

*Approved*  
*3/27/84*

# NEEDS STUDY TECHNICAL PAPER

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## EXECUTIVE SUMMARY

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### 1984 NEEDS STUDY INVENTORY

- HIGHWAYS, ROADS & STREETS -

(Approved by Needs Study Committee 3-27-84)

1984 NEEDS STUDY INVENTORY  
FOR HIGHWAYS, ROADS & STREETS

DEFINITIONS

ADT - Average Daily Traffic. Daily traffic volume averaged over a one year period.

VMT - Vehicle Miles of Travel. Average daily traffic on a route multiplied by the length of the specific link. For annual VMT, this figure is multiplied by 340.

Line Miles - Directional centerline mileage. For example, one mile of divided highway, having separate lanes in opposite directions, would be considered as two line miles. Use of line miles provides a more precise statement of costs for freeways and other divided highways since condition and improvements vary on opposing lanes of divided highways.

Route Miles - The commonly used statement of the distance a route cover regardless of the number of lanes or cross section type. One mile to two-lane highway is equal to one mile of four-lane divided highway.

Certified Miles - The mileage of road, street and highway systems in the state as approved by the State Transportation Commission for distribution of funds under Act 51, P.A. of 1981 as amended.

Existing Roadway Conditions - The rating applied to each segment of highway, road and street as determined by field inspection in the inventory process. The roadway surface, base, and drainage condition is rated accordingly:

Urban Areas - Developed areas designated by the Bureau of the Census having a central city population of 5,000 or more.

Rural Areas - An area of the state not included in the boundaries of urban areas.

Functional Classification - A designation given to a group of streets and highways based upon the character of service they are intended to provide.

Classifications include:

Rural

Statewide Arterials  
Regional Arterials  
Local Arterials  
Principal Collectors  
Secondary Collectors  
Residential  
Local Access  
Industrial/Commercial

Urban

Statewide Arterials  
Regional Arterials  
Metro Arterials  
Local Arterials  
Principal Collectors  
Secondary Collectors  
Residential  
Local Access  
Industrial/Commercial

Legal Systems - Designation of the state's highway, road and street system by jurisdiction and, as in the county and city system, by level of importance within jurisdictions. The legal systems are:

- |                |                      |
|----------------|----------------------|
| Legal System 1 | State Trunklines     |
| Legal System 2 | County Primary Roads |
| Legal System 3 | County Local Roads   |
| Legal System 4 | City Major Streets   |
| Legal System 5 | City Local Streets   |

Surface Types - The predominant type of existing surface on a roadway as coded by the local agencies in the inventory process. Surface Types are as follows:

Surface Type

- Graded and Drained Earth
- Gravel and Similar
- Bituminous Surface Treated Gravel (Seal Coat)
- Mixed Bituminous Surface (1" or more) on Gravel
- Mixed Bituminous Surface (1" or more) on Concrete or Brick or Black Base
- Concrete
- Brick
- Freeway Designed Bituminous Concrete on Aggregate Base
- Unimproved Earth

## THE HIGHWAY NEEDS STUDY INVENTORY PROCESS

### County and City Systems

The inventory process for the county and city portion of the Highway Needs Study began in January 1983. At that time, in an attempt to obtain maximum participation, the needs study procedural data was included with the mailing of the Act 51 reporting requirements which are sent out annually by the Local Government Division of the MDOT. The mailings were sent to all 83 county road commissions and to the street administrators of all incorporated cities and villages.

Each needs study procedural package included the following items.

1. Procedural Manual which explained how to update the 1977 needs study inventory. The manual also contained a sample inventory data form (Form 1716), a sample computer inventory sheet, and a detailed definition of each item coded. The manual indicated that all coding changes were to reflect conditions as of January 1, 1983.
2. Computer Printout of each jurisdiction's road and street inventory reflecting conditions as of the previous needs study update done in 1977. The printout listed and identified each segment of road, its various system classifications, and its existing conditions and dimensions.
3. Road or Street System Maps which were to be used to show changes, additions, or deletions to segments, and to show new roads added to the system since the previous study.

4. Existing Road Inventory Coding Forms (Form 1716) which provided for the coding of inventory data on those roads and streets added to a jurisdiction since the 1977 needs study.

Local personnel then completed their part of the update according to instructions in the procedural manual. They were asked to review their road and street systems and indicate on the printouts and code forms any changes, additions, or deletions that had occurred since the 1977 needs study. During this phase of the study, MDOT personnel provided direct assistance to those jurisdictions requesting it.

Following completion of the inventory update by each local jurisdiction, the data was returned to the Department where all changes and additions were reviewed for compliance with needs study procedural requirements. All changes that were made directly on the inventory printout were then coded and submitted to data entry where they were keyed and transferred to data entry tapes. These tapes were then merged with the needs study master tapes through a series of needs study update programs. One of these programs provided an edit and logic check of the data output to assure that coding was complete, correct, and fell within the required coding parameters. A listing of errors was provided by the update programs each time that a data entry tape was processed. Errors were corrected and the data recoded and processed back through the update cycle.

### State Trunkline System

The inventory process for the state trunkline system made use of the Trunkline Sufficiency Rating as the source for inventory data. The ratings, done at two year intervals, require that every mile of trunkline be driven and changes or additions to the system recorded. Data from the 1982 Trunkline Sufficiency Rating was merged with the needs study master tape to provide data for the trunkline portion of the Highway Needs Study. This data was then processed through the same edit and logic programs as that of the non-trunkline inventory.

### Sample Size

The 1983 inventory was the first in which 100 percent participation by local jurisdictions was achieved. All 83 counties and 532 cities and incorporated villages submitted inventory updates. Previous inventories were either done on a sample basis for cities under 5000 population, or data from previous studies were used to determine deficiencies.

## SYSTEM DESCRIPTION

### System Mileage

The state system of highways, roads, and streets consists of 119,809 line miles under the administration of the Michigan Department of Transportation, the County Road Commissions, and the City Street Administrators. The mileages and percent of total under each jurisdiction are shown in Exhibit 1.

Road mileage is expressed in a number of ways including route miles, certified miles, and line miles. These are defined in the previous section. Exhibit 2 compares mileages from the 1977 Needs Inventory with mileages from the present study for each legal system and for the three mileage types.

### Functional Classification

Highways, roads, and streets are classified according to the predominant character of the service provided. This process is called functional classification and has a major part in analysis of the system and in planning for future improvements.

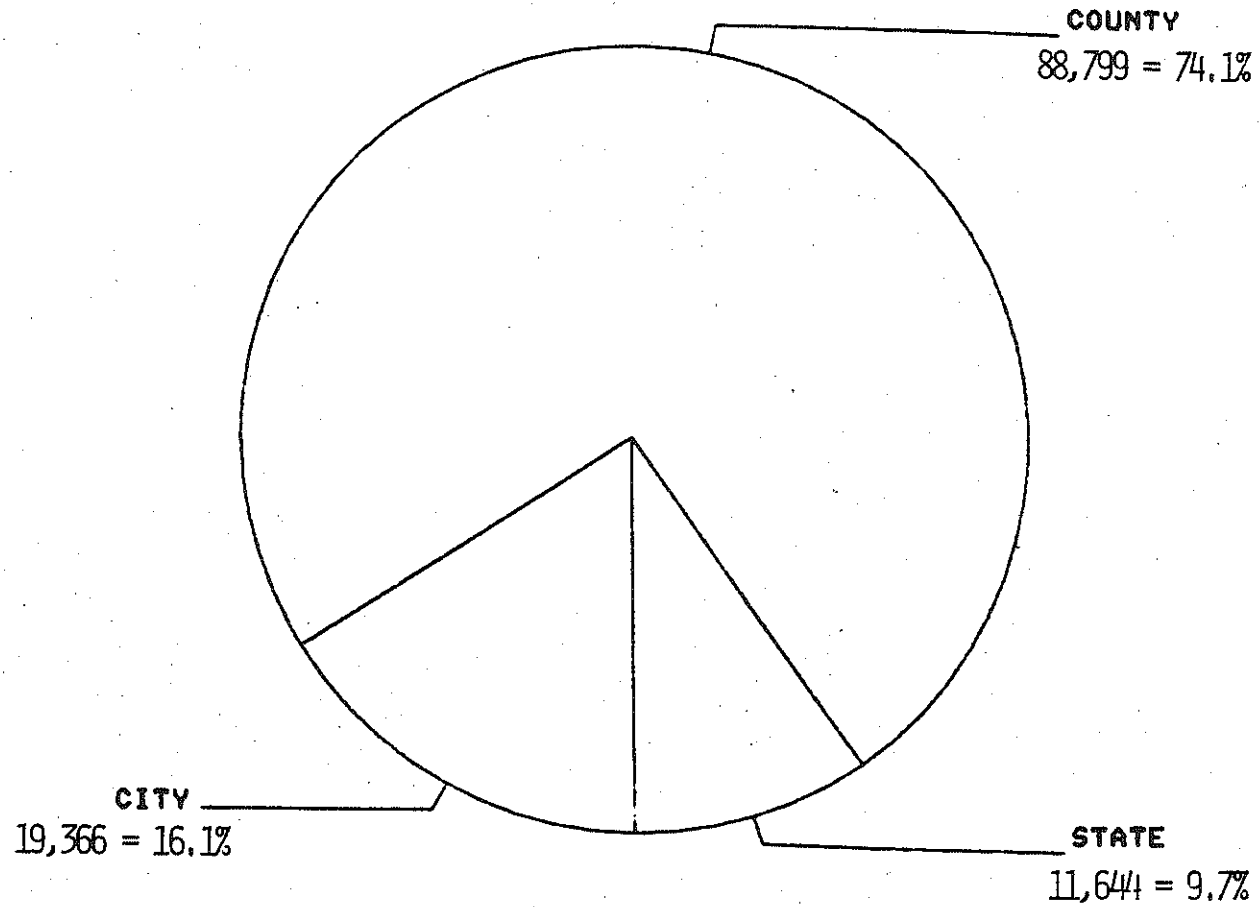
There are two major purposes of the road system, to move traffic (mobility) and provide access to adjacent property (accessibility). The majority of roads serve both purposes to varying degrees. Therefore, before a road can be properly classified, a determination must be made of its primary function and the degree to which it serves more than one function.

