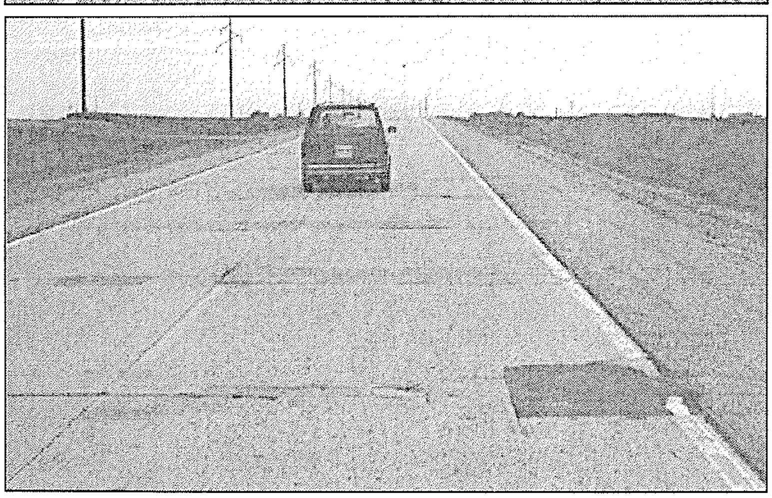
MINNESOTA DEPARTMENT OF TRANSPORTATION

2003 Pavement Management Annual Report



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Office of Materials
Pavement Management Unit

ANNUAL REPORT

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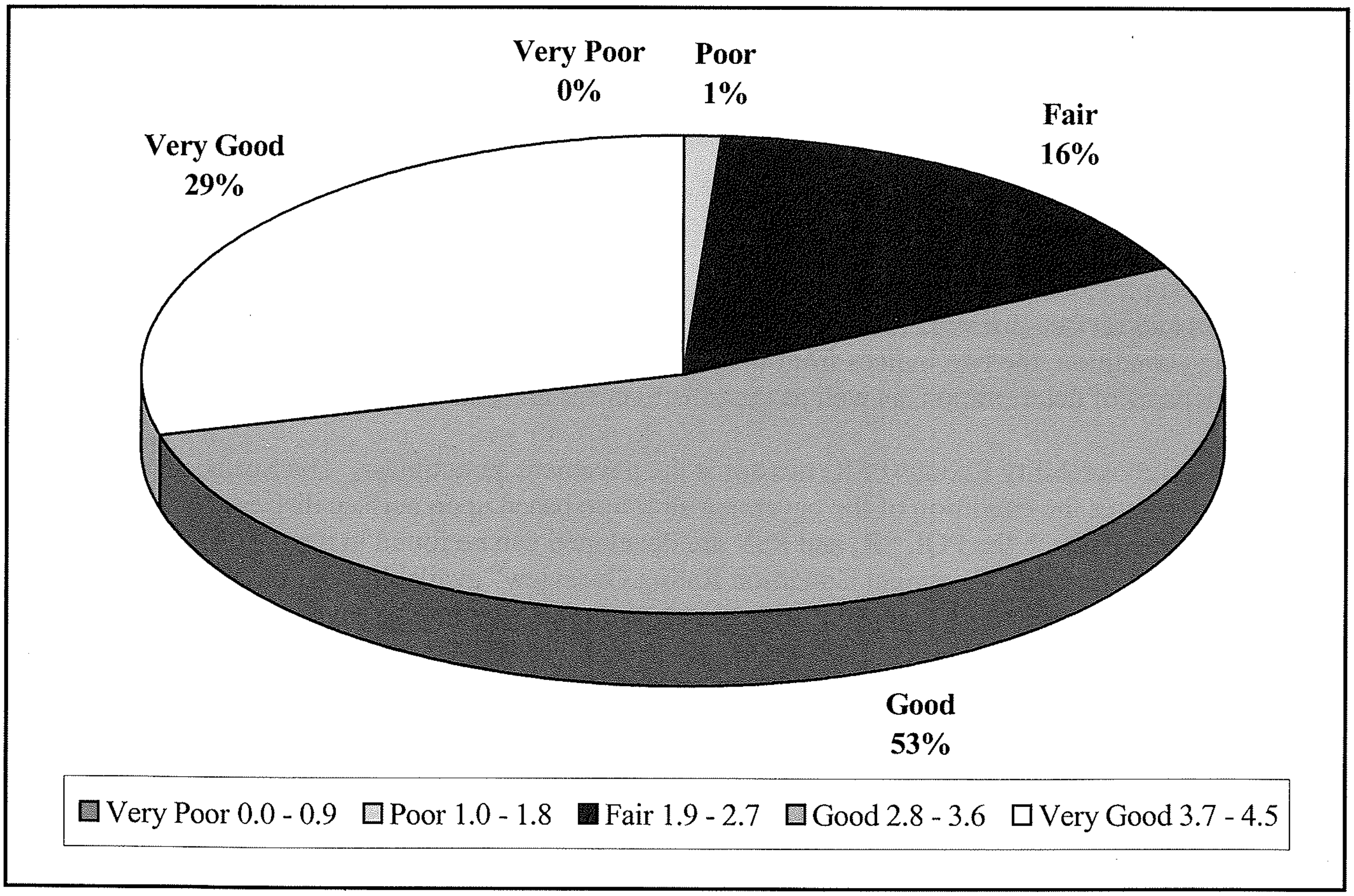
Chapter 1 Executive Summary

This report documents the condition of highway pavements under the jurisdiction of the Minnesota Department of Transportation (Mn/DOT). The data presented herein is in a different form than similar data presented in the 2003 Pavement Condition Executive Summary. The data in the Executive Summary is reported using the statewide performance measures. The data in this report is presented using weighted averages for both current and historical conditions. Each type of reporting technique provides certain insight into the pavement performance trends of the trunk highway system. The executive summary can be obtained by contacting the Pavement Management Engineer at the address listed at the top of page 3.

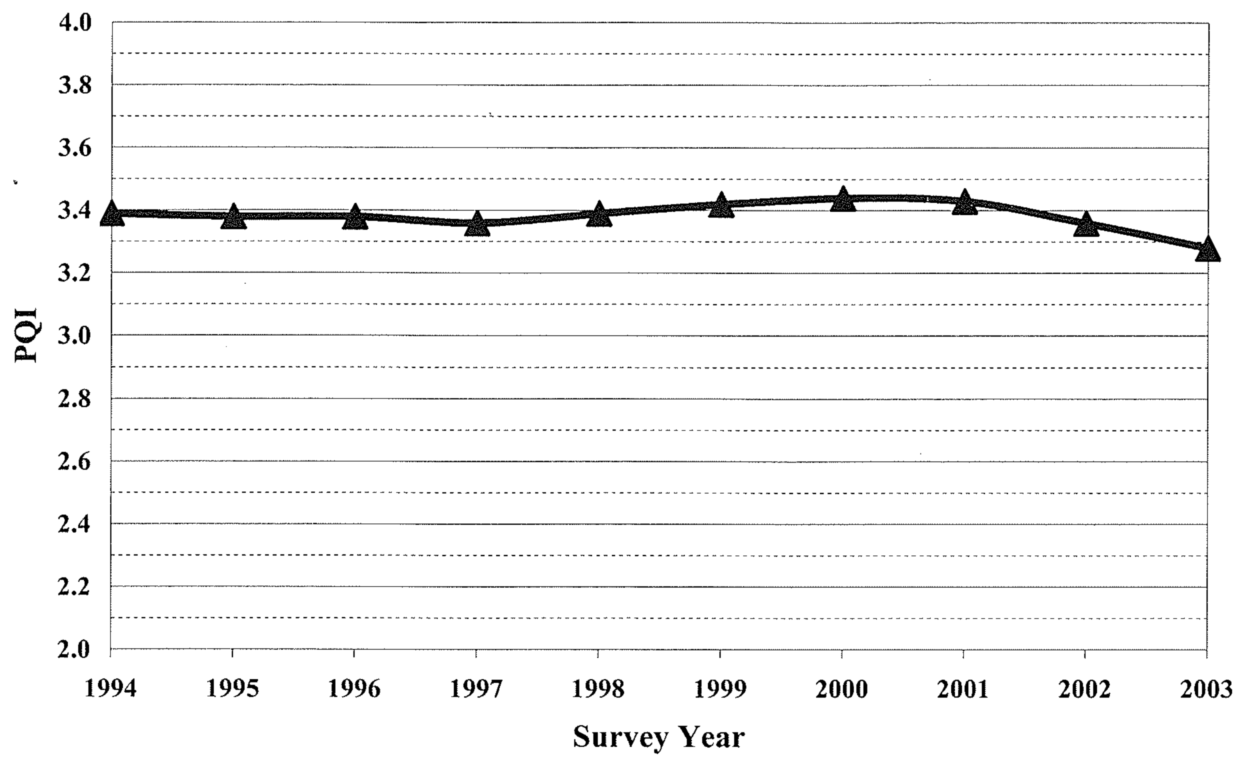
Pavement condition ratings in this report are based on routine surveys conducted in 2003 for pavement smoothness and surface distress (cracking, patching, etc.). Numerical indices are calculated for both smoothness and distress based on these surveys. In addition, a composite index of these two measurements, called the Pavement Quality Index (PQI), is used to represent the overall condition of the pavement. The PQI ranges from 0.0 to 4.5 and is divided into five equal parts and given a descriptive name, either "Very Good," "Good," "Fair," "Poor," or "Very Poor." Figure 1-1 shows the distribution of the current PQI values of Minnesota's highways.[i]

Figure 1-1 Statewide Pavement Quality Index (PQI) Distribution



The PQI of each segment of pavement can be used to compare the present and past conditions. From this comparison, trends can be developed and predictions of future condition can be made. Figure 1-2 shows the average PQI for the trunk highway system in Minnesota from 1994 to 2003. It is apparent from this figure that there has been a steady decline in the condition of Mn/DOT's highway pavements, as measured by the average PQI, since 2001. An overview of Mn/DOT's highway system is provided in Chapter 2.

Figure 1-2 Statewide Pavement Quality Index (PQI), 1994-2003



As mentioned previously, the PQI is derived from two other measures of pavement condition: smoothness and surface distress. Although it is useful to have one composite number like the PQI to characterize condition, the two indices from which it is derived may provide greater insight into the rate and mechanisms of deterioration, as well as the effectiveness and cost of maintenance and rehabilitation.

The Present Serviceability Rating (PSR) measures the pavement smoothness. The Surface Rating (SR) indirectly measures the condition of the pavement structure based upon surface distress. The procedures and techniques by which the PQI, SR, and PSR are developed can be found in the "Mn/DOT Surface Distress Manual" and the "Pavement Condition Rating Overview" available from the Pavement Management Unit website: www.mrr.dot.state.mn.us/pavement/pvmtmgmt/pavemgmt.asp.

The remainder of this report, specifically Chapters 4 through 6, presents more detailed data of the current and historical values of the three performance indices (PSR, SR and PQI). The information is further refined to allow for comparison between different functional classes or route types, as well as between districts.

The current and historical values of the PQI, SR, and PSR, together with the distress and ride measurements from which they are calculated, are maintained in a computer database. The Pavement Management Unit in the Office of Materials maintains a computer application called Highway Pavement Management Application (HPMA). HPMA can be used to develop a wide variety of statistical information about very detailed subsets of highway pavements and to prioritize pavement segments based upon the cost-effectiveness of applicable maintenance and rehabilitation techniques. Requests to perform a specific analysis or for assistance in running HPMA should be directed to David Janisch, Pavement Management Engineer, at 651-779-5567 or dave.janisch@dot.state.mn.us.

General Observations

Some general observations that can be made regarding the data in this report are:

- The condition of the Minnesota trunk highway system decreased in 2003.
  - The percent of the trunk highway mileage with a PQI in either the "Good" or "Very Good" category in 2003 is 82 percent, down from 87 percent in 2002.
  - The percent of the trunk highway mileage with a PSR in either the "Good" or "Very Good" category in 2003 is 59 percent, down from 69 percent in 2002.
  - The percent of the trunk highway mileage with an SR in either the "Good" or "Very Good" category in 2003 is 91 percent, down from 93 percent in 2002.
- The smoothness of the trunk highway system, as characterized by the average PSR, decreased appreciably for the second straight year. The average PSR on the entire trunk highway system is 3.16, down from 3.31 in 2002. This is the lowest the average PSR has been since 1986.
- The average PSR decreased in every district in 2003. District 2 decreased the most (7.4%) followed by D-1 (5.8%), D-7 (5.1%) and D-3 (3.9%). District 6, 8 and Metro changed the least, 1.3%, 1.8% and 1.3% respectively.

