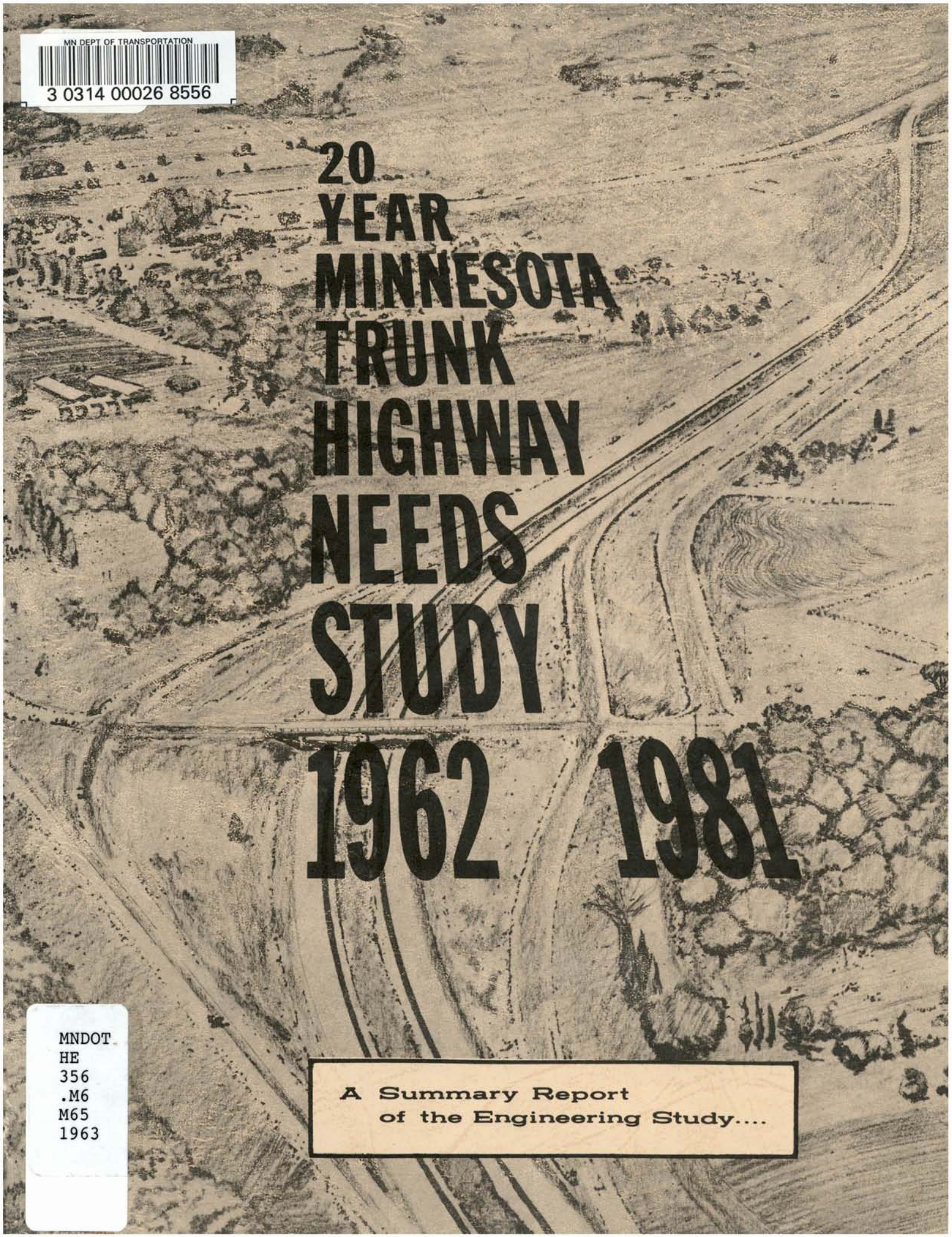

20 YEAR MINNESOTA TRUNK HIGHWAY NEEDS STUDY 1962 1981

A Summary Report
of the Engineering Study....

MINNESOTA TRUNK HIGHWAY NEEDS

1962 - 1981

A SUMMARY REPORT

OF THE ENGINEERING STUDY

MINNESOTA HIGHWAY DEPARTMENT
Planning and Programming Division
Planning Research Section

In Cooperation With The
U. S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

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CONTENTS

SUMMARY

The data on which this report is based has been collected and processed during the past year. The estimated costs are based on the needed construction, possible necessary utility rearrangements, and construction engineering. Preliminary engineering and right-of-way acquisition costs are not included in the estimates.

The funds required, as determined by this study, to bring the present State Highway System up to standards adequate to handle anticipated 1981 traffic total approximately $1,211,694,000 over the next 20 years. This would be an average expenditure of $60,585,000 per year for construction, exclusive of any right-of-way or preliminary engineering costs.