Roads may be grouped within three broad classifications: arterials, collectors, and local access roads. Arterials principally carry high volumes of traffic on relatively long trips; thus, their predominant



# EXHIBIT 1

## MICHIGAN 1984 NEEDS STUDY INVENTORY LINE MILEAGE



TOTAL LINE MILES - 119,809

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## EXHIBIT 2

### INVENTORY MILEAGES BY LEGAL SYSTEM

|                 | ROUTE MILES    |                | CERTIFIED MILES |                | LINE MILES     |
|-----------------|----------------|----------------|-----------------|----------------|----------------|
|                 | 1983           | 1977           | 1983            | 1977           | 1983           |
| STATE TRUNKLINE | 9,496          | 9,453          | 9,476           | 9,455          | 11,644         |
| COUNTY PRIMARY  | 26,009         | 25,676         | 26,026          | 25,830         | 26,146         |
| COUNTY LOCAL    | 62,643         | 62,304         | 62,809          | 62,534         | 62,653         |
| CITY MAJOR      | 5,408          | 5,299          | 5,407           | 5,285          | 5,553          |
| CITY LOCAL      | 13,748         | 13,512         | 13,714          | 13,569         | 13,813         |
| <b>TOTAL</b>    | <b>117,304</b> | <b>116,244</b> | <b>117,432</b>  | <b>116,673</b> | <b>119,809</b> |

characteristic can be considered "mobility." On the other end of the classification range are the local access roads whose principal function is to provide access to adjacent property. Between the arterial and local access systems lies the collector system whose function is to provide service between the other two systems and between minor population and economic centers.

Functional classification is a major factor in determining the type of facility. Exhibit 3 shows line miles of each functional classification by legal system for the rural and urban systems.

### EXHIBIT 3

#### LINE MILES BY FUNCTIONAL CLASSIFICATION BY LEGAL SYSTEM

| FUNCTIONAL CLASSIFICATION | LEGAL SYSTEM |        |        |       |        |
|---------------------------|--------------|--------|--------|-------|--------|
|                           | 1            | 2      | 3      | 4     | 5      |
| <u>Rural</u>              |              |        |        |       |        |
| Statewide Arterial        | 4,337        | -      | -      | -     | -      |
| Regional Arterial         | 4,183        | 404    | -      | 10    | -      |
| Local Arterial            | 399          | 7,884  | 37     | 321   | 2      |
| Principal Collector       | 23           | 13,102 | 274    | 418   | 4      |
| Secondary Collector       | -            | 1,781  | 1,447  | 420   | 26     |
| Residential               | -            | -      | 4,448  | 4     | 2,080  |
| Local Access              | -            | 45     | 51,012 | 1     | 62     |
| Industrial/Commercial     | -            | 3      | 167    | 20    | 36     |
| Total Rural Miles         | 8,942        | 23,219 | 57,385 | 1,194 | 2,210  |
| <u>Urban</u>              |              |        |        |       |        |
| Statewide Arterial        | 1,611        | -      | -      | -     | -      |
| Regional Arterial         | 968          | 103    | -      | 44    | -      |
| Metro Arterial            | -            | 477    | -      | 273   | -      |
| Local Arterial            | 118          | 1,318  | 15     | 1,010 | 17     |
| Principal Collector       | 5            | 880    | 97     | 1,441 | 34     |
| Secondary Collector       | -            | 137    | 304    | 1,430 | 219    |
| Residential               | -            | -      | 4,020  | 18    | 10,680 |
| Local Access              | -            | 6      | 721    | 15    | 445    |
| Industrial/Commercial     | -            | 6      | 111    | 128   | 208    |
| Total Urban Miles         | 2,702        | 2,927  | 5,268  | 4,359 | 11,603 |
| Total Miles               | 11,644       | 26,146 | 62,653 | 5,553 | 13,813 |

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## SYSTEM CHARACTERISTICS

### Mileages by ADT Groups

Exhibit 4 shows the various legal system mileages within average daily traffic (ADT) volume groupings. A little over 40 percent of the state's road mileage carries 100 or less vehicles per day and most of this volume group, or about 88 percent, is found within the County Local Road System. At the other extreme, less than one percent of the total state mileage carries average daily traffic of more than 30,000 vehicles. As would be expected, most of this mileage is on the State Trunkline System. The majority of the state's trunkline mileage, or about 33 percent, is within the 2000-5000 ADT group. More than half of the total County Primary System mileage carries between 250 and 2000 vehicles per day.

### Annual Vehicle Miles of Travel by Legal System

Based on the inventory data, annual vehicle miles of travel (AVMT) totals 59.8 billion miles as shown in Exhibit 5. Most of this travel, 29.7 billion AVMT, occurs on the State Trunkline System. Although the trunkline system represents only 10 percent of the total state road mileage, it accounts for nearly 50 percent of the total state vehicle miles of travel. The County Road System carries 18.6 billion annual vehicle miles of travel, or 31 percent of the total AVMT, while the City Street System accounts for the remaining 19 percent or 11.5 billion annual vehicle miles of travel.

For historic comparison, the AVMT totaled 33 billion and 52 billion respectively in the 1960 and 1970 Highway Needs Studies.

## EXHIBIT 4

### LINE MILES OF HIGHWAYS, ROADS & STREETS OPERATING AT VARIOUS AVERAGE DAILY TRAFFIC VOLUMES

| ADT GROUP       | LEGAL SYSTEM  |                   |                 |               |               |
|-----------------|---------------|-------------------|-----------------|---------------|---------------|
|                 | State         | County<br>Primary | County<br>Local | City<br>Major | City<br>Local |
| 0 - 100         | -             | 2,242             | 43,606          | 66            | 3,664         |
| 101 - 250       | -             | 4,435             | 11,377          | 118           | 2,232         |
| 251 - 2,000     | 2,478         | 14,672            | 7,315           | 2,194         | 7,659         |
| 2,001 - 5,000   | 3,832         | 2,710             | 327             | 1,479         | 203           |
| 5,001 - 10,000  | 2,930         | 1,116             | 22              | 932           | 26            |
| 10,001 - 30,000 | 2,017         | 918               | 6               | 717           | 28            |
| Over 30,000     | 386           | 53                | -               | 37            | 1             |
| <b>TOTAL</b>    | <b>11,644</b> | <b>26,146</b>     | <b>62,653</b>   | <b>5,553</b>  | <b>13,813</b> |

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**EXHIBIT 5**  
**INVENTORY LINE MILEAGE**  
**AND**  
**ANNUAL VEHICLE MILES OF TRAVEL (AVMT)**

|        | MILES   | PERCENT | AVMT* | PERCENT |
|--------|---------|---------|-------|---------|
| STATE  | 11,644  | 10      | 29.7  | 50      |
| COUNTY | 88,799  | 74      | 18.6  | 31      |
| CITY   | 19,366  | 16      | 11.5  | 19      |
| TOTAL  | 119,809 | 100     | 59.8  | 100     |

\*IN BILLIONS

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### Surface Types by Legal System

Of a total of 119,809 line miles on the state's road and street system, 50,214 miles, or 42 percent have gravel or earth surfaces. Ninety-seven percent of this mileage, or 48,704 miles, occurs on the county road network with the County Local System containing 45,095 miles. Unimproved earth roads total 5,692 miles -- less than 5 percent of the total system. Most of these roads are also within the County Local System. Roads having a bituminous surface over gravel (Bit. on Flex.) total 34,061 miles, or 28 percent of total system miles. The remaining hard-surface roads total 21,887 miles, or 18 percent of the total system. Most of this mileage is on the State Trunkline System and also within the urban portion of the various local jurisdiction mileages. Information on the surface types of the road and street system is shown in Exhibit 6.

### Relationship of Population and Employment to Travel

Exhibit 7 shows the relative increases in annual vehicle miles of travel, population, and employment, between 1950 and 1982. The growth of population and employment occurred at about the same rate and both increased approximately 40 percent over the 32 year interval. Annual vehicle miles of travel for the same duration of time, however, increased by about 125 percent. VMT increases are influenced by other socio-economic factors and trip making characteristics such as household size, trip length, and type of employment. The trends for all three categories appear to be leveling off from 1970 on.

### Existing and Projected Population Growth Comparison

Existing and projected population growth comparisons for the 1974, 1977, and 1984 Highway Needs Studies are shown in Exhibit 8. For the nine