Endnotes for Chapter 1

[i] The pavement conditions of bridges, ramps, loops, and a portion of TH 74 that has a gravel surface are not included in this report.

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Chapter 2 Minnesota's Trunk Highway System

Minnesota's trunk highway system consists of approximately 11,900 centerline miles of pavement. Slightly less than 9,500 miles are two-lane undivided routes; the remaining 2,400 miles are multilane divided routes such as interstate routes.

In the pavement management system, roadway miles are also used to quantify the trunk highway system. A roadway mile is equal to one mile of undivided highway or one mile of divided highway, in one direction only. For example, one mile of I-94 counts as two roadway miles because the eastbound and westbound directions are counted as separate lengths of roadway. This is done to account for instances in which—due to differences in construction or design—one direction of a divided road is different from another. There currently are 14,285 roadway miles of trunk highway with condition ratings. The pavement on some of the longer bridges in the state is not rated.

Mn/DOT Districts

The direct management of Minnesota's trunk highway system is the responsibility of eight districts. The district staff prioritizes highway segments for routine maintenance, preventive maintenance, rehabilitation, and reconstruction work. The types of work performed are determined by the district staff with the concurrence of Central Office staff. The boundaries of each of the eight districts are shown in Figure 2-1.

The established district boundaries somewhat complicate the implementation of transportation improvements because they do not follow county boundaries. For the planning and implementation of transportation improvements, Mn/DOT seeks input from county and municipal officials and staff. As a result, it is helpful for county officials to have only one Mn/DOT liaison and vice versa. Area Transportation Partnership (ATP) is the term for districts with boundaries that have been modified to follow county boundaries. Figure 2-2 is a map of the ATP boundaries. Throughout this report, the data is analyzed on a district basis.

Route Types

Three route types—Interstate, U.S., and Minnesota routes—comprise the trunk highway system that is under the jurisdiction of Mn/DOT. Figure 2-3 is a pie chart showing the percentage of mileage for each of the three route types. The trunk highway system may also be characterized in a number of other ways such as by pavement type or design standards.

Figure 2-1 District Boundaries

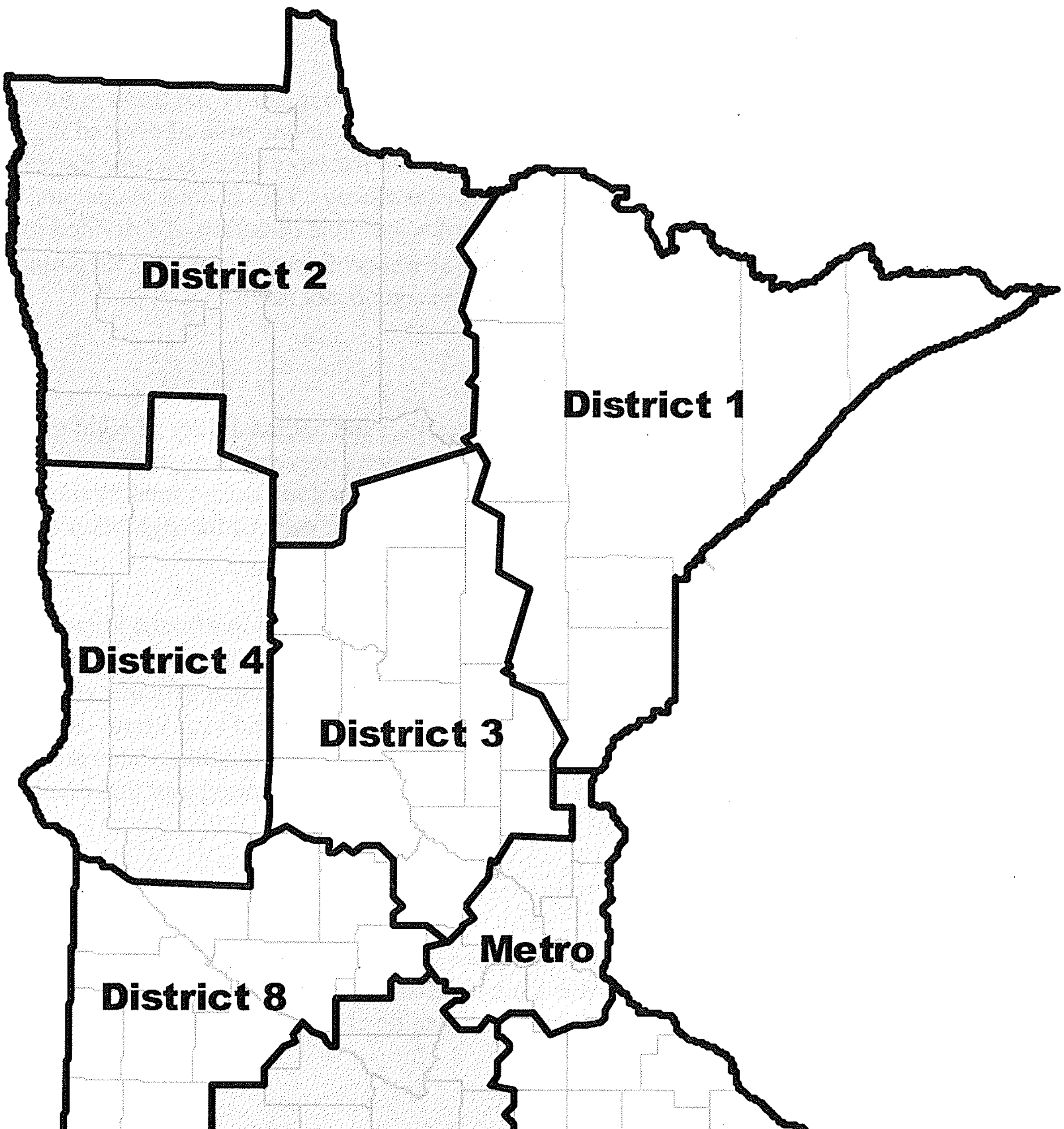


Figure 2-2 Area Transportation Partnership Boundaries

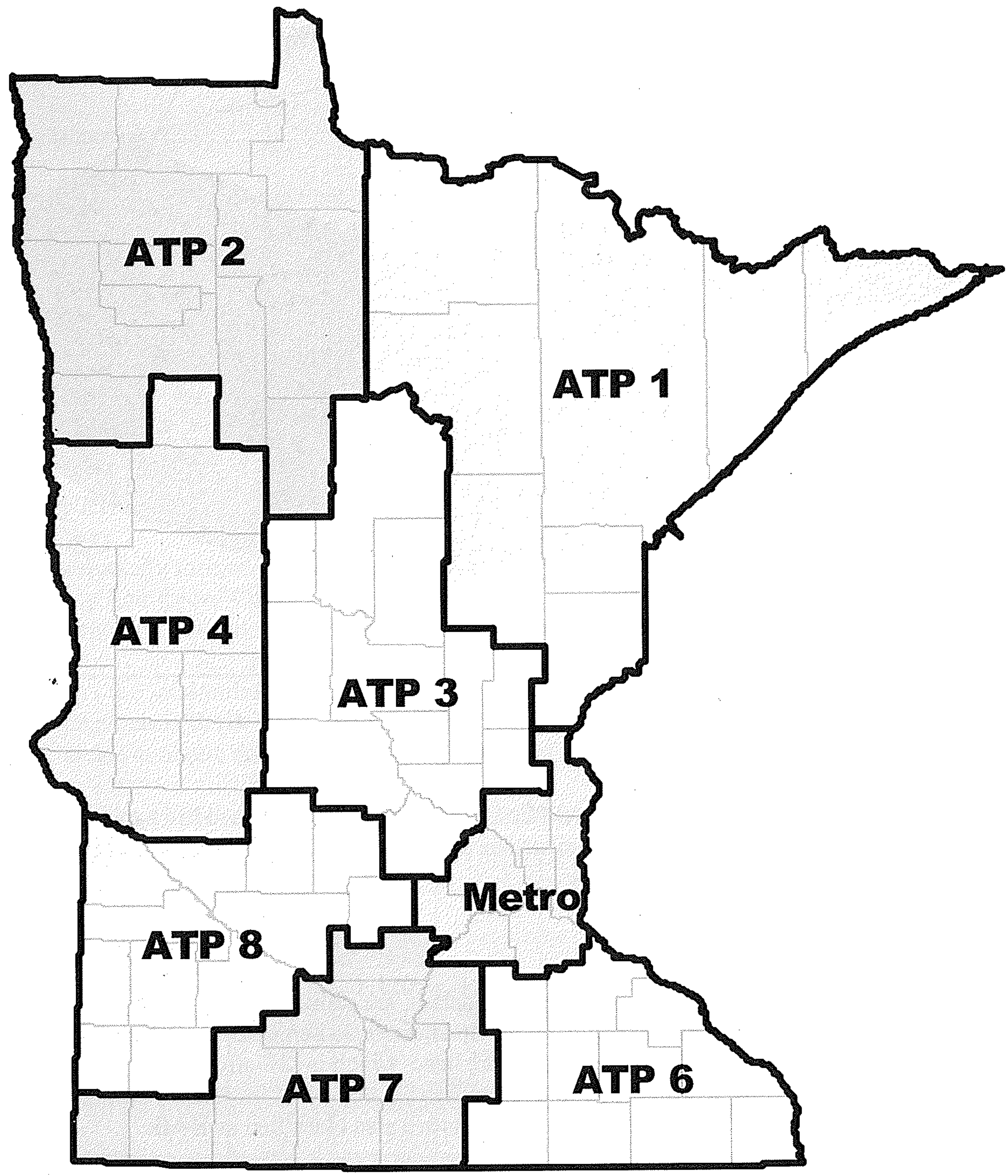
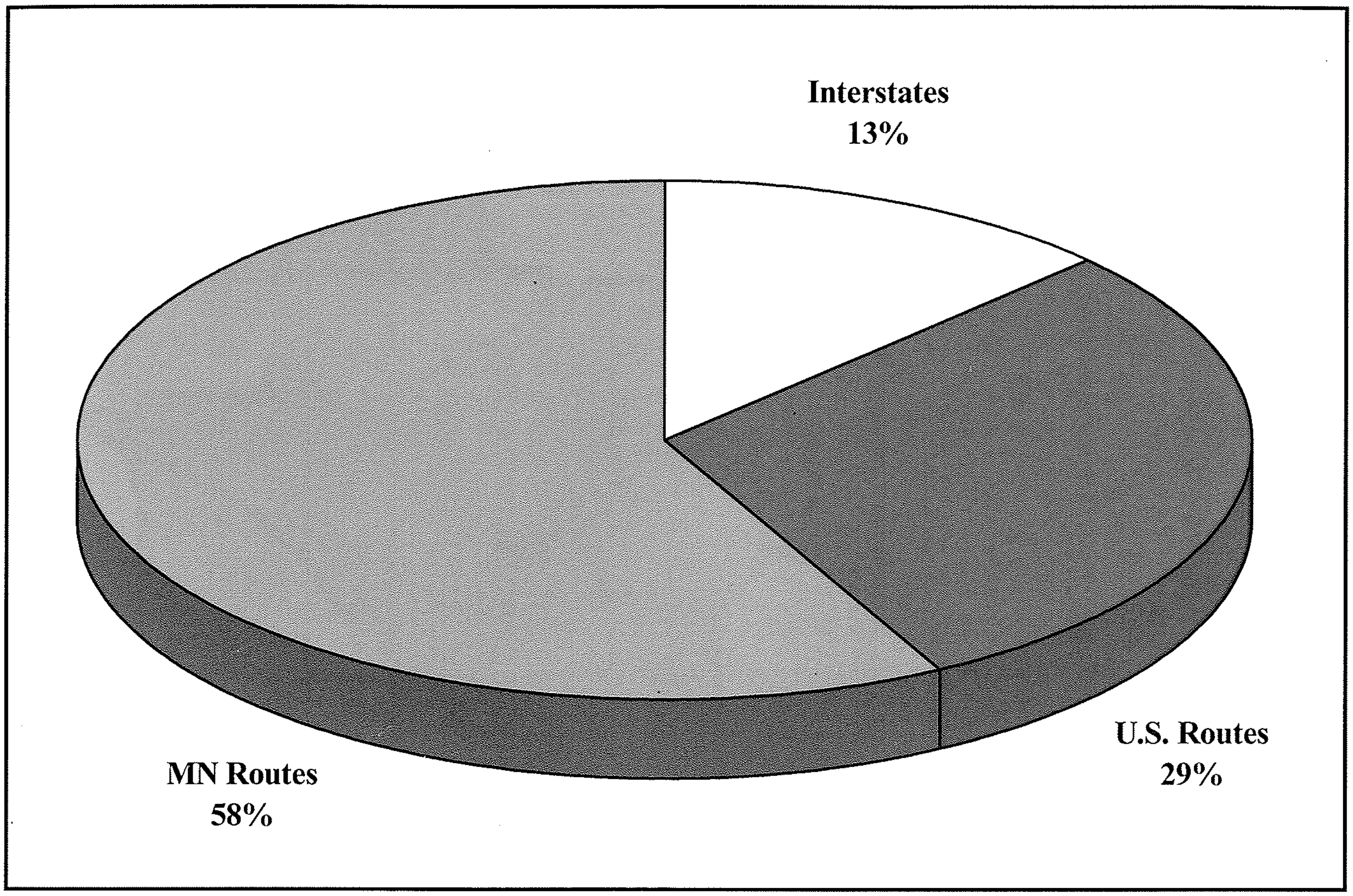


Figure 2-3 Statewide Highway Type Distribution (Roadway Miles)



Pavement Types

In the pavement management system, seven different pavement types are used to characterize each section. These pavement types allow for comparison and separate deterioration models to be used. The seven pavement types are defined as follows.

