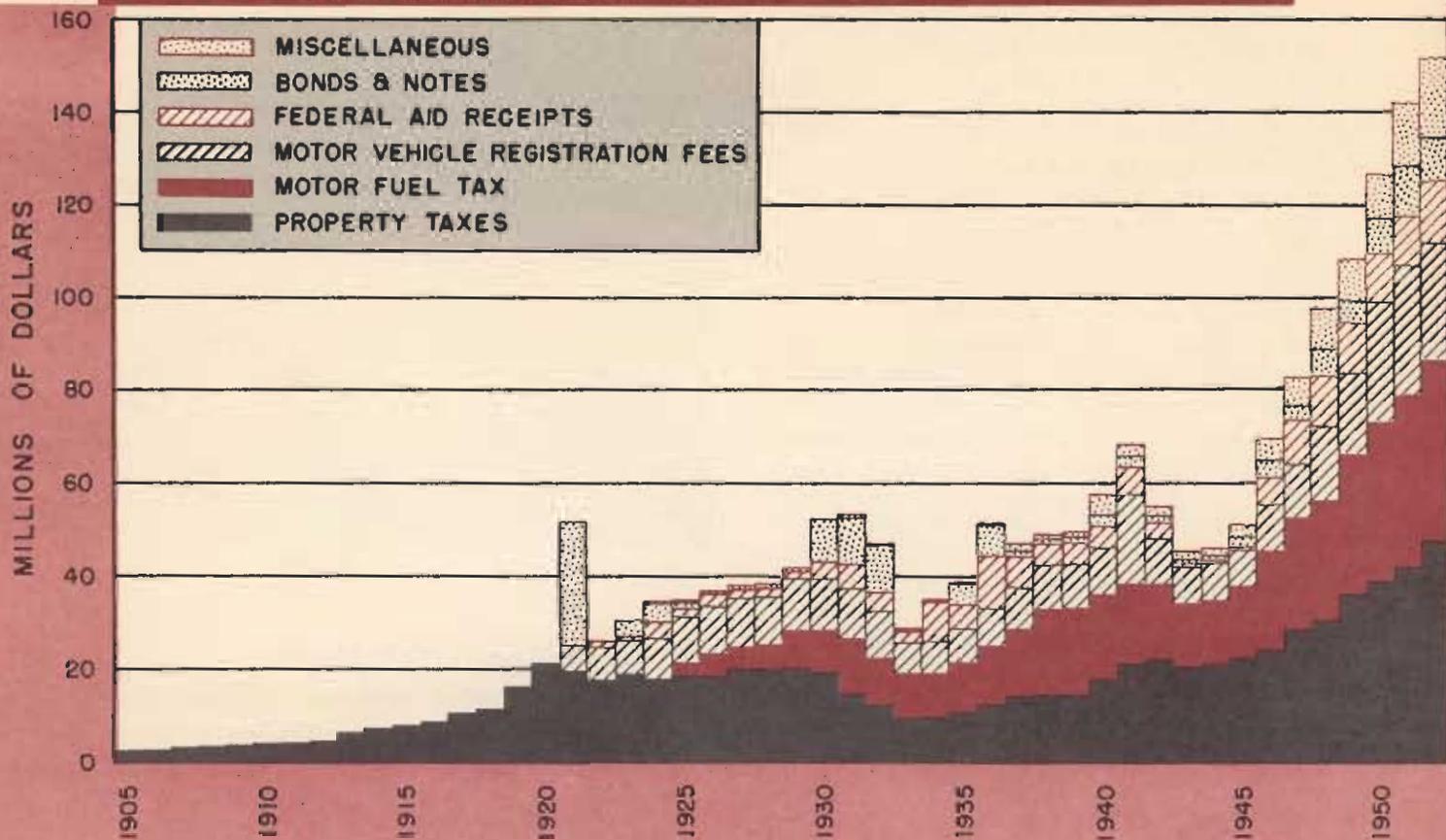
The Department of Highways has expedited planning and construction of projects of mutual concern through its County Division. The basic controls now required on the State-aid System should be extended to all county roads receiving State financial assistance. An urban division of similar scope should be established to work cooperatively with cities in developing arterial projects fitting into the master plans of cities.

Since county road management in Minnesota is of high quality, and because of possible substantial savings, it is urged that townships take utmost advantage of county management facilities. Townships can extend the present practice of cooperative agreements with counties to provide maintenance operations, and they can expand the cooperative work to include construction.

Because by and large, streets are the points of worst congestion and delay, cities are urged to step up development of comprehensive plans and street department organization. Smaller cities should be encouraged to obtain the services of county engineers on a reimbursable basis.

Because of the several municipalities and counties involved, as well as the State, it is recommended that a metropolitan expressway authority be established for the Minneapolis-St. Paul area. Investments by the State and local governments could be best used, and quicker results obtained, through such a cooperative agency.