Included in this estimate is the upgrading of approximately 1,598 miles of existing 20-foot concrete pavement at a cost of $191,209,000.

The costs included in this report provide for the elimination of all springtime axle load restrictions below 7 tons at an estimated cost of $366,800,000. At the present time, approximately 5,015 miles of state highways are restricted each spring to less than 7-ton axle loads.

APPRAISAL PROCEDURE AND STANDARDS

The procedure used in collecting the data included an examination and appraisal of the State Highway System by the District Engineers. The procedures used throughout this study have been developed to provide, on a continuing basis, a means of measuring the accomplishments and the rate of progress toward bringing the State Highway System up to standards which will adequately carry the anticipated 1981 traffic volumes.

The appraisal involved the comparison of each section of roadway first with a set of minimum conditions which are considered adequate for existing traffic, and secondly with the design standards presently considered adequate for estimated 1981 traffic volumes. Sections of highway failing to substantially meet the minimum conditions were considered "Presently Deficient" and the cost of improvements needed to make these sections conform to the accepted design standards for projected 1981 traffic volumes were estimated. Sections which fulfill the minimum conditions were considered "Presently Adequate". These sections were then compared to the accepted design standards for projected 1981 traffic volumes to determine future deficiencies for which the cost of needed improvements were estimated.

RESULTS OF THE STUDY

Examination of the State Highways to determine the extent of the construction improvements required during the next two decades to adequately handle the anticipated 1981 traffic volumes reveals that of the 11,817 mile State Highway System (exclusive of Interstate Routes), 11,095 miles will require varying amounts of improvements which were estimated to cost $1,211,693,900. Of the mileage requiring improvements, approximately 7,630 miles (or approximately 69%) now have features which cause them to be rated deficient. Improvement of these sections to the accepted design standards for 1981 traffic volumes will involve estimated construction costs of $933,020,900.

The following table contains the distribution of miles and estimated cost of construction improvements needed to adequately handle anticipated 1981 traffic volumes.

System	Existing Miles	Miles Needing Improvements	Estimated Cost of Improvements
Federal-Aid Primary Routes	7,639	6,942	$ 887,102,100
Federal-Aid Secondary Routes	4,118	4,099	298,789,000
Non-Federal Aid Routes	60	54	25,802,800
Total	11,817	11,095	$ 1,211,693,900

Of the mileage needing improvements, 63 percent is on the Federal-Aid Primary System and account for 73 percent of the estimated cost of improvements. The Federal-Aid Secondary System accounts for 36 percent of the miles with needs and 25 percent of the estimated cost of improvements.

Of the total mileage 85.5 percent is located in rural areas, 8.4 percent in municipalities with population under 5,000, and 6.1 percent in urban areas.* However, the cost of needed improvements is not divided in the same proportion as the mileage. The cost of needed improvements are estimated to be

*An urban area is defined as the incorporated area of any municipality having a population of 5,000 or more as determined by the latest Federal Census including adjacent non-incorporated areas contained within boundaries fixed by a state highway department subject to the approval of the Secretary of Commerce.

65.8 percent in rural areas, 8.2 percent in municipalities with under 5,000 population, and 26.0 percent in urban areas.

The required construction improvements have been classified into five types of projects:

Type I - Complete Construction or Reconstruction

This classification covers the major construction jobs such as building an entirely new roadway, completely rebuilding an existing roadway, or both including the construction of necessary bridges.

Type II - Regrading, Widening, and Resurfacing

This classification includes widening the roadway, easing the critical vertical and horizontal curves, strengthening the base, and resurfacing.

Type III - Base and Surfacing

Projects in this classification are those with adequate alignment and sufficient width to allow for increased base and surface depth without additional grading.

Type IV - Surfacing Only

Projects in this classification consist of applying an additional surfacing course.

Type V -Miscellaneous Construction

This classification covers bridge replacement not included with other work as well as a number of relatively minor construction items.

Included in the Type I Projects are 339 miles of 20-foot concrete pavement which are recommended for complete reconstruction to multi-lane divided facilities at an estimated cost of $87,180,000, and 226 miles of 20-foot concrete pavement which are recommended for complete reconstruction as 2-lane, single roadway facilities at an estimated cost of $33,270,000. The Type II projects contain

33 miles of 20-foot concrete pavement which are recommended to be regraded, widened, and resurfaced, and the addition of a new roadway parallel to the old roadway to obtain a 4-lane divided highway at an estimated cost of $7,302,000; and 1,000 miles to be regraded, widened, and resurfaced as 2-lane single roadway facilities at an estimated cost of $63,457,000.