Bituminous—Aggregate Base (BAB)

Bituminous pavements, which are commonly called asphalt, are utilized for both new construction and as an overlay for rehabilitation of an existing pavement surface. When used for new construction, layers of bituminous may be placed upon layers of aggregate base, which is a controlled aggregate gradation. This is termed Bituminous Aggregate Base and abbreviated BAB. Cold in-place recycling (CIR) and full depth reclamation of existing bituminous pavements are also classified as BAB.

Bituminous—Full Depth (BFD)

With sufficiently increased thickness of the bituminous layers, the aggregate base may be eliminated. Such pavement is termed Bituminous Full Depth and abbreviated BFD. Although Bituminous Full Depth was used extensively in the 1970s and 1980s, its use by Mn/DOT has been discontinued because of long-term performance concerns.

Bituminous Over Bituminous (BOB) & Bituminous Over Concrete (BOC)

Bituminous that is used as an overlay on top of existing bituminous surfaces is termed Bituminous Over Bituminous or BOB, while bituminous used as an overlay on concrete pavement is abbreviated BOC. Overlays are primarily used to minimize road roughness where the underlying pavement is structurally competent, to increase pavement structural capacity, or as an interim measure until the roadway can be reconstructed.

Concrete—Doweled (CD)

For new Portland Cement Concrete pavement construction, Mn/DOT currently uses only concrete with dowel bars (i.e., steel rods) connecting adjacent panels. Unbonded concrete overlays, which are used extensively by Mn/DOT on top of deteriorated concrete, are also classified as concrete doweled pavements.

Concrete—Undoweled (CU)

Concrete pavement without dowels between the panels is abbreviated CU and is no longer used because the differential movement between panels causes roughness.

Continuously Reinforced Concrete Pavement (CRCP)

Concrete continuously formed without panel joints but with continuous steel reinforcement is referred to as Continuously Reinforced Concrete Pavement or CRCP. CRCP is no longer used because of past performance problems related to corrosion of the steel caused by de-icing salt.

Table 2-1 shows the total miles of different pavement types by district subtotal and state total.[i] Bituminous pavements (BAB, BFD, BOB, and BOC) account for nearly eighty-five percent of the total mileage. Doweled concrete comprises fourteen percent of the total mileage.

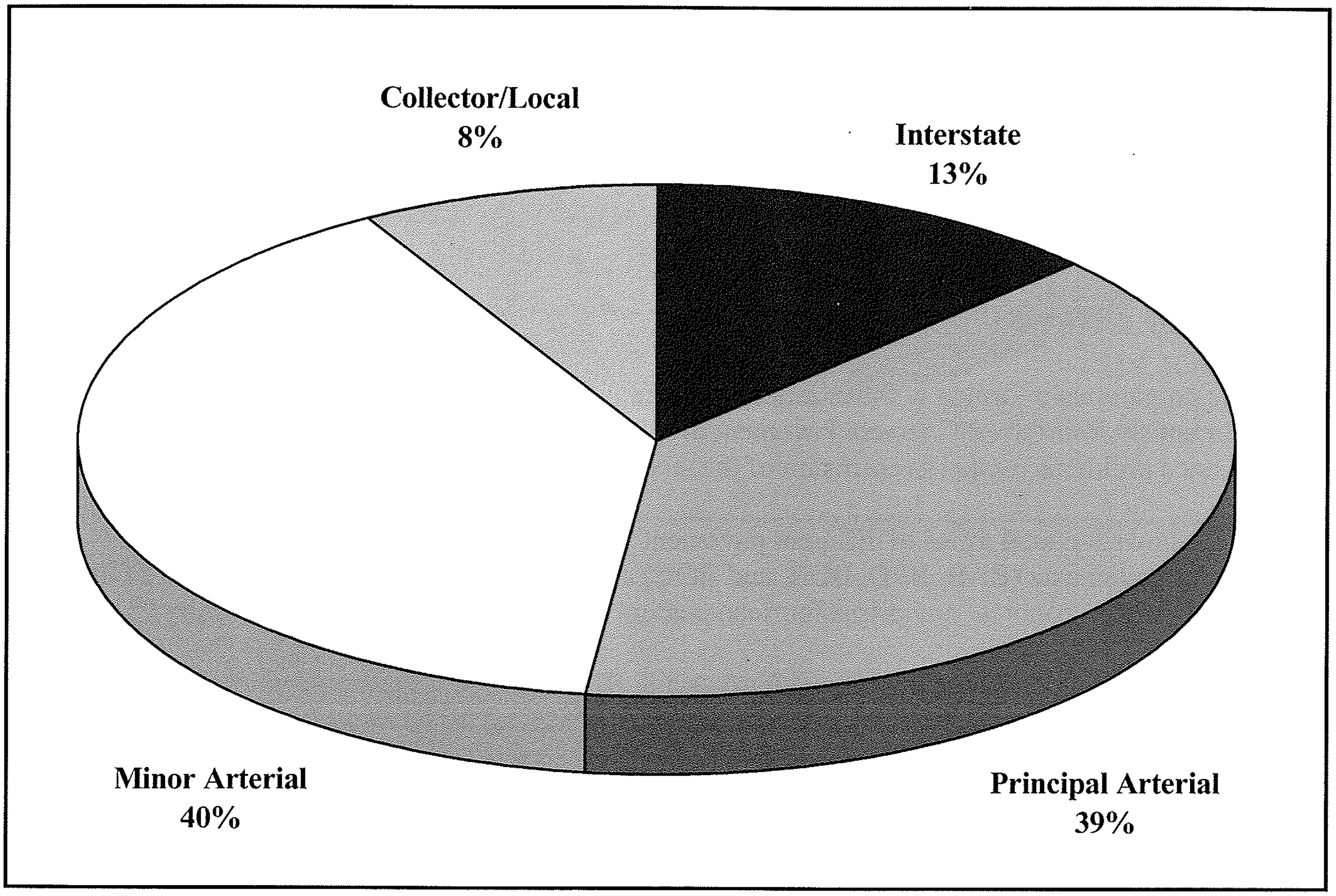
Table 2-1 Roadway Miles of Pavement for State & Districts[ii]

Pavement	State	D-1	D-2	D-3	D-4	D-6	D-7	D-8	Metro
BAB	868	196	141	204	98	71	29	30	98
BFD	186	36	4	17	17	37	5	23	47
BOB	7,843	1,170	1,420	1,329	1,050	787	630	877	580
BOC	3,203	211	300	199	470	532	584	342	564
CD	1,994	245	71	188	141	369	374	152	453
CU	175	9	14	39	33	15	26	32	6
CRCP	18	0	0	0	18	0	0	0	0
Total	**14,285**	**1,867**	**1,951**	**1,976**	**1,828**	**1,812**	**1,648**	**1,455**	**1,748**

Functional Class

The safe and expedient movement of traffic conflicts with the other major goal of highway design: providing access to residences, businesses, and recreational areas. Accordingly, highways are grouped into different functional classes, which provide different combinations of mobility and access such that the integrated highway system achieves both of these goals. The design and functional class vary based upon whether the highway serves a rural or urban area. The use of the highway can be further subdivided into one of four broad classes: interstate, principal arterial, minor arterial, and collector/local. Figure 2-4 shows the percentage of roadway mileage for these functional classes.

Figure 2-4 Statewide Functional Class Distribution (Roadway Miles)



The interstate system connects every large community in the United States with controlled access, high design speed freeways. The Federal Aid Highway acts of 1944 and 1956 created the interstate system, formally the "National System of Interstate and Defense Highways." The interstate system has become such a critical part of our transportation system that Chapter 5 is devoted exclusively to its condition.

Limited access and a capacity to move relatively large volumes of traffic in an expedient manner characterize arterial highways. In rural areas, arterials provide a system of integrated continuous connections to the major urban areas at a level of service suitable for statewide travel. In urban areas, arterials are high traffic volume roadways that serve the major centers of activity within the urban area. Arterials are subdivided into principal and minor categories. This further distinction is based upon the relative distribution of providing access and mobility, the relative importance of the areas they serve, their length, and traffic volumes.

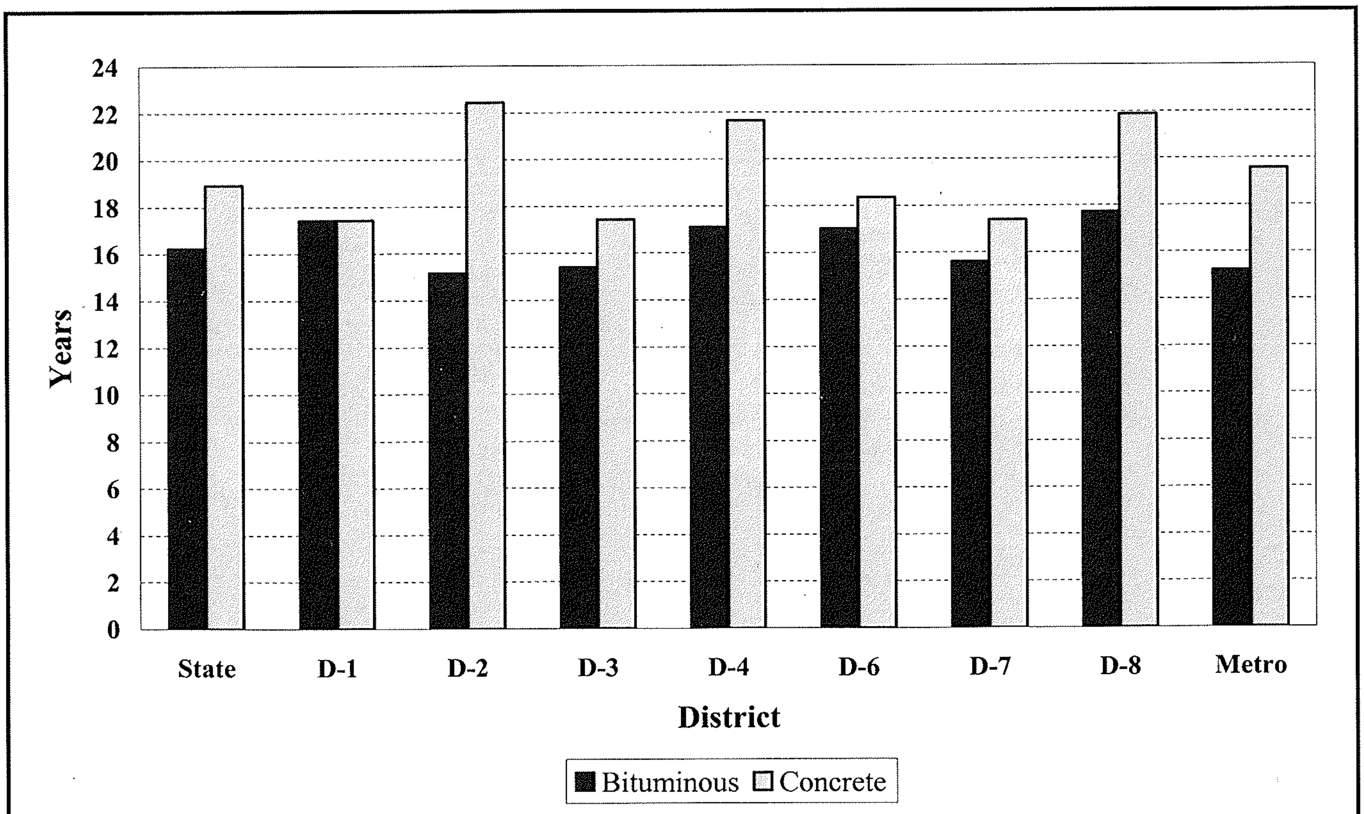
Collector routes are characterized by roughly even distribution of access and mobility with generally lower traffic volumes than arterials. In rural areas, collectors primarily serve as connections to the arterial system and provide for travel within the county. In urban areas, collectors act as an intermediate connection between the arterial system and the points of origin and destination. Collectors typically serve commercial and industrial areas.