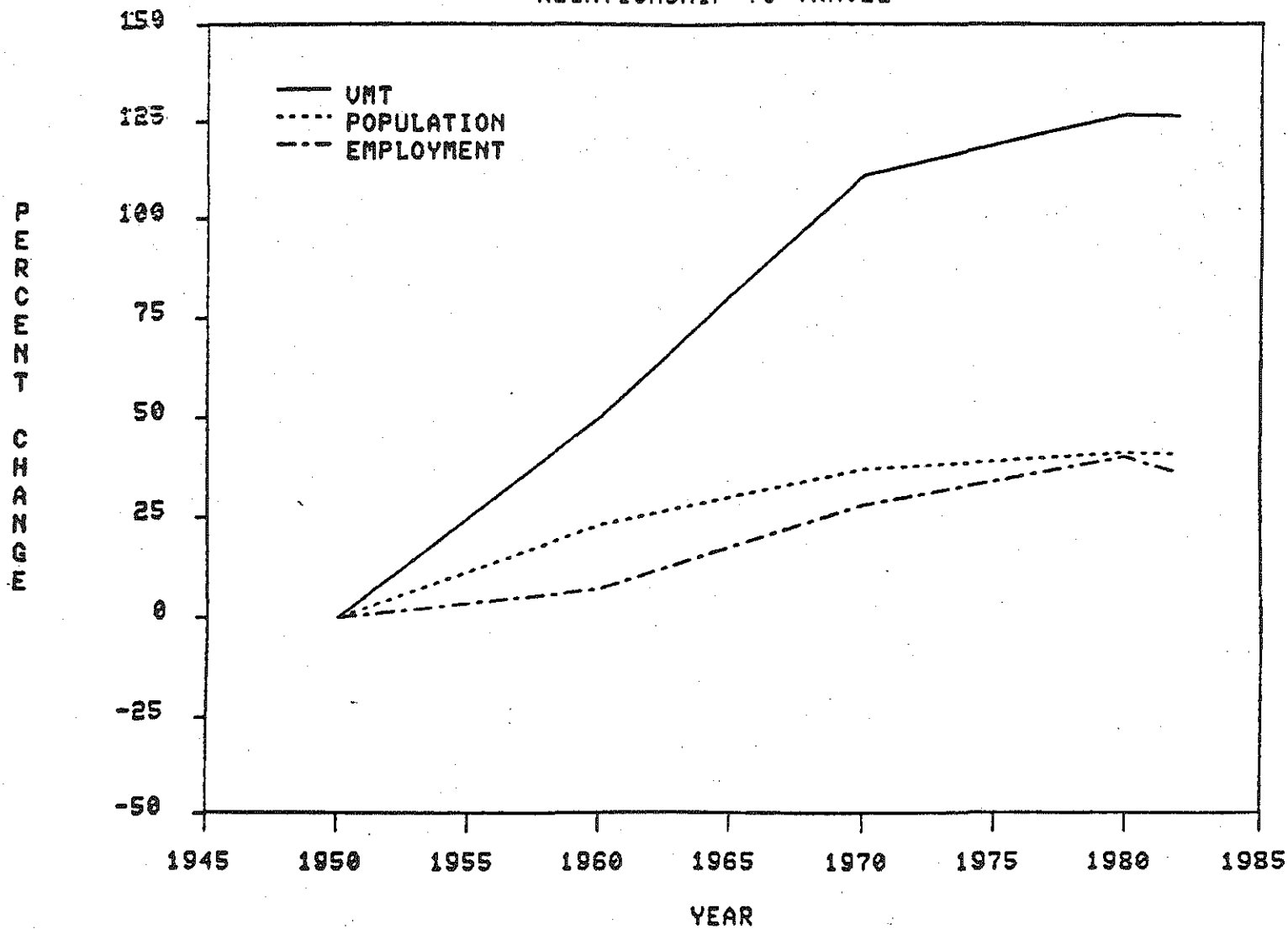
# EXHIBIT 6

## SURFACE TYPE BY JURISDICTION

| Surf. Type      | Unimproved Earth | Earth & Gravel | Seal Coat | Bituminous On Gravel | Bituminous On Concrete | Concrete | Brick | Freeway Bituminous |
|-----------------|------------------|----------------|-----------|----------------------|------------------------|----------|-------|--------------------|
| State Trunkline |                  |                |           |                      |                        |          |       |                    |
| Rural           |                  |                | 52.20     | 3,633.80             | 2,352.71               | 2,450.60 |       | 452.70             |
| Urban           |                  |                | 3.50      | 100.90               | 1,026.09               | 1,537.10 | 2.70  | 31.20              |
| County Primary  |                  |                |           |                      |                        |          |       |                    |
| Rural           | 90.11            | 3,465.32       | 4,539.59  | 13,278.11            | 1,735.83               | 108.88   |       | 1.57               |
| Urban           | 1.60             | 51.42          | 177.73    | 1,105.88             | 1,039.76               | 543.81   | .42   | 6.30               |
| County Local    |                  |                |           |                      |                        |          |       |                    |
| Rural           | 5,531.62         | 38,219.18      | 6,954.25  | 6,268.16             | 356.41                 | 53.41    |       | 1.80               |
| Urban           | 23.14            | 1,321.26       | 537.04    | 2,424.11             | 473.51                 | 482.72   |       | 6.66               |
| City Major      |                  |                |           |                      |                        |          |       |                    |
| Rural           | .74              | 18.83          | 60.60     | 854.70               | 241.81                 | 15.76    | .70   |                    |
| Urban           | .32              | 35.50          | 195.04    | 1,235.57             | 1,921.70               | 938.88   | 27.83 | 4.89               |
| City Local      |                  |                |           |                      |                        |          |       |                    |
| Rural           | 10.29            | 474.19         | 300.38    | 1,307.04             | 96.39                  | 21.64    |       |                    |
| Urban           | 34.40            | 935.92         | 827.23    | 3,852.40             | 2,362.42               | 3,560.82 | 27.54 | 2.34               |
| TOTAL           |                  |                |           |                      |                        |          |       |                    |
| Rural           | 5,632.76         | 42,177.52      | 11,907.02 | 25,341.81            | 4,783.15               | 2,650.29 | .70   | 456.07             |
| Urban           | 59.46            | 2,344.10       | 1,740.54  | 8,718.86             | 6,823.48               | 7,063.33 | 58.49 | 51.39              |