The above recommended construction will improve 1,598 miles out of a total of 1,690 miles of 20-foot concrete pavement presently on the State Highway System.

The following table contains the mileage with needed improvements, the total estimated cost and average cost per mile for the five types of projects.

Type of Project	Miles With Needed Improvements	Total Estimated Cost	Average Estimated Cost Per Mile
Type I	3,717	$ 717,527,600	$ 193,016
Type II	5,944	409,442,900	68,881
Type III	96	5,134,800	53,326
Type IV	813	33,527,500	41,248
Type V	525	46,061,100	*
Total	11,095	$ 1,211,693,900	

* Average Cost Per Mile not shown because of the variable type of work involved (major river crossings to installation of railroad crossing signs).

LONG RANGE PLAN FOR HIGHWAY CONSTRUCTION

Prior to February, 1962, the Department's policy called for construction to either a 5 ton, 7 ton, or a 9 ton springtime axle load design. When it became necessary to increase springtime load carrying capacities from one type to another, considerable regrading was required before placing additional base and surfacing. The cost of such construction was considerably higher than the cost which would have been incurred if the original construction had conformed to higher standards.

In February, 1962, a new construction policy was adopted. This policy specifies the use of either a 9 ton or a 7 ton-ultimate-9 ton axle load design. The latter design provides for sufficient graded width and base depth to allow for upgrading to unrestricted standards without major reconstruction. As a result of this policy, present springtime restrictions of 4, 5, and 6 ton axle loads on a total of 5,015 miles will be raised to a minimum of 7 tons on 2,671 miles at an estimated cost of $176,234,000 and to unrestricted standards on 2,344 miles at an estimated cost of $190,566,000.

The total cost differential between the two policies is estimated to be $21,660,000 with the present "7 ton-ultimate-9 ton Plan" totaling $1,211,693,900 and the previous "5, 7, 9 ton Plan" totaling $1,190,033,180.

CLASSIFICATION OF ROUTES BY SERVICE LEVEL

The classification of State Highway routes by the level of service to be provided is an essential part of the Highway Needs Study since this supplies another useful tool for the long range planning of future highway construction. Criteria used as guides in determining the service level are:

1 - 1981 Traffic projection

2 - Traffic growth rates.

The four functional classifications employed in this study are briefly described as follows:

1 - Freeway Routes - High level multi-lane state routes with complete control of access, no intersections at grade, and constructed to permit year around use by maximum legal axle loads.

2 - Expressway Routes - Heavily traveled major, multi-lane state routes with partial to fully controlled access, minor intersections may be permitted at grade, and constructed to permit year around use by maximum legal axle loads.

3 - Trunk Routes* - Less heavily traveled major state routes with limited or partial control of access, and constructed to year around use by maximum legal axle loads. These routes would allow direct access to abutting properties where such access would not create appreciable interference with traffic.

4 - Collector or Feeder Routes - The prime purpose of these routes is to provide access to the major state highway routes from abutting property and local roads and streets. These routes would be constructed to carry a minimum of a 7-ton springtime axle load with provisions to be ultimately upgraded to a 9-ton springtime axle load by the placing of additional surfacing courses.

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* The designation "Trunk Route" was selected for this classification, with due regard to the possible confusion with the term "Trunk Highway" because "Trunk Route" implies a major route but it does not carry the connotation of the highest classification which other similar terms imply. This is the largest classification and contains approximately 48 percent of the present State Highway System.

The following table contains (1) the mileage to be included in each of the proposed classifications, (2) the mileage presently meeting the criteria of the classification, (3) the mileage needing construction improvements, (4) the estimated cost of the improvements needed to bring the mileage up to the standards required for that classification, and (5) the estimated average cost per mile in each classification.

Proposed Classification and Mileage	Mileage Presently Meeting Criteria of Classification	Mileage Needing Improvements	Estimated Cost of Improvements	Estimated Average Cost Per Mile
Freeway Routes (240 Miles)	23	217	$ 165,652,900	$ 765,000
Expressway Routes (1,463 Miles)	90	1,373	355,809,100	259,000
Trunk Routes (5,680 Miles)	294	5,386	410,406,200	76,000
Collector Routes (4,434 Miles)	315	4,119	279,825,700	68,000
Total (11,817 Miles)	722	11,095	$1,211,693,900	

There are two important factors which contribute to the higher average cost of the Freeway and Expressway Routes: (1) they require more extensive and complicated construction, and (2) a greater percentage of their mileage will require major changes in existing facilities or completely new locations. On the other hand, the Trunk and Collector Routes will require less costly upgrading since they conform, to a greater degree, to the conditions of the present State Highway facilities.

MINNESOTA TRUNK HIGHWAY NEEDS
1962-1981

MINNESOTA DEPT. OF HIGHWAYS.

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