Their many points of direct access to the surrounding area characterize local roads. Speeds and traffic volumes are lower and trip distances are shorter. Local highways connect to higher priority collectors or arterials to provide mobility over greater distances.

Pavement Rehabilitation

The effects of repeated heavy loads and weather extremes on pavement condition necessitate an ongoing program of maintenance and rehabilitation. Rehabilitation and reconstruction are activities that upgrade the pavement structure of a highway after the cumulative loads exceed its actual capacity or the pavement has deteriorated for other reasons. Rehabilitation work is frequently undertaken with safety enhancements, intersection upgrades, or bridgework. Rehabilitation projects for bituminous pavements include medium or thick overlays, with and without milling. Rehabilitation projects for concrete pavements include major joint repairs and bituminous or unbonded concrete overlays. Figure 2-5 shows the average number of years between original construction and first rehabilitation for pavements built since 1955. Statewide, the average age when the first rehabilitation for bituminous and concrete pavements is performed is 16 and 19 years, respectively. For bituminous, the first rehabilitation is considered to be when an overlay is placed or the road is reconstructed. For concrete, the first rehabilitation is considered to be when the pavement is overlaid, reconstructed or has a joint repair.

Figure 2-5 Average Time from Original Construction to First Rehabilitation/Reconstruction



Preventive Maintenance

Mn/DOT has endorsed the concept of using preventive maintenance on pavements in good structural condition as a way to cost-effectively extend usable service life. Beginning in 2001, a goal of $40 million dollars was set for preventive maintenance projects. Approximately one-third of the trunk highway system has been identified as potentially benefiting from preventive maintenance.

Microsurfacing, crack sealing, crack repair, rut filling, chip sealing, and thin hot mix overlays are examples of bituminous pavement preventive maintenance activities. Joint resealing, diamond grinding, and minor Concrete Pavement Repair (which includes relatively small quantities of repair of spalled joints, cracked corners, and delaminated areas) are concrete pavement preventive maintenance activities.

Each year the Pavement Management Unit writes a report identifying the needs and pavement sections that would be good candidates for preventive maintenance. It determines the percent of the preventive maintenance needs in each district and applies this percent to the $40 million goal. A copy of this report can be at: http://www.mrr.dot.state.mn.us/pavement/pvmtmgmt/2004PMRec%27s.pdf.

Endnotes for Chapter 2

[i] Distances for undivided highways are given in miles measured along the centerline of the highway, irrespective of the number of lanes. Divided highways are treated as separate roadways in each direction for the computation of distance. Due to rounding, tabular data entries do not necessarily sum to the totals displayed.

[ii] There is also a portion of TH 74 in D-6, about 9 miles long, in the Whitewater Wildlife Area, with a gravel surface. This is the only gravel surfaced trunk highway in Minnesota.

Chapter 3 Pavement Condition Measurements

The process of measuring the condition of Minnesota's trunk highway system begins with maintaining a database of a large number of attributes for each highway. The attributes include data on length, lane width, shoulder width and type, pavement type and thickness, dates of original construction and rehabilitation, traffic counts, and much more. This information is stored on Mn/DOT's Transportation Information System (TIS) as well as the pavement management software, HPMA. Currently, the link between the information stored on TIS and the events and conditions on the actual highway is a sequence of reference posts along each highway at approximately one-mile spacing.[i]

Pavement condition data is normally reported in one of two formats. The first is on a mile-by-mile basis, between consecutive reference posts and anywhere the pavement type changes. The advantage of reporting the data in this format is that it provides the finest level of detail on the condition of the highway system. The second format is by longer project or design segments. These segments typically coincide with paving projects and tend to represent longer sections of uniform pavement. For these sections, a length-weighted condition is reported based on the mile-by-mile results. The longer sections allow for better project identification and selection.

Mn/DOT determines the pavement condition using a specially equipped Video Inspection Vehicle (VIV), manufactured by Pathways Services, Inc.

Figure 3-1 Pavement Management Van

The VIV measures the longitudinal profile of the roadway in addition to capturing video images of the pavement surface and digital images of the surrounding area. In addition, transverse oriented distress such as rutting and faulting are measured.

Mn/DOT measures two facets of pavement condition: pavement surface distress (cracks, ruts, etc.) and pavement roughness.

Pavement Surface Distress

Generally, pavement distress measurements are made over the first 500 feet of every mile, beginning at each reference post or change in pavement type.[ii] The pavement surface is videotaped with two downward-looking video cameras mounted on the VIV. Two trained technicians at the Office of Materials view the videos and determine the type, severity, and amount of the various pavement distresses using special computer/video workstations. This procedure provides consistent measurement of surface distresses for all trunk highway pavements throughout the state, as well as a permanent record of conditions at the time of rating. An index called the Surface Rating (SR) is calculated from the distress information. The SR is intended to correspond to a rating by a panel of experienced pavement engineers. SR values range from 0.0 to 4.0. An SR of 4.0 corresponds to a new pavement with no surface distresses. An extremely distressed pavement will have an SR below 2.0.

The VIV is also equipped with five lasers mounted across the front of the vehicle. The lasers measure the distance from the van's reference bar to the pavement surface. Rutting and faulting are types of surface distress measured with the lasers. By comparing the value of the five lasers mounted across the front of the VIV, an estimate of the transverse profile can be made. Rut depths exceeding 0.5 inches are classified as a surface distress because they allow water to pond in the rut, resulting in icing or hydroplaning. Excessive rut depths also indicate a lack of required structural strength for the loads to which the pavement is subjected. On concrete pavements, faulting over 0.25 inches is considered large enough to warrant attention. If either of these thresholds is exceeded, the SR is reduced.

Pavement Roughness

As the VIV travels down the highway, the lasers are continuously firing. This data is used to determine the longitudinal profile of the roadway. If the roadway were perfectly smooth, the measurements would always be the same as the vehicle traveled along it. However, as bumps and dips are encountered the distance to the pavement surface changes. These deviations from a perfectly smooth road are defined as pavement roughness. The road surface profile is continuously measured over the mile-by-mile sections. For each section, an internationally based parameter termed the International Roughness Index (IRI) is calculated. The IRI is typically reported in meters/kilometer or inches/mile. It is based on the total vertical departure from a perfectly smooth profile that a standard vehicle would experience if it were driven over the section of roadway. To correlate the IRI measured by the VIV to how it is perceived or tolerated by drivers, Mn/DOT periodically assembles groups of people to rank pavement roughness on a scale of 0.0 to 5.0. An equation is then developed to compute the Present Serviceability Rating (PSR) from the IRI values. A PSR value of 5.0 would correspond to a perfectly smooth pavement surface. New pavements typically have a PSR of about 4.3. Most people feel a pavement is uncomfortable to drive on for long distances once the PSR reaches 2.5. For pavement design purposes, this is also considered to be the end of the pavement design life.

The Pavement Quality Index (PQI) is a composite index derived from SR and PSR values to give an overall rating to each pavement segment. The PQI value is the geometric mean of the SR and PSR values (the square root of the product of the SR and PSR). The PQI ranges from 0.0 to 4.5.

The procedures and techniques by which the PQI, SR, and PSR are developed can be found in the Mn/DOT Surface Distress Manual, available at:

http://www.mrr.dot.state.mn.us/pavement/pvmtmgmt/DistressManual.pdf.

Endnotes for Chapter 3

[i] The actual distance between reference posts is accurately maintained in the database. Numbering of reference posts begins at the state's western or southern border or at the most southerly or westerly terminus of the highway.

[ii] Generally, only the outermost lane of multilane highways is measured. Divided highways are considered separate roadways. The 500 feet past each reference post and intermediate changes in pavement type are measured for surface distresses.

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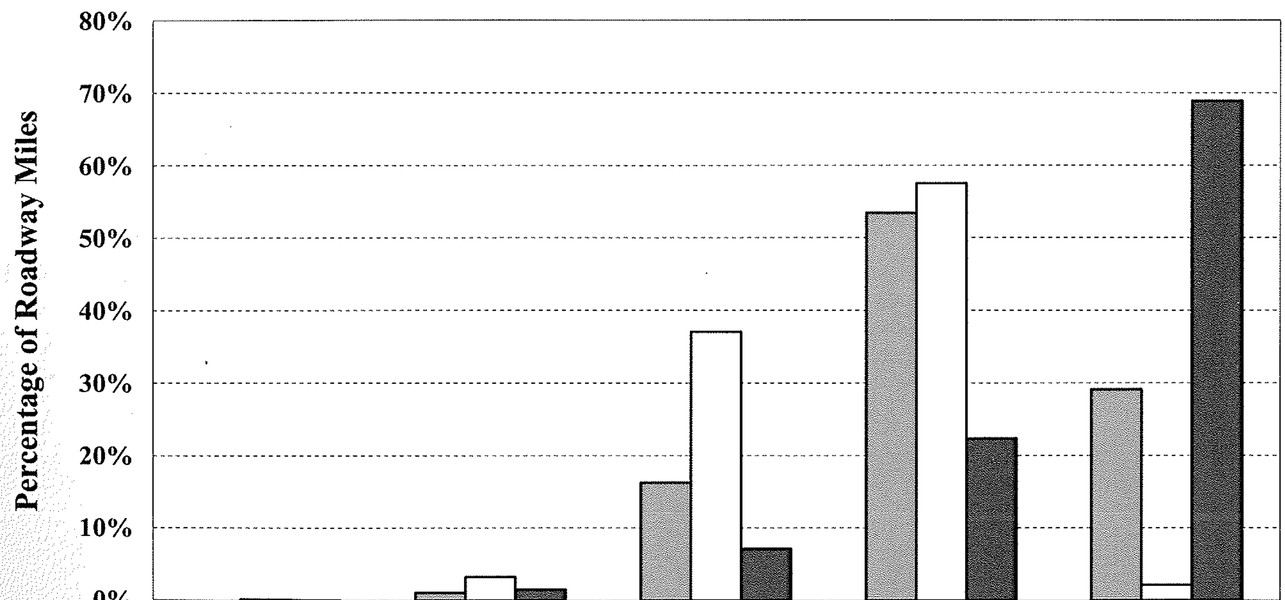
Chapter 4 Statewide Conditions

Figure 4-1 shows the distribution of the current values of the PQI, PSR, and SR into five equal categories: "Very Poor," "Poor," "Fair," "Good," and "Very Good." The category ranges are shown in Table 4-1.

Table 4-1 Descriptive Categories of Pavement Condition

Index	Very Poor	Poor	Fair	Good	Very Good
PQI	0.0 – 0.9	1.0 – 1.8	1.9 – 2.7	2.8 – 3.6	3.7 – 4.5
PSR	0.0 – 1.0	1.1 – 2.0	2.1 – 3.0	3.1 – 4.0	4.1 – 5.0
SR	0.0 – 0.8	0.9 – 1.6	1.7 – 2.4	2.5 – 3.2	3.3 – 4.0

4-1 Statewide Performance Indices by Performance Classification



	Very Poor	Poor	Fair	Good	Very Good
PQI	0%	1%	16%	53%	29%
PSR	0%	3%	37%	57%	2%
SR	0%	2%	7%	22%	69%

Pavement Condition

Some observations from Figure 4-1:

- The percent of the trunk highway mileage with a PQI in either the "Good" or "Very Good" category in 2003 is 82 percent, down from 87 percent in 2002.

- The percent of the trunk highway mileage with a PSR in either the "Good" or "Very Good" category in 2003 is 59 percent, down from 69 percent in 2002.