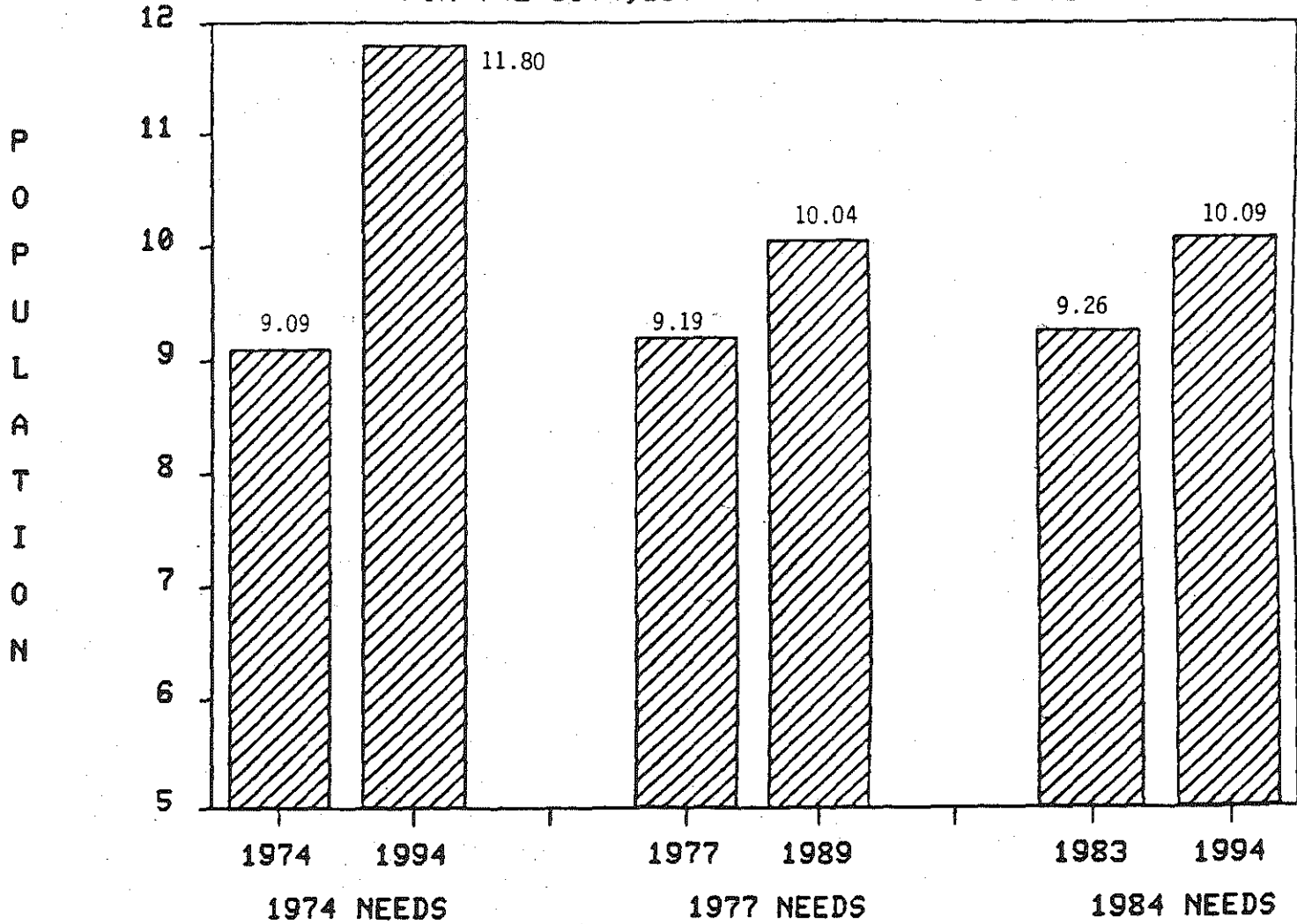
# EXHIBIT 7

## POPULATION AND EMPLOYMENT RELATIONSHIP TO TRAVEL



# EXHIBIT 8

## MILLIONS EXISTING AND PROJECTED POPULATION GROWTH COMPARISON FOR THE 1974, 1977 & 1984 NEEDS STUDIES

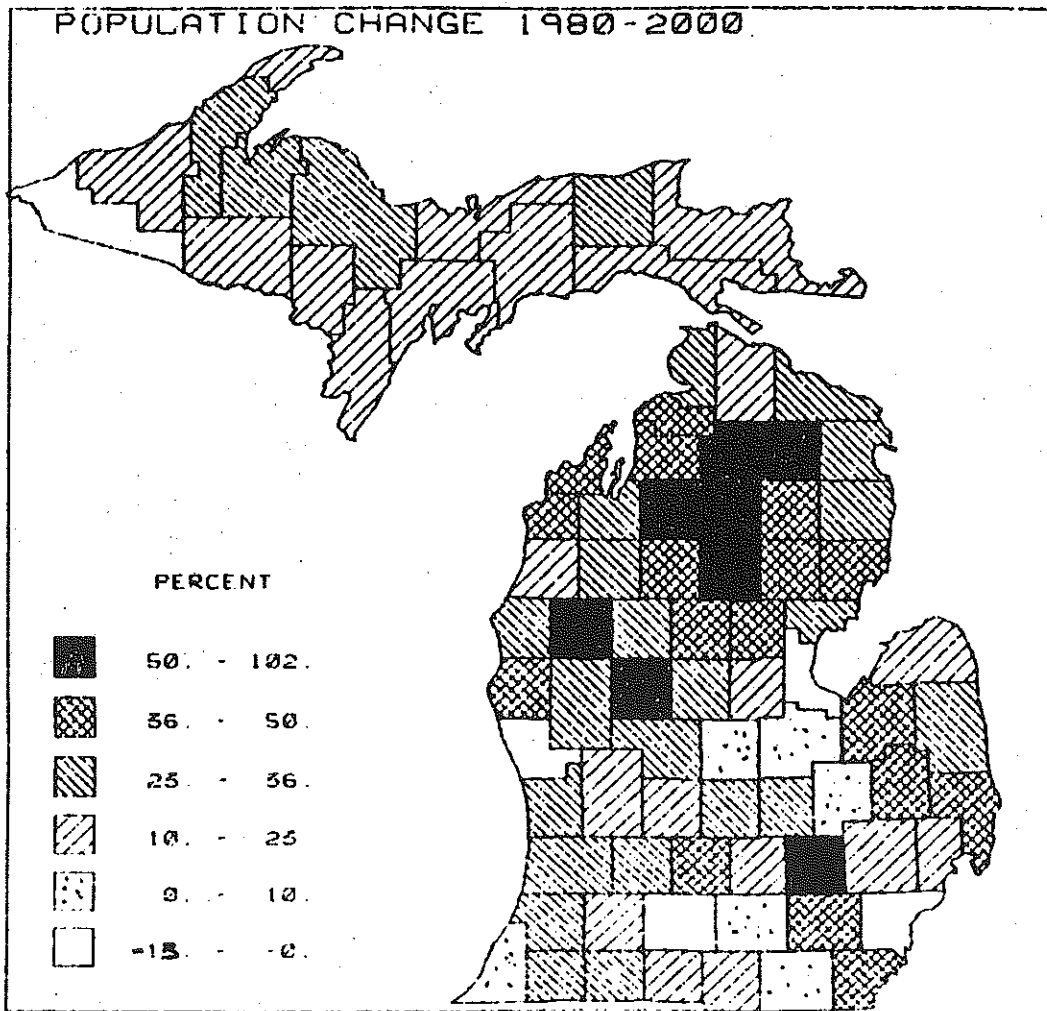


year interval between 1974 and 1983, actual population increased a little less than two percent. Projections for the 1984 study, provided by the Department of Management and Budget, call for an increase of just under eleven percent between 1980 and year 2000. This projection approximates that used for the 1977 study.

#### Map of Population Change

As shown in Exhibit 9, the greatest percentage increases are projected to occur in the north central part of the Lower Peninsula. Eight counties are predicted to incur population increases ranging from 50 percent to over 100 percent. They are Crawford, Kalkaska, Lake, Mecosta, Montmorency, Otsego, and Roscommon Counties in the northern half of the lower Peninsula, and Livingston County in the southern half. Population in five counties is projected to decrease. Those counties are Bay, Calhoun, Gogebic, Muskegon, and Wayne.

# EXHIBIT 9



Total State Population: 1980 - 9.26 Million  
2000 - 10.27 Million

## CONDITION RATING

### Surface Rating

Surface ratings are determined by a visual inspection by county and city street administrators. In order to maintain uniformity statewide, concise guidelines are provided. The five rating categories and generalized criteria are:

#### Surface Condition

|           |   |
|-----------|---|
| EXCELLENT | No visible or apparent deterioration of surface.  |
| GOOD      | Some surface deterioration evident, but on no more than 5% of the road length being rated. Average maintenance required.  |
| FAIR      | Surface deterioration on up to 25% of the road length being rated. May require above-average maintenance but not necessarily uneconomical when weighed against cost of resurfacing. |
| POOR      | Deterioration on more than 25% of the road length rated. Excessive maintenance warrants resurfacing soon.   |
| VERY POOR | Extreme deterioration - beyond maintenance capabilities. Warrants urgent resurfacing.   |

Exhibit 10 summarizes the surface ratings by legal system.

## EXHIBIT 10

### EXISTING SURFACE CONDITION BY LEGAL SYSTEM (Line Miles)

|                 | Excellent | Good      | Fair      | Poor      | Very Poor | Total      |
|-----------------|-----------|-----------|-----------|-----------|-----------|------------|
| Legal 1         |           |           |           |           |           |            |
| Urban           | 232.47    | 364.40    | 1282.55   | 733.77    | 88.30     | 2701.49    |
| Rural           | 745.75    | 1285.50   | 4429.99   | 2283.85   | 196.92    | 8942.01    |
| Total           | 978.22    | 1649.90   | 5712.54   | 3017.62   | 285.22    | 11643.50   |
| Legal 2         |           |           |           |           |           |            |
| Urban           | 507.91    | 997.34    | 813.73    | 460.76    | 147.18    | 2926.92    |
| Rural           | 2678.09   | 6702.30   | 7334.94   | 4900.23   | 1603.85   | 23219.41   |
| Total           | 3186.00   | 7699.64   | 8148.67   | 5360.99   | 1751.03   | 26146.33   |
| Legal 3         |           |           |           |           |           |            |
| Urban           | 809.21    | 1498.06   | 1671.56   | 949.88    | 339.73    | 5268.44    |
| Rural           | 2299.32   | 9183.80   | 19775.62  | 18397.20  | 7728.89   | 57384.83   |
| Total           | 3108.53   | 10681.86  | 21447.18  | 19347.08  | 8068.62   | 62653.27   |
| Legal 4         |           |           |           |           |           |            |
| Urban           | 837.75    | 1502.07   | 1144.90   | 705.08    | 169.94    | 4359.73    |
| Rural           | 172.02    | 424.88    | 388.47    | 157.64    | 50.13     | 1193.14    |
| Total           | 1009.77   | 1926.95   | 1533.37   | 862.72    | 220.07    | 5552.88    |
| Legal 5         |           |           |           |           |           |            |
| Urban           | 1797.00   | 4183.65   | 3239.44   | 1769.44   | 613.54    | 11603.07   |
| Rural           | 301.75    | 610.78    | 735.69    | 388.76    | 172.95    | 2209.93    |
| Total           | 2098.75   | 4794.43   | 3975.13   | 2158.20   | 786.49    | 13813.00   |
| Statewide Total | 10,381.27 | 26,752.78 | 40,816.89 | 30,746.61 | 11,111.43 | 119,808.97 |

## Base Rating

Base ratings are determined in the same manner as surface ratings.

Uniformity is also maintained through the application of strict criteria in the rating process. The criteria are:

### Base Condition

|           |  |
|-----------|--|
| EXCELLENT | No visible or apparent deterioration of the base. Usually reserved for bases recently constructed by latest controlled density methods.  |
| GOOD      | Some base deterioration evident, but on no more than 5% of the road length being rated. Average maintenance required.  |
| FAIR      | Base deterioration on up to 25% of the road length being rated. May require above average maintenance, but not necessarily uneconomical when weighed against cost of new base. |
| POOR      | Base deterioration on more than 25% of the road length being rated. Excessive maintenance warrants reconstruction soon.  |
| VERY POOR | Extreme deterioration of base. Beyond maintenance capabilities. Warrants urgent reconstruction.  |

Exhibit 11 summarizes the base ratings by legal system.



## EXHIBIT 11

| EXISTING BASE CONDITION<br>BY LEGAL SYSTEM<br>(Line Miles) |           |           |           |           |           |            |
|--|-----------|-----------|-----------|-----------|-----------|------------|
|  | Excellent | Good      | Fair      | Poor      | Very Poor | Total      |
| Legal 1  |           |           |           |           |           |            |
| Urban  | 1500.90   | 394.40    | 526.48    | 233.11    | 46.60     | 2701.49    |
| Rural  | 3285.10   | 1846.06   | 2125.79   | 655.89    | 1019.17   | 8942.01    |
| Total  | 4786.00   | 2240.46   | 2652.27   | 899.00    | 1065.77   | 11643.50   |
| Legal 2  |           |           |           |           |           |            |
| Urban  | 446.91    | 965.75    | 916.09    | 480.87    | 117.30    | 2926.92    |
| Rural  | 2585.31   | 8201.61   | 7418.82   | 3841.75   | 1171.92   | 23219.41   |
| Total  | 3032.22   | 9167.36   | 8334.91   | 4322.62   | 1289.22   | 26146.33   |
| Legal 3  |           |           |           |           |           |            |
| Urban  | 552.61    | 1922.07   | 1780.78   | 763.58    | 249.40    | 5268.44    |
| Rural  | 1975.94   | 12202.03  | 20406.24  | 17311.14  | 5489.48   | 57384.83   |
| Total  | 2528.55   | 14124.1   | 22187.02  | 18074.72  | 5738.88   | 62653.27   |
| Legal 4  |           |           |           |           |           |            |
| Urban  | 697.14    | 1893.56   | 1345.07   | 342.36    | 81.60     | 4359.73    |
| Rural  | 106.14    | 564.43    | 392.16    | 102.32    | 28.09     | 1193.14    |
| Total  | 803.28    | 2457.99   | 1737.23   | 444.68    | 109.69    | 5552.87    |
| Legal 5  |           |           |           |           |           |            |
| Urban  | 1492.20   | 5222.14   | 3569.46   | 1017.42   | 301.85    | 11603.07   |
| Rural  | 176.56    | 760.62    | 885.25    | 279.76    | 107.74    | 2209.93    |
| Total  | 1668.76   | 5982.76   | 4454.71   | 1297.18   | 409.59    | 13813.00   |
| Statewide Total  | 12,818.81 | 33,972.67 | 39,366.14 | 25,038.20 | 8,613.15  | 119,808.97 |

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## SYSTEM DEFICIENCIES

### Base and Surface Rating

Exhibits 12 through 16 combined the base and surface condition rating of the state's highways, roads, and streets into a matrix format. This rating of the roadway condition is a key determinate of deficiencies for input to the appraisal process. Each legal system is further divided into an urban and rural mileage matrix. When reviewing this information, it should be noted that highways that are rated "poor or very poor" in both surface and base, generally require immediate improvements to restore them to an acceptable condition.

Of the State Trunkline System, nearly six percent of the rural miles and five percent of the urban miles are rated poor or very poor in both surface and base. This is the same proportion of the system in that condition as in the 1977 Needs Study. This information is shown in Exhibit 12.