SOURCE OF REVENUES—ALL ROADS AND STREETS



Highways Up To Now

Minnesota has long been a "good roads" State. Since 1905 through 1952, identifiable revenues collected for highway and street purposes totaled approximately \$2 billion.

Due to incomplete data prior to 1937 it is not possible to determine the total investment in the highway and street network of the State. The Highway Planning Survey has complete finance data on county and township roads beginning with 1937 and for city streets since 1940. Finance data for State trunk highways are available since the establishment of the Trunk Highway System in 1921.

Of the total, \$916 million was spent on the trunk highways and was obtained from motor vehicle and fuel taxes, Federal aid and bonds.

Of the \$587 million funds available for county

roads, \$401 million was obtained from property taxes. The greater portion of \$245 million for township roads was obtained from property tax.

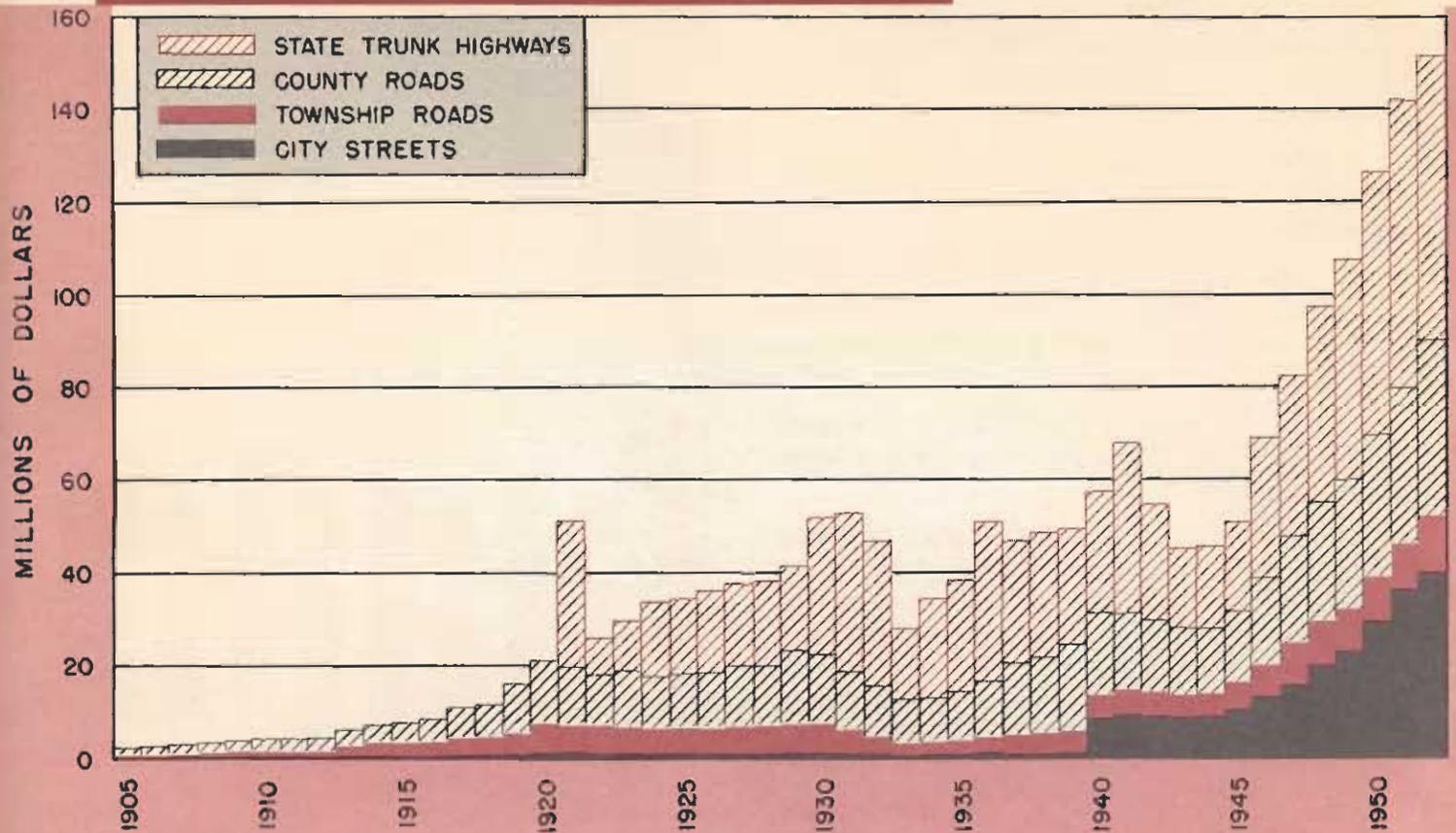
Municipalities received \$179 million from property taxes. The remaining \$93 million came from bonds and other miscellaneous sources, with some Federal aid.

Highway expenditures in 1952 for all purposes, including maintenance, right of way, bond payments, etc., were as follows:

Department of Highways ..	\$ 68,684,000
Counties	35,741,000
Cities	26,151,000
Townships	11,789,000
Total	\$142,365,000

Over the years, despite many replacements of worn out or obsolete roads and streets, the State and local governments have accumulated a total

DISTRIBUTION OF REVENUES



of 20,000 miles of hard surfaced pavement and 8,750 bridges of all sizes.