- The percent of the trunk highway mileage with an SR in either the "Good" or "Very Good" category in 2003 is 91 percent, down from 93 percent in 2002.

In order to provide more detailed information about the historical shifts in pavement condition, cumulative distribution graphs are shown in Figures 4-2, 4-3 and 4-4 for PQI, PSR, and SR, respectively. These distribution plots show the percentage of roadway miles with an index value equal to or less than the values shown on the horizontal axis.[i] Figures 4-2, 4-3, and 4-4 show the distribution curves for the PQI, PSR, and SR, respectively, for each of the last five years.

Figure 4-2 shows a decrease in pavement condition, as measured by the PQI (curve is shifted to the left). The gap between the 2002 and 2003 PQI begins at the percent of the system with a PQI of 3.5 or less, meaning there are more pavements with a 2003 PQI below 3.5 then there were in 2002.

Figure 4-3 shows a large decrease in the PSR from 2002 to 2003 (curve has a large shift to the left). The shift is very uniform, across the whole range of PSR values, indicating a uniform decline in the system.

Figure 4-4 shows a slight decrease in the SR from 2002 to 2003 (curve has shifted slightly to the left).

Figure 4-2 Cumulative Distribution of Statewide Pavement Quality Index (PQI), 1999-2003

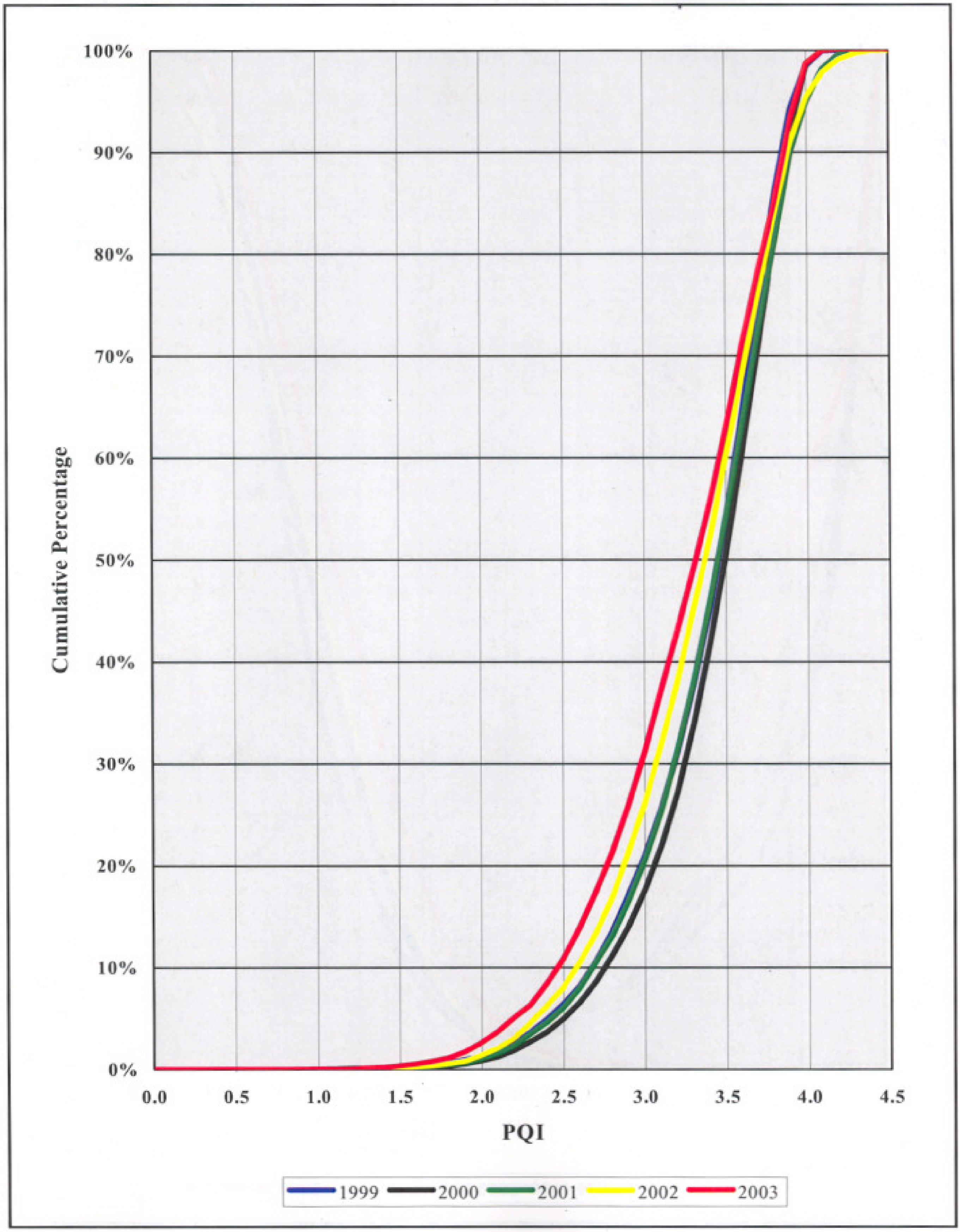


Figure 4-3 Cumulative Distribution of Statewide Present Serviceability Rating (PSR), 1999-2003

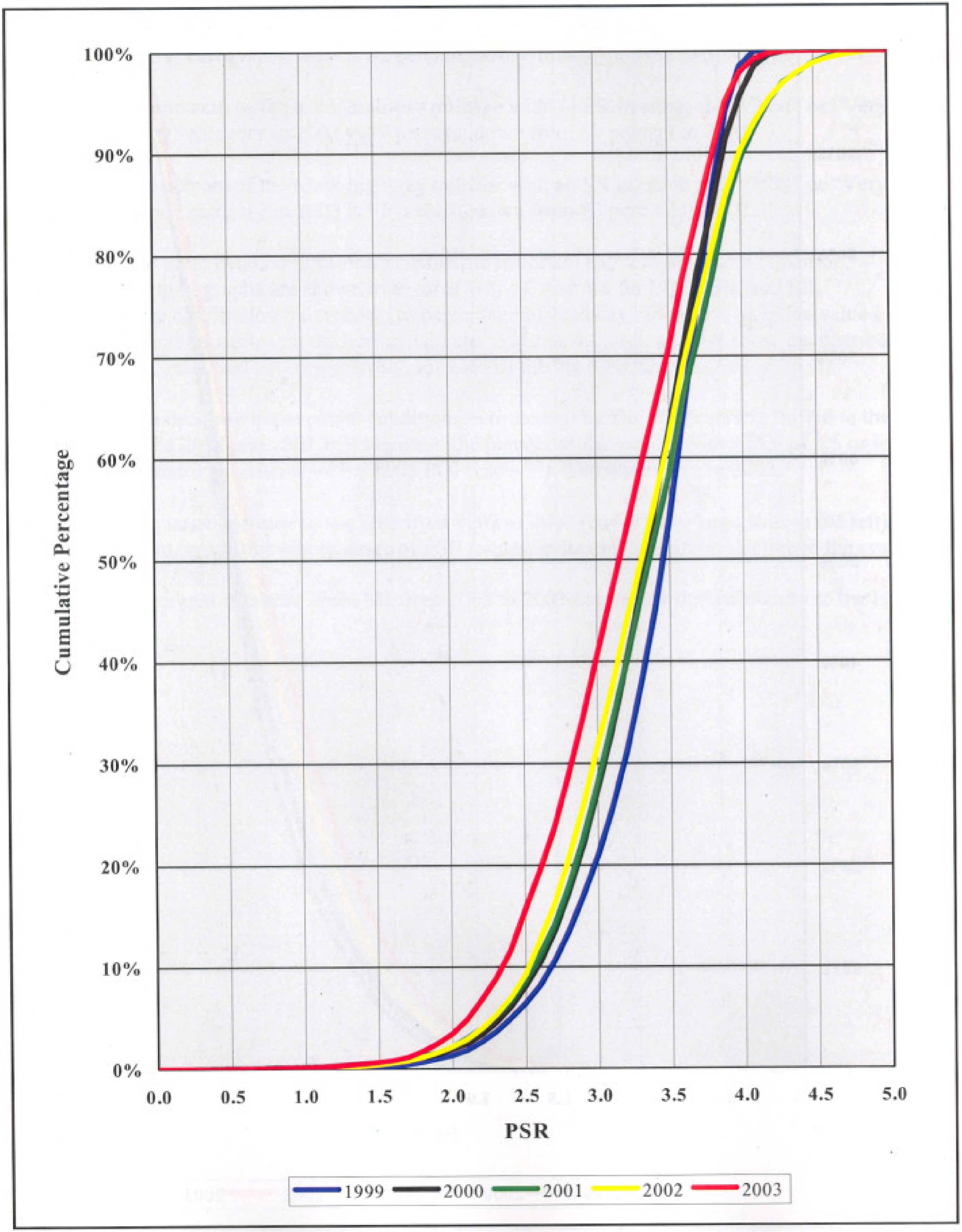
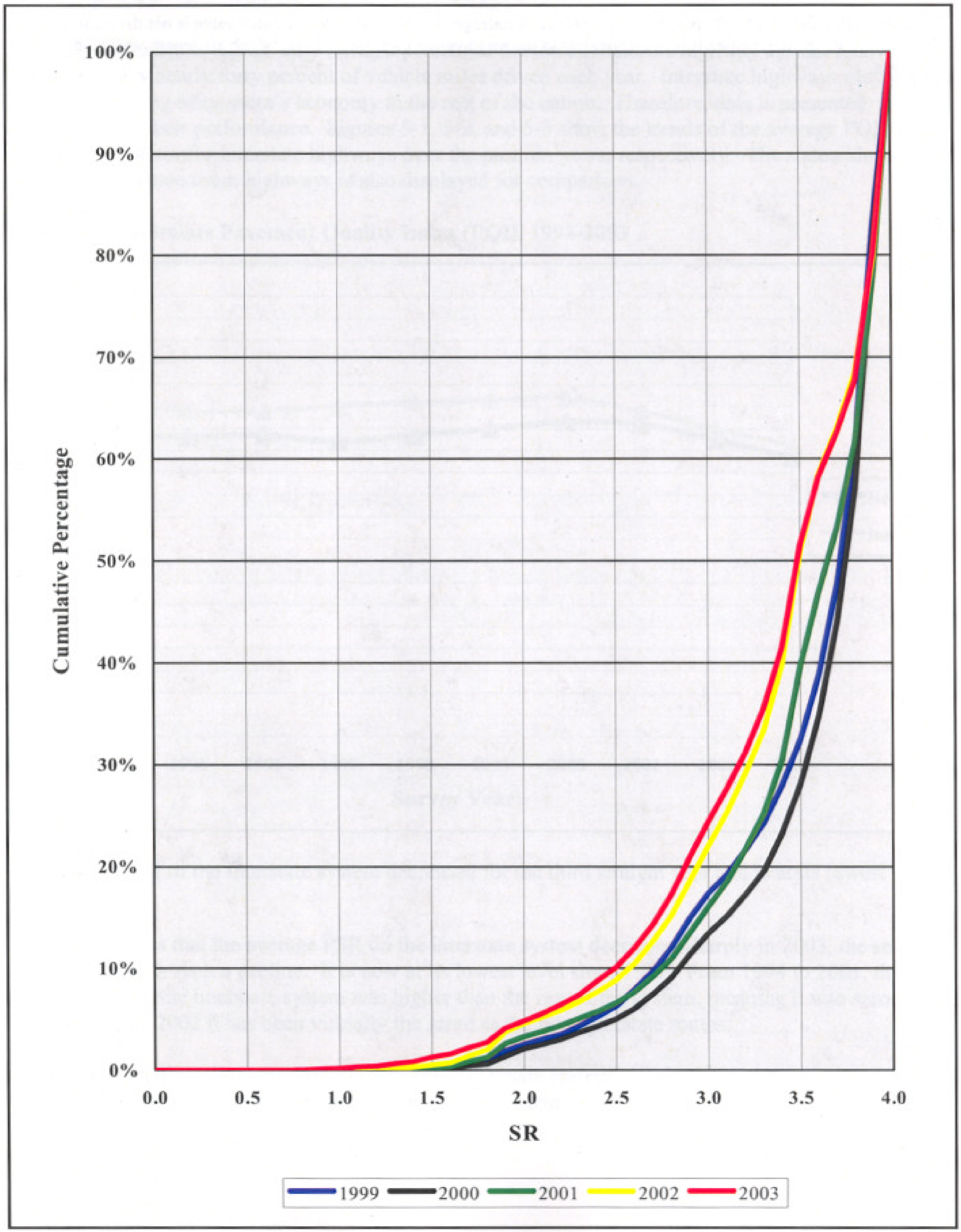