The County Road System is shown in its component parts in Exhibits 13 and 14. Of the County Primary miles in rural areas, 16 percent are rated poor or very poor in both surface and base. In urban areas, 10.7 percent are in that condition. Over 4,036 miles, or 15.4 percent of the total County Primary Roads are rated poor or very poor in both surface and base.

Of the County Local Roads, over 32 percent of the rural miles and 13.6 percent of the urban miles are rated poor or very poor in both surface and base. In total, 19,287 miles, or nearly 31 percent of the system is in that condition. This is due to the large amount of gravel roads under the counties jurisdiction.

## EXHIBIT 12

| EXISTING CONDITION OF<br>RURAL STATE TRUNKLINES<br>(Line Miles) |           |                |         |         |        |           |         |
|---|-----------|----------------|---------|---------|--------|-----------|---------|
|   |           | BASE CONDITION |         |         |        |           | TOTAL   |
|   |           | EXCELLENT      | GOOD    | FAIR    | POOR   | VERY POOR |         |
| SURFACE CONDITION   | EXCELLENT | 267.70         | 193.40  | 178.20  | 47.05  | 59.40     | 745.75  |
|   | GOOD      | 618.80         | 133.50  | 278.30  | 68.30  | 186.60    | 1285.50 |
|   | FAIR      | 1728.60        | 797.66  | 1105.49 | 322.54 | 475.70    | 4429.99 |
|   | POOR      | 667.10         | 670.90  | 514.00  | 176.80 | 255.05    | 2283.85 |
|   | VERY POOR | 2.90           | 50.60   | 49.80   | 51.20  | 42.42     | 196.92  |
| TOTAL   |           | 3285.10        | 1846.06 | 2125.79 | 665.89 | 1019.17   | 8942.01 |

| EXISTING CONDITION OF<br>URBAN STATE TRUNKLINES<br>(Line Miles) |           |                |        |        |        |           |         |
|---|-----------|----------------|--------|--------|--------|-----------|---------|
|   |           | BASE CONDITION |        |        |        |           | TOTAL   |
|   |           | EXCELLENT      | GOOD   | FAIR   | POOR   | VERY POOR |         |
| SURFACE CONDITION   | EXCELLENT | 165.80         | 32.00  | 23.57  | 8.90   | 2.20      | 232.47  |
|   | GOOD      | 264.00         | 29.00  | 51.50  | 16.60  | 3.30      | 364.40  |
|   | FAIR      | 745.90         | 162.50 | 264.10 | 95.15  | 14.90     | 1282.55 |
|   | POOR      | 309.30         | 158.70 | 153.11 | 93.36  | 19.30     | 733.77  |
|   | VERY POOR | 15.90          | 12.20  | 34.20  | 19.10  | 6.90      | 88.30   |
| TOTAL   |           | 1500.90        | 394.40 | 526.48 | 233.11 | 46.60     | 2701.49 |

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## EXHIBIT 13

| EXISTING CONDITION OF<br>RURAL COUNTY PRIMARY ROADS<br>(Line Miles) |           |                |         |         |         |           |          |
|---|-----------|----------------|---------|---------|---------|-----------|----------|
|   |           | BASE CONDITION |         |         |         |           | TOTAL    |
|   |           | EXCELLENT      | GOOD    | FAIR    | POOR    | VERY POOR |          |
| SURFACE CONDITION   | EXCELLENT | 1103.09        | 1119.36 | 347.09  | 95.09   | 13.46     | 2678.09  |
|   | GOOD      | 965.84         | 4056.92 | 1362.44 | 260.49  | 5.61      | 6702.30  |
|   | FAIR      | 407.40         | 2332.87 | 3729.70 | 769.93  | 95.04     | 7334.94  |
|   | POOR      | 85.09          | 513.78  | 1717.95 | 2328.16 | 255.25    | 4900.23  |
|   | VERY POOR | 23.89          | 178.68  | 261.64  | 388.08  | 751.56    | 1603.05  |
| TOTAL   |           | 2585.31        | 8201.61 | 7418.82 | 3841.75 | 1171.92   | 23219.41 |

| EXISTING CONDITION OF<br>URBAN COUNTY PRIMARY ROADS<br>(Line Miles) |           |                |        |        |        |           |         |
|---|-----------|----------------|--------|--------|--------|-----------|---------|
|   |           | BASE CONDITION |        |        |        |           | TOTAL   |
|   |           | EXCELLENT      | GOOD   | FAIR   | POOR   | VERY POOR |         |
| SURFACE CONDITION   | EXCELLENT | 239.05         | 166.81 | 74.20  | 27.12  | 0.73      | 507.91  |
|   | GOOD      | 167.45         | 448.85 | 258.58 | 115.04 | 7.42      | 997.34  |
|   | FAIR      | 33.57          | 260.16 | 384.73 | 113.88 | 21.39     | 813.73  |
|   | POOR      | 4.39           | 73.83  | 118.42 | 176.17 | 27.95     | 460.76  |
|   | VERY POOR | 2.45           | 16.10  | 20.16  | 48.66  | 59.81     | 147.18  |
| TOTAL   |           | 446.91         | 965.75 | 916.09 | 480.87 | 117.30    | 2926.92 |

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## EXHIBIT 14

| EXISTING CONDITION OF<br>RURAL COUNTY LOCAL ROADS<br>(Line Miles) |           |                 |          |          |          |           |          |
|---|-----------|-----------------|----------|----------|----------|-----------|----------|
|   |           | BASE CONDITIONS |          |          |          |           | TOTAL    |
|   |           | EXCELLENT       | GOOD     | FAIR     | POOR     | VERY POOR |          |
| SURFACE CONDITION   | EXCELLENT | 1045.37         | 906.28   | 264.99   | 75.71    | 6.97      | 2299.32  |
|   | GOOD      | 653.56          | 6176.87  | 1911.70  | 402.51   | 39.16     | 9183.80  |
|   | FAIR      | 198.47          | 3724.04  | 12150.31 | 3344.69  | 358.11    | 19775.62 |
|   | POOR      | 69.62           | 1071.69  | 5054.28  | 10997.92 | 1203.69   | 18397.20 |
|   | VERY POOR | 8.92            | 323.15   | 1024.96  | 2490.31  | 881.55    | 7728.89  |
| TOTAL   |           | 1975.94         | 12202.03 | 20406.24 | 17311.14 | 5489.48   | 57384.83 |

| EXISTING CONDITION OF<br>URBAN COUNTY LOCAL ROADS<br>(Line Miles) |           |                |         |         |        |           |         |
|---|-----------|----------------|---------|---------|--------|-----------|---------|
|   |           | BASE CONDITION |         |         |        |           | TOTAL   |
|   |           | EXCELLENT      | GOOD    | FAIR    | POOR   | VERY POOR |         |
| SURFACE CONDITION   | EXCELLENT | 301.28         | 421.46  | 68.81   | 14.66  | 3.00      | 809.21  |
|   | GOOD      | 172.54         | 923.41  | 311.25  | 80.45  | 10.41     | 1498.06 |
|   | FAIR      | 72.36          | 467.07  | 968.64  | 154.31 | 9.18      | 1671.56 |
|   | POOR      | 6.14           | 101.17  | 411.17  | 369.56 | 34.84     | 949.88  |
|   | VERY POOR | 0.29           | 8.96    | 20.91   | 117.60 | 191.97    | 339.73  |
| TOTAL   |           | 552.61         | 1922.07 | 1780.78 | 763.58 | 249.40    | 5268.44 |

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The total County Road System, combining primary and local roads, represents a system of 88,799 miles. Of this total, 26 percent is rated poor or very poor in both surface and base. This compares with 28 percent in 1977.

The City Street System is shown in its component parts in Exhibits 15 and 16. Slightly over seven percent of the rural City Major Streets and nearly six percent of the urban are rated poor or very poor in both surface and base. Of the total 5,553 miles of this system, 6.1 percent is in this condition.

Of the total 13,813 miles of City Local Streets, 8.7 percent is rated poor or very poor in both surface and base. This compares with 11 percent reported in this condition in 1977. Looking at the rural and urban miles shows 13.5 percent of the rural and 7.8 percent of the urban miles rated poor or very poor in both surface and base.

## EXHIBIT 15

| EXISTING CONDITION OF<br>RURAL CITY MAJOR STREETS<br>(Line Miles) |           |                |        |        |        |           |         |
|---|-----------|----------------|--------|--------|--------|-----------|---------|
|   |           | BASE CONDITION |        |        |        |           | TOTAL   |
|   |           | EXCELLENT      | GOOD   | FAIR   | POOR   | VERY POOR |         |
| SURFACE CONDITION   | EXCELLENT | 62.68          | 78.04  | 25.01  | 5.56   | 0.73      | 172.02  |
|   | GOOD      | 35.10          | 300.33 | 70.60  | 16.50  | 2.35      | 424.88  |
|   | FAIR      | 6.05           | 144.42 | 217.90 | 18.95  | 1.15      | 388.47  |
|   | POOR      | 1.81           | 37.95  | 66.45  | 44.28  | 7.15      | 157.64  |
|   | VERY POOR | 0.50           | 3.69   | 12.20  | 17.03  | 16.71     | 50.13   |
| TOTAL   |           | 106.14         | 564.43 | 392.16 | 102.32 | 28.09     | 1193.14 |

| EXISTING CONDITION OF<br>URBAN CITY MAJOR STREETS<br>(Line Miles) |           |                |         |         |        |           |         |
|---|-----------|----------------|---------|---------|--------|-----------|---------|
|   |           | BASE CONDITION |         |         |        |           | TOTAL   |
|   |           | EXCELLENT      | GOOD    | FAIR    | POOR   | VERY POOR |         |
| SURFACE CONDITION   | EXCELLENT | 407.79         | 275.40  | 123.14  | 26.26  | 5.16      | 837.75  |
|   | GOOD      | 195.97         | 894.25  | 345.76  | 59.31  | 6.78      | 1502.07 |
|   | FAIR      | 63.42          | 500.14  | 508.71  | 62.93  | 9.70      | 1144.90 |
|   | POOR      | 26.05          | 190.72  | 326.10  | 145.34 | 16.86     | 705.08  |
|   | VERY POOR | 3.91           | 33.05   | 41.36   | 48.52  | 43.10     | 169.94  |
| TOTAL   |           | 697.14         | 1893.56 | 1345.07 | 342.36 | 81.60     | 4359.73 |