Increasing costs for construction and maintenance activities are a major factor in the present highway problem. The construction dollar, using 1940 as a base, was worth 49 cents in 1952. The maintenance dollar, based on 1937 to 1941 average prices, was worth only 58 cents in 1952. While there has been considerable variation in value from year to year the trend has been steadily downward since 1940.

This inflationary trend has had a pronounced effect on the highway program. While the total expenditures for construction and maintenance activities in 1952 were 3.7 times those for 1940 these expenditures actually purchased only twice the volume of work.

The status of the rural roads and city streets is shown in the following tables:

Present Status of Rural Road Improvement (In Miles)

	State Trunk Highways	State-aid Roads	County-aid and County Roads	Township Roads	Total
Hard Surfaced	8,801	2,663	891	279	12,634
Gravel	1,588	12,530	23,608	35,026	72,752
Graded—Not Surfaced	1	257	1,359	11,882	13,499
Unimproved	—	39	300	7,349	7,688
Total	10,390	15,489	26,158	54,536	106,573

Present Status of City Street Development (In Miles)

	State Trunk and County- aid Highways	State-aid and County- aid roads	Other City Streets	Total
Hard Surfaced	1,409	811	5,205	7,425
Gravel	51	656	2,699	3,406
Graded—Not Surfaced	—	22	912	934
Total	1,460	1,489	8,816	11,765

Safer Highway Travel

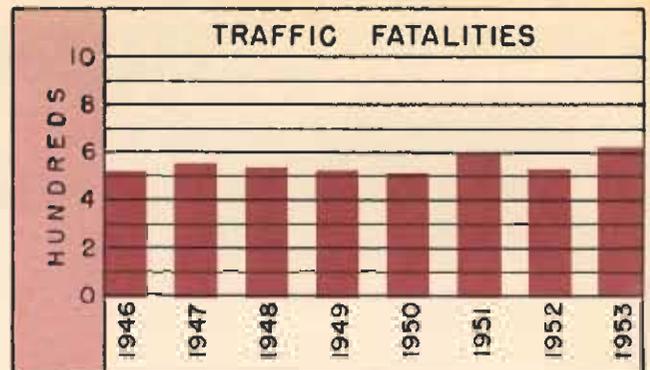
Since a goal of the engineering appraisal is to find means for increasing efficiency and economy in highway transportation, it is necessarily concerned with the problem of accidents.

Accidents mean losses in human life, limb and property, which are a large part of the total transportation cost.

Annually Minnesota suffers huge economic losses from traffic accidents. The 1953 total bill was \$70 million, an amount about equal to that spent for all highway construction in the same year.

In 1953, 637 persons were killed in Minnesota traffic accidents. Twenty thousand others were injured.

To reduce this needless waste, it is urged that the State and local governments step up all activities recommended in the Action Program of the President's Highway Safety Conference, and that private citizens cooperate through both safety groups and civic organizations. A major need is for increased activity by State agencies in giving technical assistance to communities and in working closely with the Minnesota Safety Council.



State Economy and Highways

The economy and security of the nation and of all states and communities rests on highway transportation—which serves all people and all activities. The well-being of every individual is affected by the adequacy of highways and streets.

. . .

One of every seven people employed in Minnesota has a highway transportation job.

. . .

Practically everything produced or consumed in the State travels all or part of the way over the highways.

. . .

Four-fifths of the livestock moves from farms to primary markets by truck.

. . .

Almost all timber for paper mills is moved by truck.

Dispersal of light industry plants is increasing. Highways play an important role in employee transportation and in integrating operations of dispersed plants

. . .

Minnesota has more than a dozen regional wholesale centers—most of the distribution is over the highways.

. . .

Growth is expected in the highway-borne tourist business which produces in excess of \$150 million each summer.

. . .

Minnesota highways link together:

- 3 million people
- 175,000 farms
- About 1,000 hamlets and villages
- 200 county trade centers
- 64 large trade centers
- Several hundred lumber camps
- Hundreds of mining operations.

TO SOLVE any problem it is first necessary to determine its make-up and its scope. The engineering study of Minnesota's highway problem has provided a breakdown of its various phases and has measured, for the first time, all road and street deficiencies.

What needs to be done is no longer a matter of guess work.

The public, highway officials and engineers, and the law makers have before them a complete picture of the State's physical highway needs. The job ahead is large and has its complications, true enough, but possessed of facts on actual needs and with knowledge of fiscal requirements, the State is in position to materially speed up highway progress.

An important part of the solution is modernization of laws which will strengthen policies, improve relations between the State and local governments, and which will enable highway administrators to do a better job. Also, long-range improvement programs should be tied to firm and sound fiscal plans.

How fast and how far Minnesota goes will depend on the desires and actions of the people and of the law makers.