Figure 4-4 Cumulative Distribution of Statewide Surface Rating (SR), 1999-2003



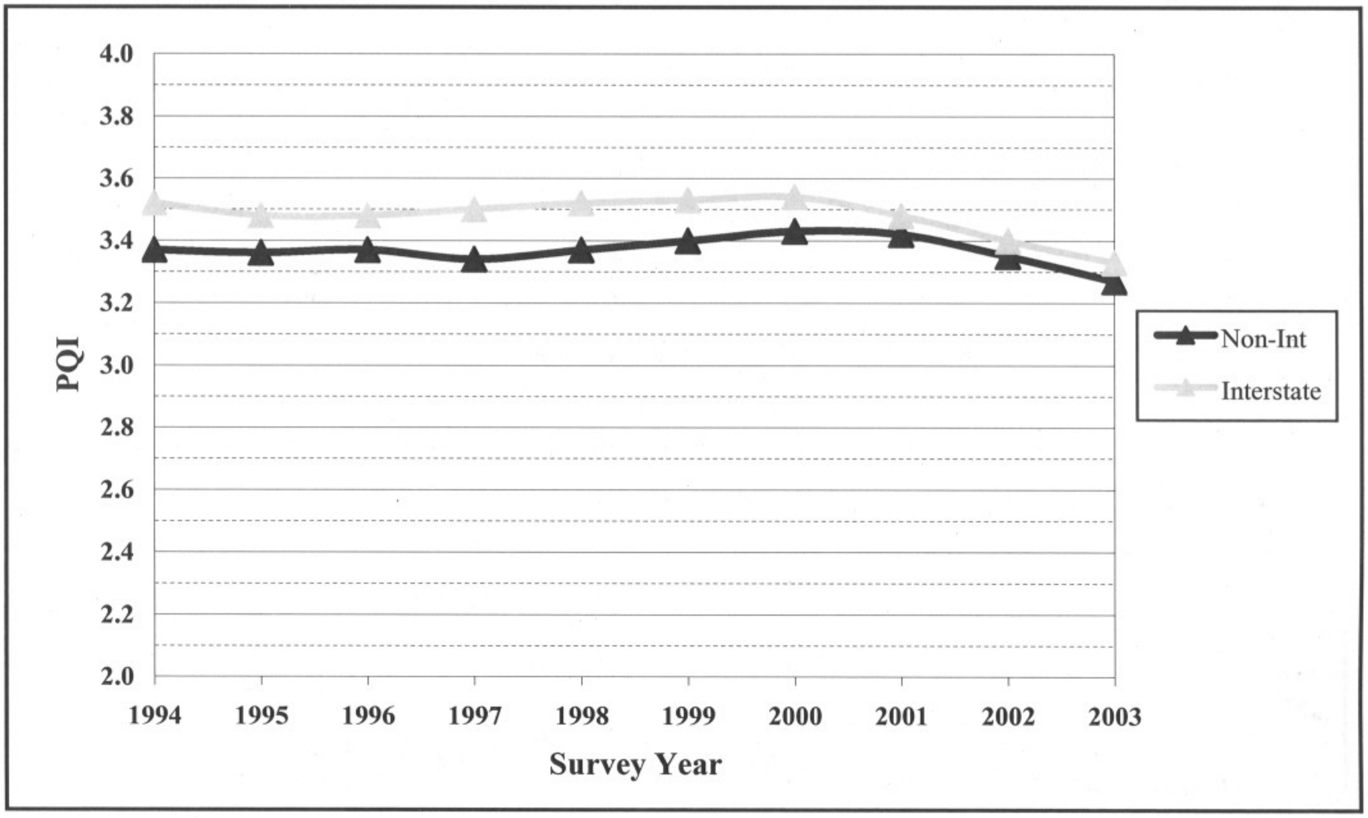
Endnotes for Chapter 4

[i] The index value for which fifty percent of the pavement mileage has an equal or lower index value is not the mean value. Rather, it is the median value. It is not equivalent to the mean values presented herein, which are length-weighted averages.

Chapter 5 Interstate Highways

Interstate highways comprise only thirteen percent of the total Minnesota highway system roadway miles, but carry nearly forty percent of vehicle miles driven each year. Interstate highways play a major role in connecting Minnesota's economy to the rest of the nation. Therefore, data is presented specifically on their performance. Figures 5-1, 5-2, and 5-3 show the trends of the average PQI, PSR, and SR, and values for interstate highways over the past ten years, respectively. The statewide average of all non-interstate trunk highways is also displayed for comparison.

Figure 5-1 Interstate Pavement Quality Index (PQI), 1994-2003



The average PQI of the Interstate system decreased for the third straight year and is at its lowest level since 1992.

Figure 5-2 shows that the average PSR on the interstate system decreased sharply in 2003, the second straight year with such a decline. It is now at its lowest level since 1992. From 1994 to 2001, the average PSR on the interstate system was higher than the rest of the system, meaning it was smoother. However, since 2002 it has been virtually the same as the non-interstate routes.

After two years of decline, the average SR of the interstate system remained about the same in 2003 as it was in 2002. This follows the trend of the rest of the system.

Figure 5-2 Interstate Present Serviceability Rating (PSR), 1994-2003

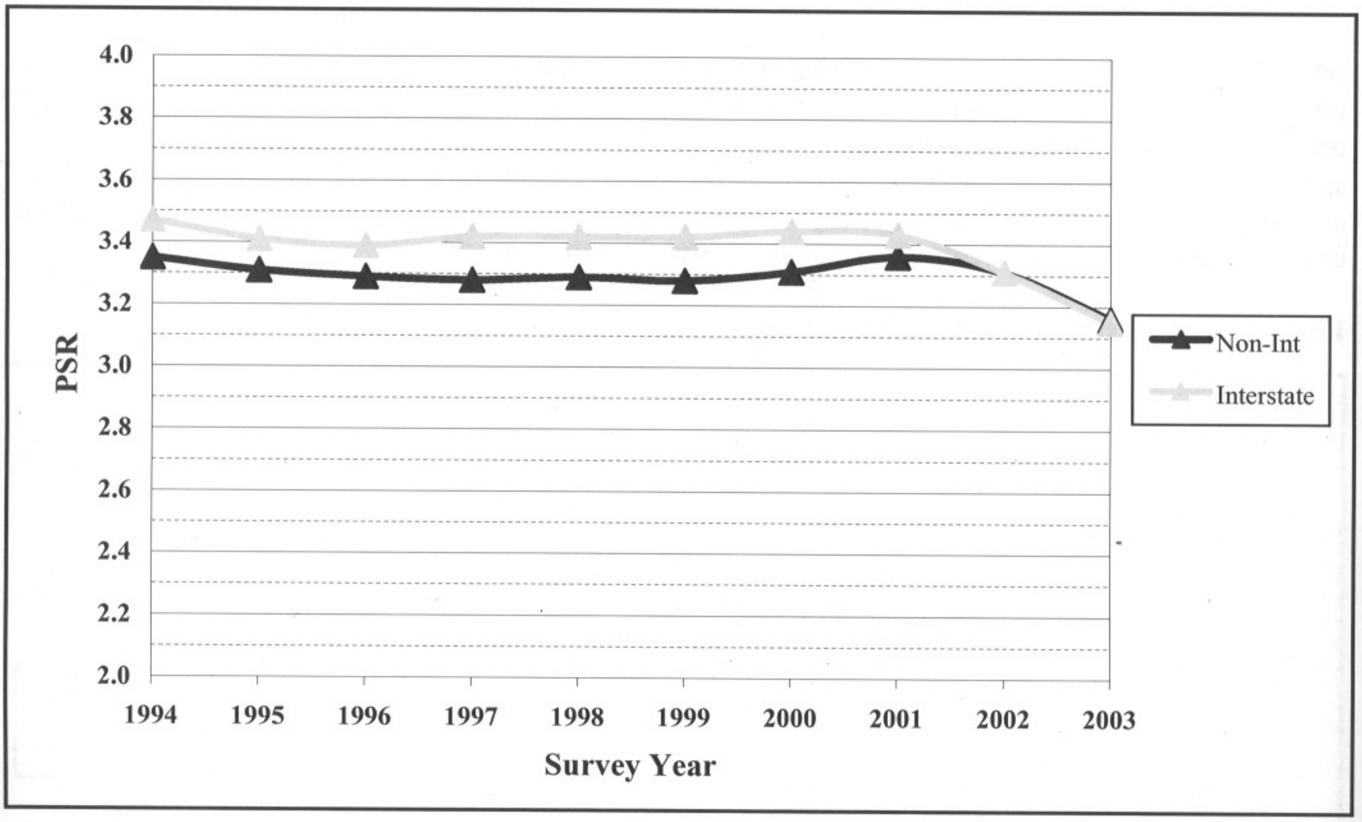
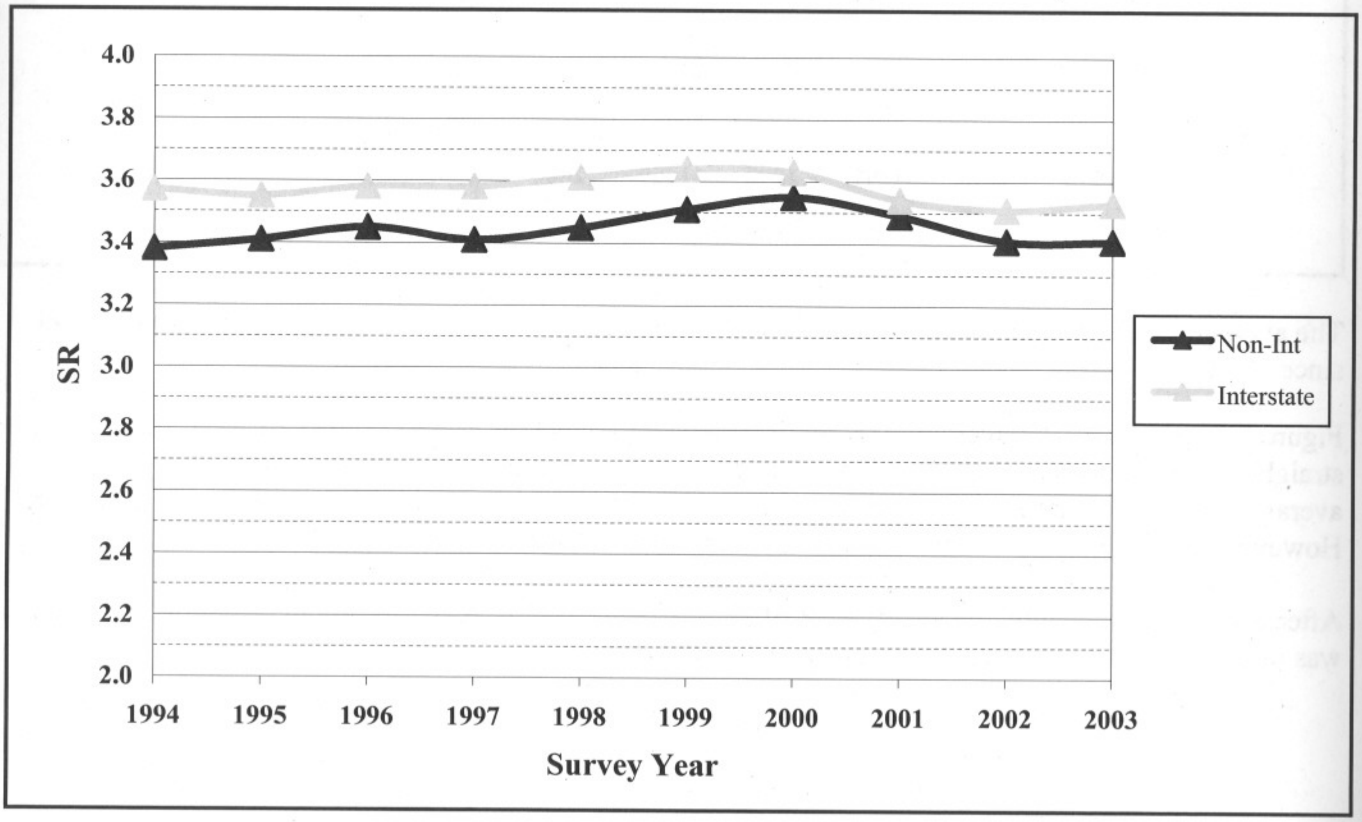


Figure 5-3 Interstate Surface Rating (SR), 1994-2003



Chapter 6 District Historical Trends

To put the current conditions in perspective, it is useful to review historical trends. Figures 6-1 to 6-24 are plots comparing each district with the overall trunk highway system from 1994 through 2003. The statewide average for each year is displayed for comparison. Differences in the relative performance of districts for average index values may be attributable to a higher percentage of high priority functional classes (which have higher trigger values), more severe climatic extremes, or the balance of funds devoted to expansion as contrasted with those allocated to preservation.