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## EXHIBIT 16

| EXISTING CONDITION OF<br>RURAL CITY LOCAL STREETS<br>(Line Miles) |           |                |        |        |        |           |         |
|---|-----------|----------------|--------|--------|--------|-----------|---------|
|   |           | BASE CONDITION |        |        |        |           | TOTAL   |
|   |           | EXCELLENT      | GOOD   | FAIR   | POOR   | VERY POOR |         |
| SURFACE CONDITION   | EXCELLENT | 124.78         | 118.67 | 50.14  | 5.77   | 2.39      | 301.75  |
|   | GOOD      | 36.49          | 407.46 | 139.17 | 20.43  | 7.23      | 610.78  |
|   | FAIR      | 10.32          | 190.86 | 481.52 | 43.46  | 9.53      | 735.69  |
|   | POOR      | 2.26           | 36.75  | 170.86 | 164.36 | 14.53     | 388.76  |
|   | VERY POOR | 2.71           | 6.88   | 43.56  | 45.74  | 74.06     | 172.95  |
| TOTAL   |           | 176.56         | 760.62 | 885.25 | 279.76 | 107.74    | 2209.93 |

| EXISTING CONDITION OF<br>URBAN CITY LOCAL STREETS<br>(Line Miles) |           |                |         |         |         |           |          |
|---|-----------|----------------|---------|---------|---------|-----------|----------|
|   |           | BASE CONDITION |         |         |         |           | TOTAL    |
|   |           | EXCELLENT      | GOOD    | FAIR    | POOR    | VERY POOR |          |
| SURFACE CONDITION   | EXCELLENT | 885.72         | 508.76  | 285.15  | 101.24  | 16.13     | 1797.00  |
|   | GOOD      | 507.55         | 2750.20 | 785.74  | 131.14  | 9.02      | 4183.65  |
|   | FAIR      | 79.61          | 1397.24 | 1600.50 | 152.24  | 9.85      | 3239.44  |
|   | POOR      | 16.49          | 511.08  | 742.61  | 467.68  | 31.58     | 1769.44  |
|   | VERY POOR | 2.83           | 54.86   | 155.46  | 165.12  | 235.27    | 613.54   |
| TOTAL   |           | 1492.20        | 5222.14 | 3569.46 | 1017.42 | 301.85    | 11603.07 |

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### Gravel Roads

The treatment of roads that are not hard surfaced is of particular importance when determining highway needs. Roads of this type include: 1) unimproved earth, 2) graded and drained earth, and 3) gravel and similar type roads. For this and past needs studies, the latter two types are referred to as "gravel roads." Since questions arise as to how these gravel roads should be treated when assessing needs, the inventory data associated with them are included here.

There were 44,521 miles of gravel roads reported in this inventory process. Exhibit 17 shows how this mileage was determined from the total miles reported. Exhibits 18 and 19 indicate the miles of gravel roads by jurisdiction and the amount of traffic carried.

## EXHIBIT 17

### GRAVEL ROADS

|                 |                        |
|-----------------|------------------------|
| 119,808         | TOTAL LINE MILES       |
| - <u>55,948</u> | HARD SURFACE ROADS     |
| 63,860          |                        |
| - <u>13,647</u> | SEAL COAT ROADS        |
| 50,213          |                        |
| - <u>5,692</u>  | UNIMPROVED EARTH ROADS |
| 44,521          | TOTAL GRAVEL ROADS     |

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## EXHIBIT 18

### GRAVEL ROADS BY JURISDICTION

|               | <u>RURAL</u>  | <u>URBAN</u> | <u>TOTAL</u>  |
|---------------|---------------|--------------|---------------|
| <u>COUNTY</u> |               |              |               |
| PRIMARY       | 3,465         | 51           | 3,516         |
| LOCAL         | <u>38,219</u> | <u>1,321</u> | <u>39,540</u> |
| TOTAL         | 41,684        | 1,372        | 43,056        |
| <u>CITY</u>   |               |              |               |
| MAJOR         | 19            | 36           | 55            |
| LOCAL         | <u>474</u>    | <u>936</u>   | <u>1,410</u>  |
| TOTAL         | 493           | 972          | 1,465         |

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## EXHIBIT 19

### GRAVEL ROADS BY ADT GROUP

| <u>ADT RANGE</u> | <u>MILES</u> | <u>PERCENT</u> |
|------------------|--------------|----------------|
| 0 - 100          | 34,144       | 76.7           |
| 101 - 125        | 1,822        | 4.1            |
| 126 - 150        | 2,317        | 5.2            |
| 151 - 200        | 2,164        | 4.9            |
| 201 - 250        | 1,005        | 2.2            |
| 251 - 2,000      | 2,928        | 6.6            |
| OVER 2,000       | <u>141</u>   | <u>0.3</u>     |
|                  | 44,521       | 100.0          |

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## PROJECTED DEFICIENCIES AND IMPROVEMENTS<sup>1/</sup>

### Deficiencies

An inventory describes the existing condition of the system. To determine system deficiencies, propose improvements, and estimate the cost of those improvements for the 12 year period of the study, MDOT has developed a Needs Appraisal Model. This model examines the existing inventory (present travel demand and physical roadway conditions) and makes assumptions about the growth of travel demand and expected physical deterioration of the system. Based on these assumptions about expected system changes over a period of years (1983-1994), deficiencies are assigned to each segment on the system. Deficiencies to the roadway are described as:

- 1) Surface - Surface deficient
- 2) Base - Base deficient or  
Base and surface deficient
- 3) Capacity - Capacity deficient or  
Capacity and surface deficient or  
Capacity and base deficient or  
Capacity, surface and base deficient

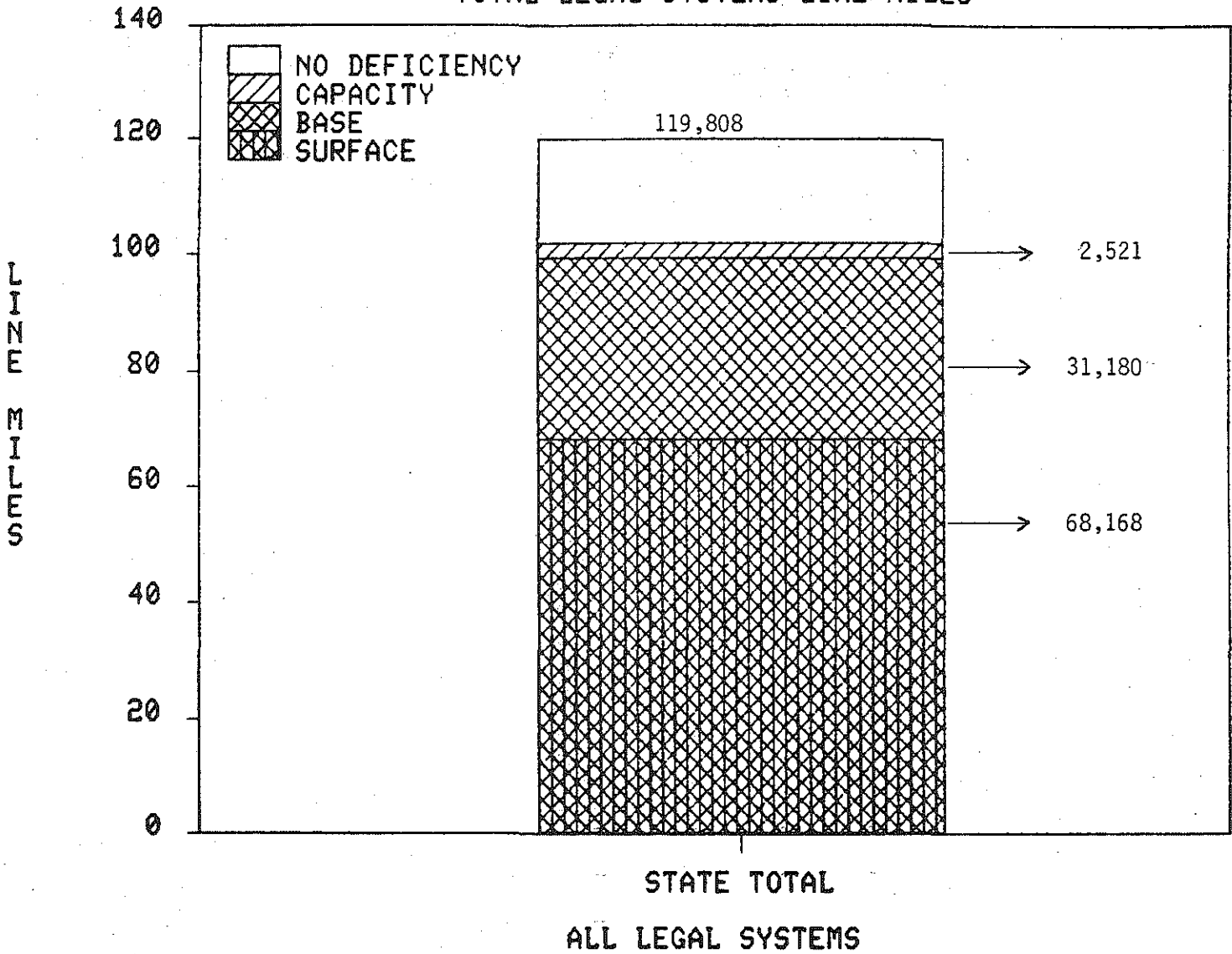
Exhibits 20 and 21 summarize "base case" deficiencies that are projected to occur on Michigan's roadway facilities through the study period. Statewide on all legal systems, about 56.9 percent of the 119,809 line miles can be expected to be deficient in surface only. About 26 percent will be deficient in base or base-surface over the period, and 3.7 percent of the system miles will have a capacity deficiency.

<sup>1/</sup> This analysis does not include deficiencies or improvements for structures, railroad crossing or new projects on new locations.