Due to the size of the system, the effects of recent actions are relatively difficult to discern regardless of their magnitude. As a result, consistent action or inaction over a long period of time has a profound impact on the current results. To make valid inferences about causal relationships requires that the independent variables be adequately controlled and the data be evaluated over a long enough period of time.

Observations

Pavement Quality Rating (PQI), Figures 6-1 to 6-8

The average PQI of D-8 and Metro remained virtually the same as in 2002 while the rest of the districts decreased.

D-2, D-6 and Metro are the only districts below the statewide average PQI in 2003. While D-2 and Metro are only slightly below the statewide average, D-6 is considerably below, for the third straight year.

Present Serviceability Rating (PSR), Figures 6-9 to 6-16

The average PSR decreased in every district in 2003. District 4 decreased the most (8.1%) followed by D-2 (7.4%), D-1 (5.8%), D-7 (5.1%) and D-3 (3.9%). District 6, 8 and Metro changed the least, 1.3%, 1.8% and 1.3% respectively. D-1's average PSR fell for the first time since 1998.

The 2003 average PSR in D-2, D-6, and Metro are below the statewide average. D-1, D-3, D-4 and D-8 are slightly above the statewide average while D-7 is at the average. Only D-6 is appreciably different from the statewide average PSR one way or the other.

Surface Rating (SR), Figures 6-17 to 6-24

The 2003 average SR in D-3, D-4, D-6 and D-8 was virtually the same as in 2002. D-2, D-7 and Metro had slight increases. Only D-1 had a noticeable decline in average SR in 2003.

The 2003 average SR in D-2 and D-6 are below the statewide average. While D-2 is only slightly below the average, D-6 is significantly below (6.7%). This is the fourth consecutive year that D-6 has had an average SR below the statewide average, the third year in a row that it has been significant.