EXHIBIT 20

THOUSANDS

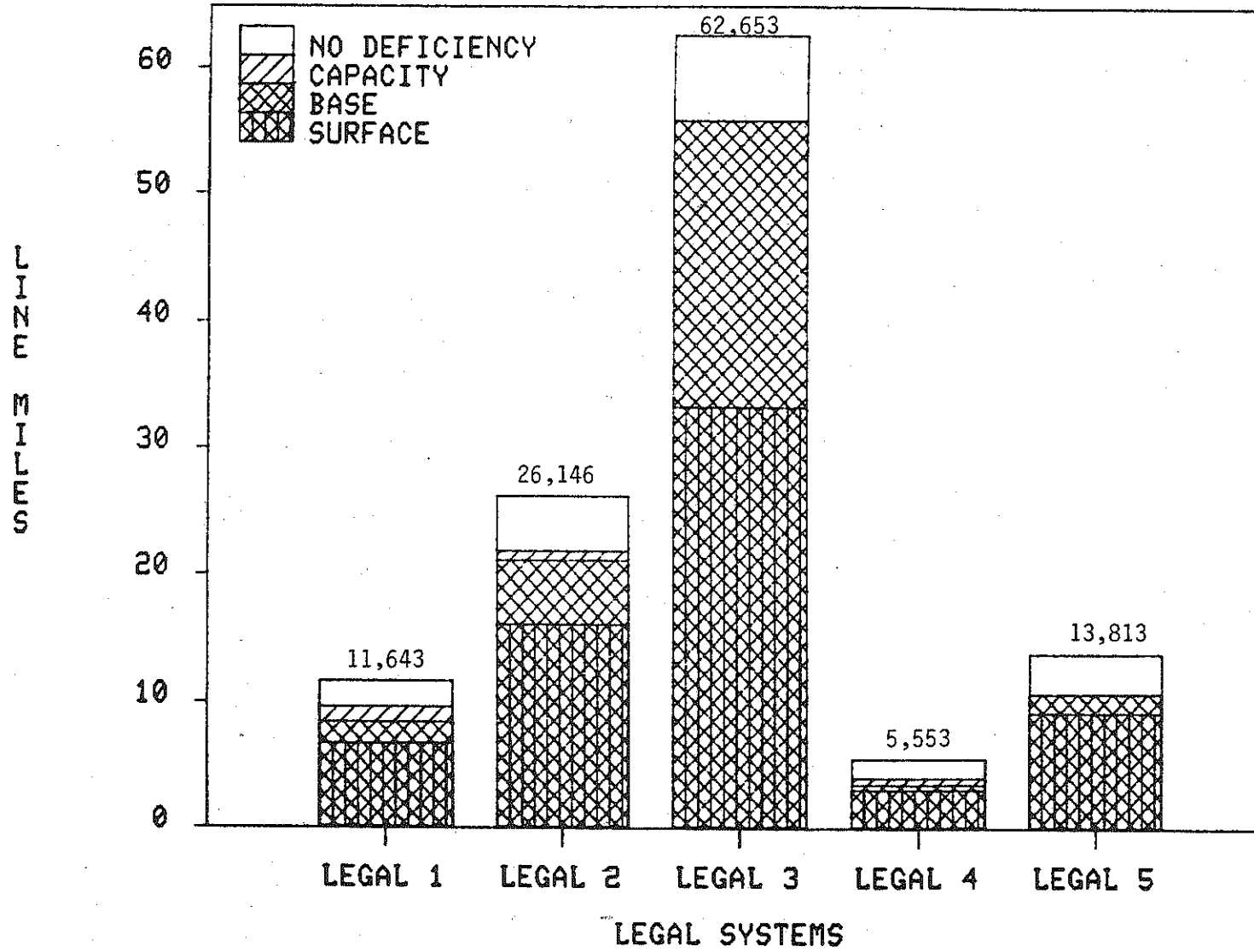
MICHIGAN 1984 NEEDS STUDY  
TOTAL LEGAL SYSTEMS-LINE MILES



# EXHIBIT 21

THOUSANDS

## MICHIGAN 1984 NEEDS STUDY DEFICIENT LINE MILES BY LEGAL SYSTEM (R#21)



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### State Trunkline System

In total, 83 percent of the trunkline will become deficient and of the 9,637 deficient miles, 6,686 (69 percent) are surface deficiencies. These deficiencies are expected to occur over the study period. Eighteen percent of the trunkline miles will become base deficient. The State Trunkline System carries high traffic volumes, and as a result, 13 percent of the miles will become capacity deficient.

Compared to the total system, trunkline deficient miles represent 10 percent of the total deficient mileage in the state. Forty-eight percent of all capacity deficiencies on all systems occur on the State Trunkline System.

### County Primary System

Seventy four percent of the County Primary System mileage will have a deficient surface by 1994. All deficient conditions taken together represent 83 percent of the 26,146 miles of the County Primary System for the study period. Three percent, or 725 miles, will become capacity deficient.

The deficient mileage on the County Primary System, when compared to all systems represent 21 percent. The surface deficiencies account for 23 percent of all surface deficiencies.

### County Local System

Eighty-nine percent of the County Local System mileage is projected to become deficient by 1994. Of the deficient miles, 60 percent are surface deficiencies with 33,228 miles. Base deficient mileage amounts to 22,509 miles, or 40 percent of the system.



The large size of the County Local System accounts for the fact that 55 percent of all deficiencies are on it. Of this total amount, the County Local System surface deficiencies represent 49 percent of all surface deficient mileage. Similarly, of the base deficiencies on all systems, 72 percent are on the County Local System. The 552 capacity deficient miles represent 22 percent of the total system capacity deficient mileage.

#### City Major Street System

The City Major System amounts to 5,553 miles and 73 percent are expected to become deficient by 1994. The majority, 76 percent, are in the surface deficient category. Approximately 14 percent of the system will be capacity deficient during the study period. When compared to all systems, the City Major deficiencies represent only 4,029 miles, or four percent.

#### City Local Street System

The City Local System mileage is 13,813 of which 10,682 (or 77 percent) is projected to become deficient by 1994. Eighty-six percent of the deficiencies are in the surface category and 14 percent are in base. Total deficient mileage for the system represents 10 percent of all systems with surface representing 13 percent.

#### Improvements

After determining the expected deficiencies that are likely to occur during the 12 year period of the Needs Study, the Needs Appraisal Model determines the most appropriate physical improvement type that will resolve the deficiency.

For this analysis, the improvements required on Michigan highways, roads and streets can be broadly divided into three categories: resurfacing, reconstruction and widening. Definition of what is included in each category is given as follows:

- Resurfacing - Resurface existing roadway
  - Resurface and minor widening (less than a lane)
  - Resurface and major widening (more than a lane)
- Reconstruction - Reconstruct existing roadway
  - Reconstruct and minor widening (less than a lane)
  - Reconstruct and Major widening (more than a lane)
- Widening - Widen only (more than a lane)

The definition of these improvements have been adjusted for reporting purposes in the 1984 Needs to reflect the definition of "Maintenance" in the December 1982 Act 51 legislation. Resurface, Resurface and Minor Widening, Reconstruct, and Reconstruct and Minor Widening correspond to the definition of "Maintenance" by including only work that requires widening less than one lane width. Resurface and Major Widening, Reconstruction and Major Widening, and Widening Only fall more closely under projects that increase the capacity of a facility to handle through traffic. It should be noted that not all projects in these categories increase through traffic and only that portion of the improvement of these projects that is attributable to that increased traffic should be considered for costing purposes.

Exhibits 22 and 23 summarize the projected distribution of improvements for Michigan's 119,809 line miles of system.

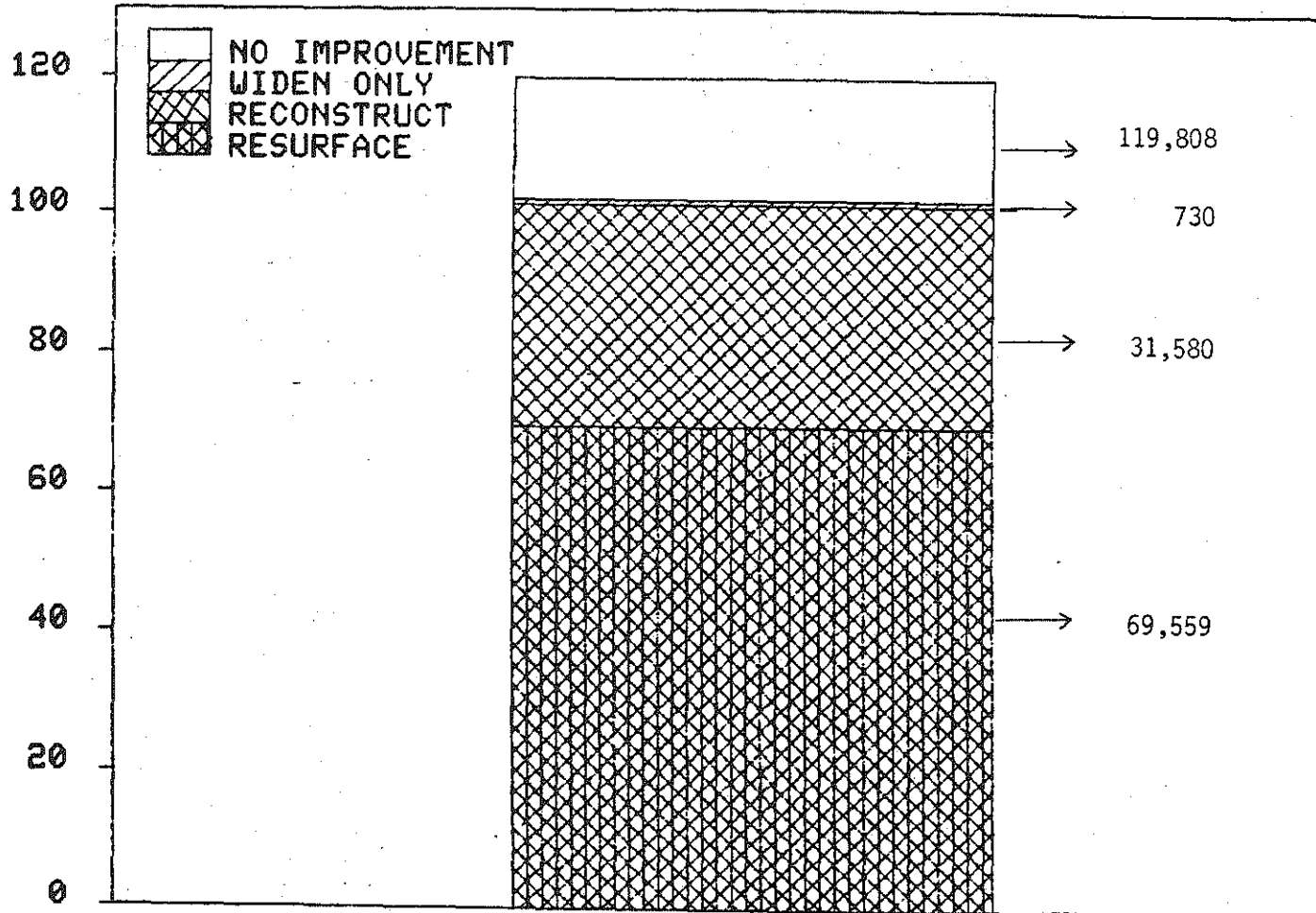
Fifty-eight percent of all 119,809 roadway line miles requiring improvements throughout the study period are in the resurfacing category, while 26 percent will require reconstruction. About one percent will require widening only and 15 percent will not require any work during the period.

EXHIBIT 22

THOUSANDS

MICHIGAN 1984 NEEDS STUDY  
TOTAL LEGAL SYSTEMS-LINE MILES (R#21)

LINE MILES

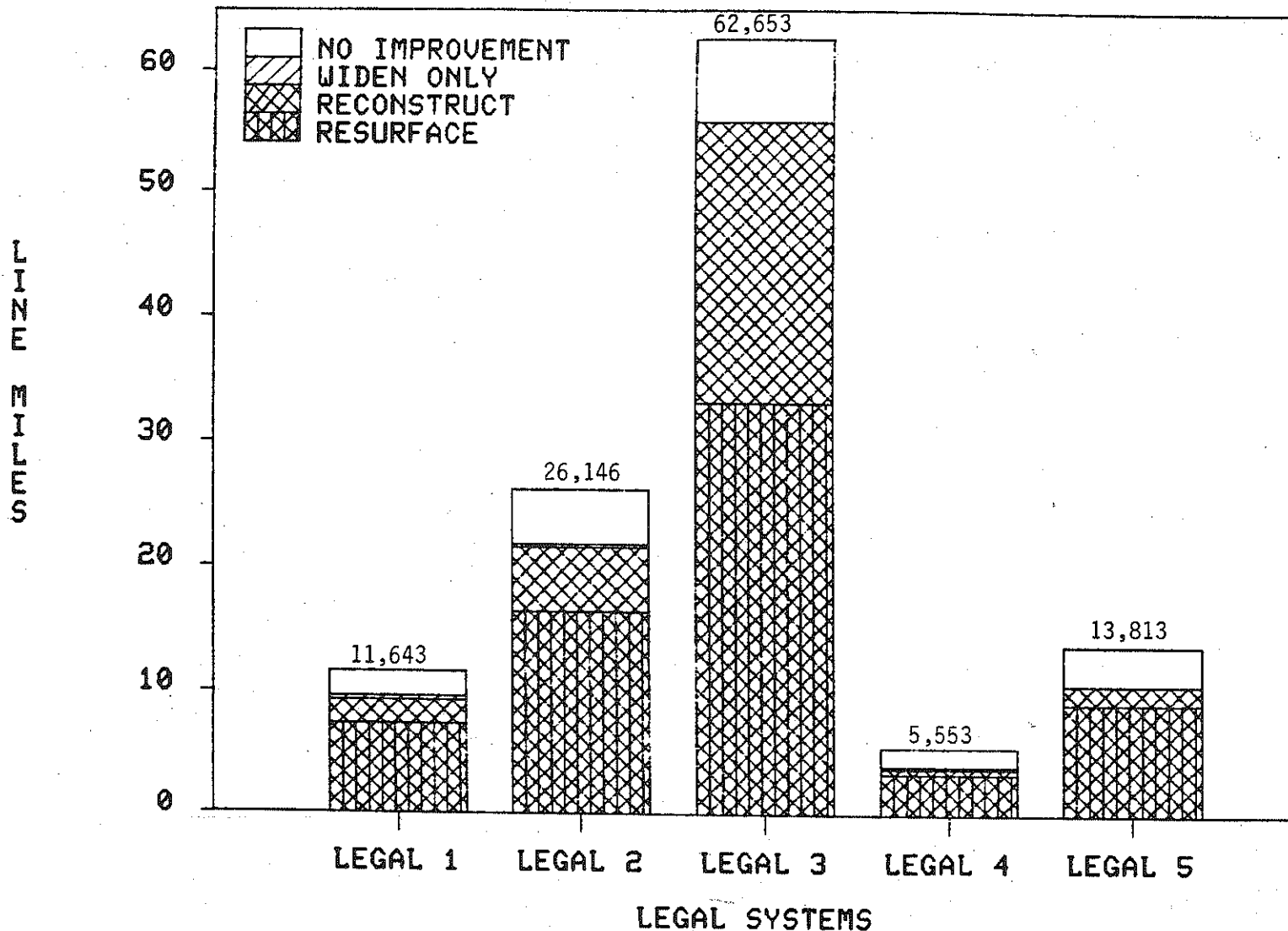


STATE TOTAL  
ALL LEGAL SYSTEMS

EXHIBIT 23

THOUSANDS

MICHIGAN 1984 NEEDS STUDY  
DEFICIENT LINE MILES BY LEGAL SYSTEM (R#21)



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### State Trunkline System

Resurfacing improvements will be required on 63 percent of the State Trunkline System by 1994. Compared to the total, these 7,419 miles represent 10 percent of all resurfacing projects. Only six percent of all reconstruction projects will be required on the trunkline system because of good base condition of the system.

### County Primary Road System

The distribution of projects for the County Primary System is similar to the State Trunkline System. Of the system, sixty-three percent and 20 percent respectively will require resurfacing or reconstructing in the study period.

Compared to the total system, the County Primary System accounts for 24 percent of all resurfacing projects with 16,391 line miles in this category.

### County Local Road System

The County Local System of 62,653 line miles, compared to all other systems, has the smallest proportion of its miles in resurfacing with 53 percent requiring resurfacing and 36 percent requiring reconstruction. However, partially because of the large size of the system, 48 percent of all resurfacing projects and 71 percent of all reconstruction projects are on the County Local System.

### City Major Street System

Sixty-one percent of the City Major Street mileage will need resurfacing by 1994 and eight percent will need reconstruction. The City Major portion represents five percent of all resurfacing projects. City Major

Streets represent 4.6 percent of all systems mileage, so its share of necessary improvements is also small.

#### City Local Street System

The total system mileage for the City Local System is 13,813 line miles which is 12 percent of the total mileage in the state. Of these miles, 67 percent will need to be resurfaced by 1994, and 11 percent will need to be reconstructed. This 9,188 miles of resurfacing projects represents 13 percent of all resurfacing projects on the entire system.

In summary, the Needs Study process involves development of an inventory of existing demand and facility characteristics, the projection of the change that can be expected in that demand and facility condition over the life of the study period, and the development of a typical improvement that will resolve the expected deficiencies. Once this is completed, costs can be applied to develop the capital dollar investment. Future technical discussion will address some of these costing criteria considerations. An example of the type of analysis that can be performed using the inventory and appraisal modal is provided in the following section.

It should be noted that this report is principally developed to "fix" and summarize the inventory reported by the various participating governmental agencies.

## ANALYSIS OF COUNTY PRIMARY ROADS WITHIN INCORPORATED PLACES

### Inventory

As indicated previously, the County Primary Road System accounts for 26,147 line miles or 21.8 percent of the entire roadway system. Of that total, 4,036 line miles have a surface condition rating of poor or very poor. This is over 15 percent of the system. In incorporated places, the counties have responsibility for 823 line miles of roadway with 338 line miles having an average daily traffic (ADT) of 15,000 or more. Of this total, 453 line miles are two-lane facilities. Of the two-lane facilities, approximately 96 line miles have an ADT of 15,000 or more. Finally, of the 338 total line miles that have 15,000 ADT or more, 80 miles are in the surface rating categories of poor or very poor. For the 96 line miles of two-lane roads, 26 line miles are in the surface rating category of poor or very poor.

### Projected Improvement Needs

The inventory of the existing condition on the County Primary System in incorporated places was then entered into the Needs Appraisal Model. The model estimated that during the study period (1983-1994), 110 line miles of County Primary Roads would have a projected ADT of 15,000 or more and a surface rating of poor or very poor. Of this total, 43 line miles will be on two-lane roads.

Also by looking at a year by year analysis, it was determined by the Needs Appraisal Model that to the year 1985, approximately 88 line miles of County Primary Roads would have an ADT of 15,000 or more and a poor or very poor surface rating. Of this total, 27 line miles were two-lane roads.

Exhibit 24 summarizes the present inventory condition of the County Primary System in incorporated places. It also provides the expected line miles for that system that reflect the impacts of projected growth in travel demand and the expected deterioration to surface condition that will occur over the 1983-1994 period.



COUNTY PRIMARY ROADS WITHIN INCORPORATED PLACES

|  | LINE MILES     |           |
|--|----------------|-----------|
|  | Two-Lane Roads | All Roads |
| Present total County Primary Roads   | = 453          | 823       |
| Present County Primary Roads that have ADT's of 15,000 and over  | = 96           | 338       |
| Present County Primary Roads that have ADT's of 15,000 and over and surface ratings of poor and very poor  | = 26           | 80        |
| Present County Primary Roads projected to 1985 by the Needs Appraisal Model to have ADT's of 15,000 and over   | = 106          | 385       |
| Present County Primary Roads projected to 1985 by the Needs Appraisal Model to have ADT's of 15,000 and over and surface ratings of poor and very poor | = 27           | 88        |
| Present County Primary Roads projected to 1994 by the Needs Appraisal Model to have ADT's of 15,000 and over   | = 147          | 421       |
| Present County Primary Roads projected to 1994 by the Needs Appraisal Model to have ADT's of 15,000 and over and surface ratings of poor and very poor | = 43           | 110       |

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