Figure 6-1 District 1 Pavement Quality Index (PQI), 1994-2003

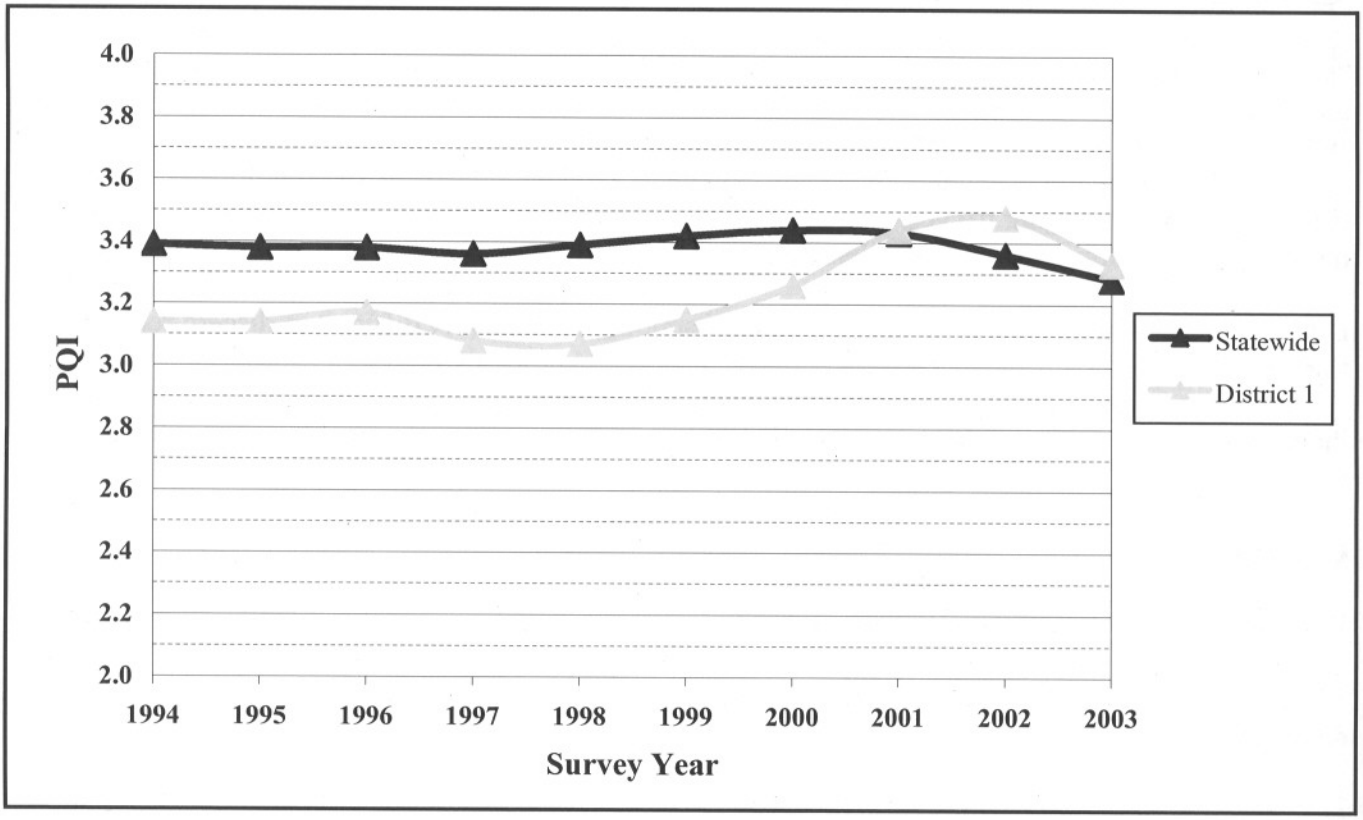


Figure 6-2 District 2 Pavement Quality Index (PQI), 1994-2003

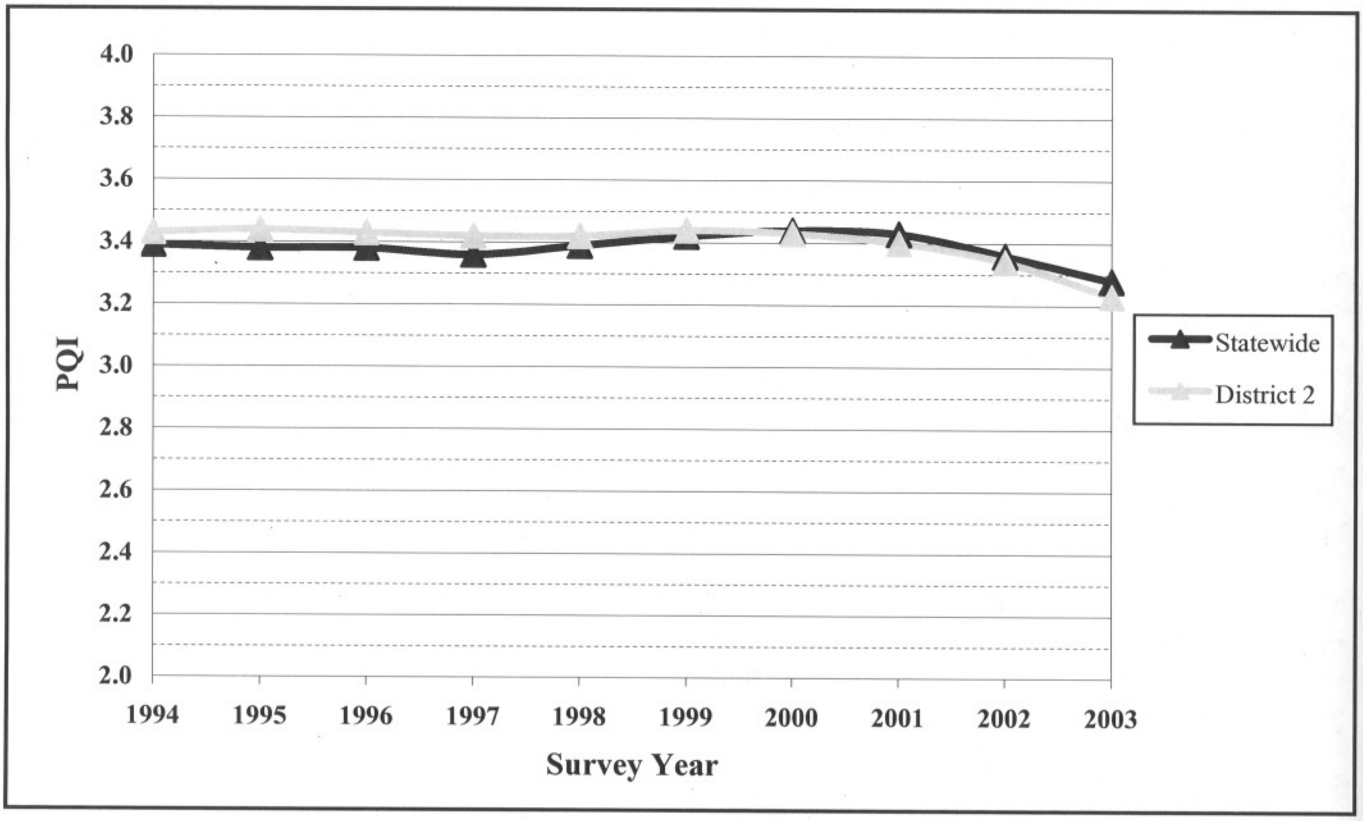


Figure 6-3 District 3 Pavement Quality Index (PQI), 1994-2003

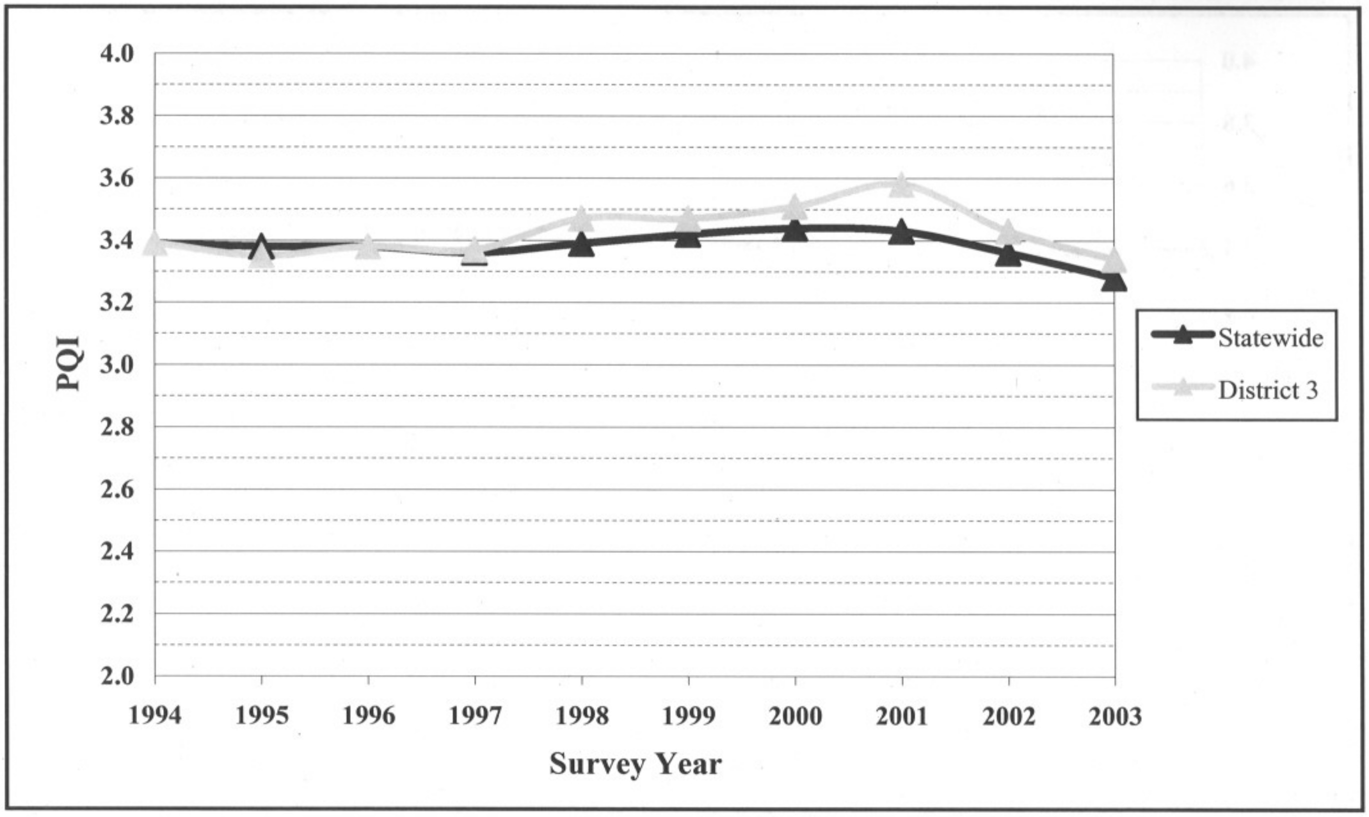


Figure 6-4 District 4 Pavement Quality Index (PQI), 1994-2003

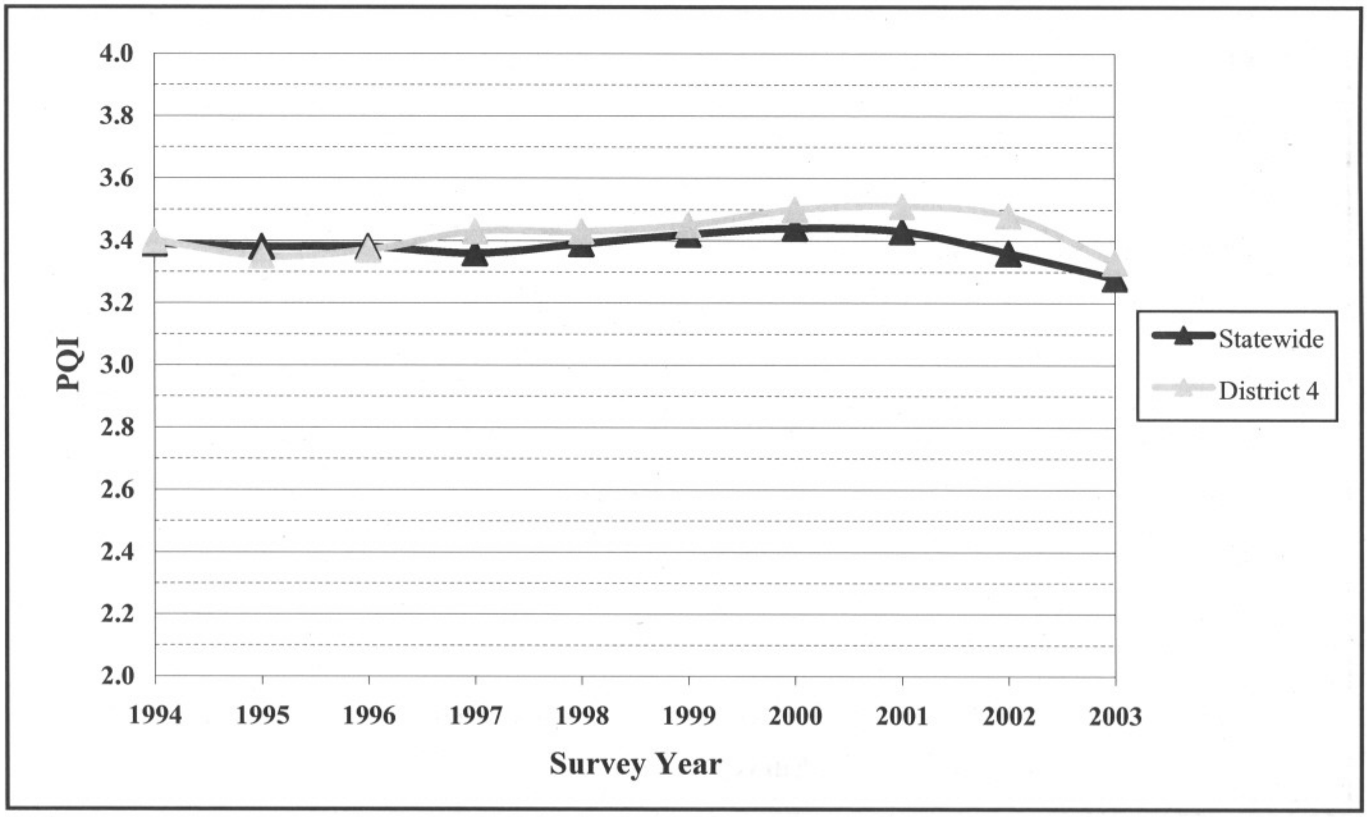


Figure 6-5 District 6 Pavement Quality Index (PQI), 1994-2003

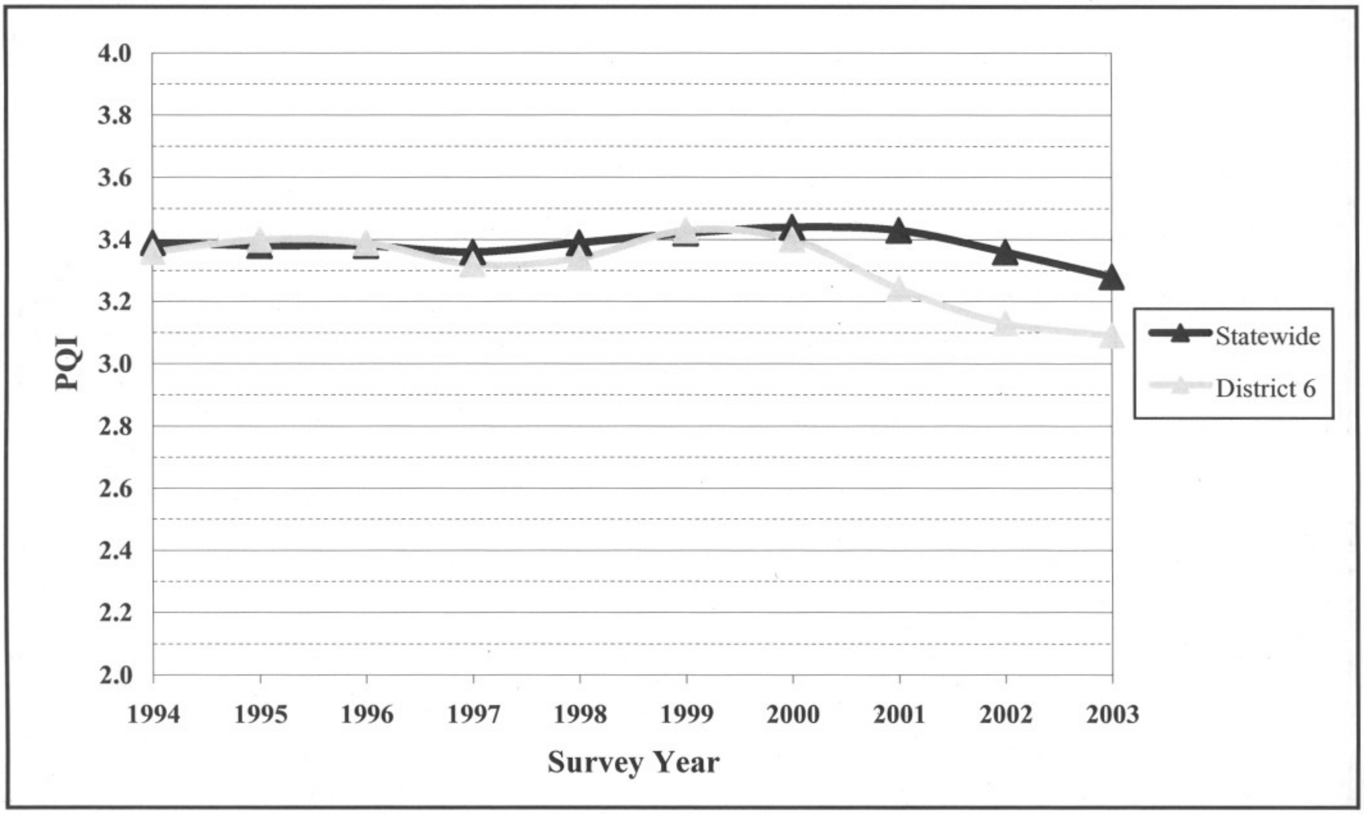


Figure 6-6 District 7 Pavement Quality Index (PQI), 1994-2003

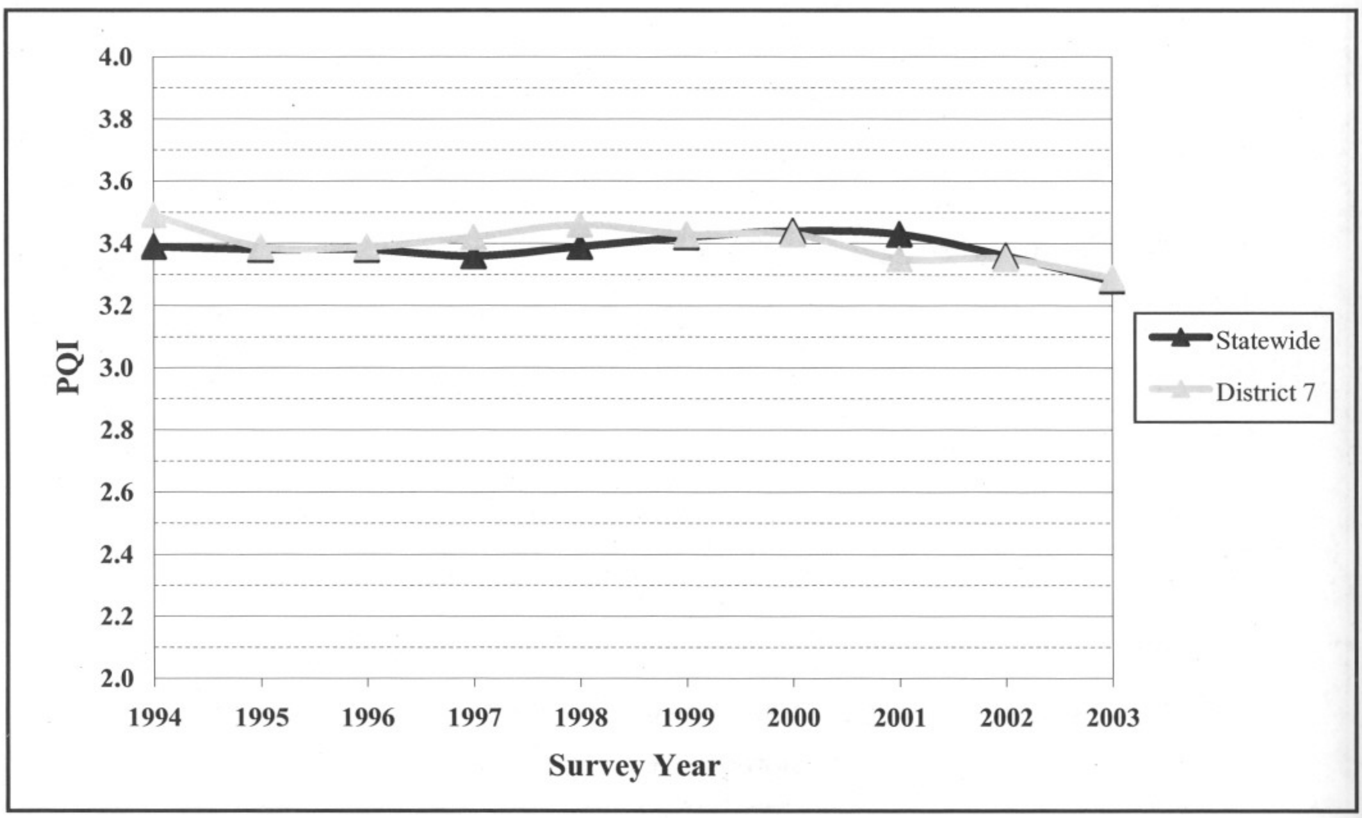


Figure 6-7 District 8 Pavement Quality Index (PQI), 1994-2003

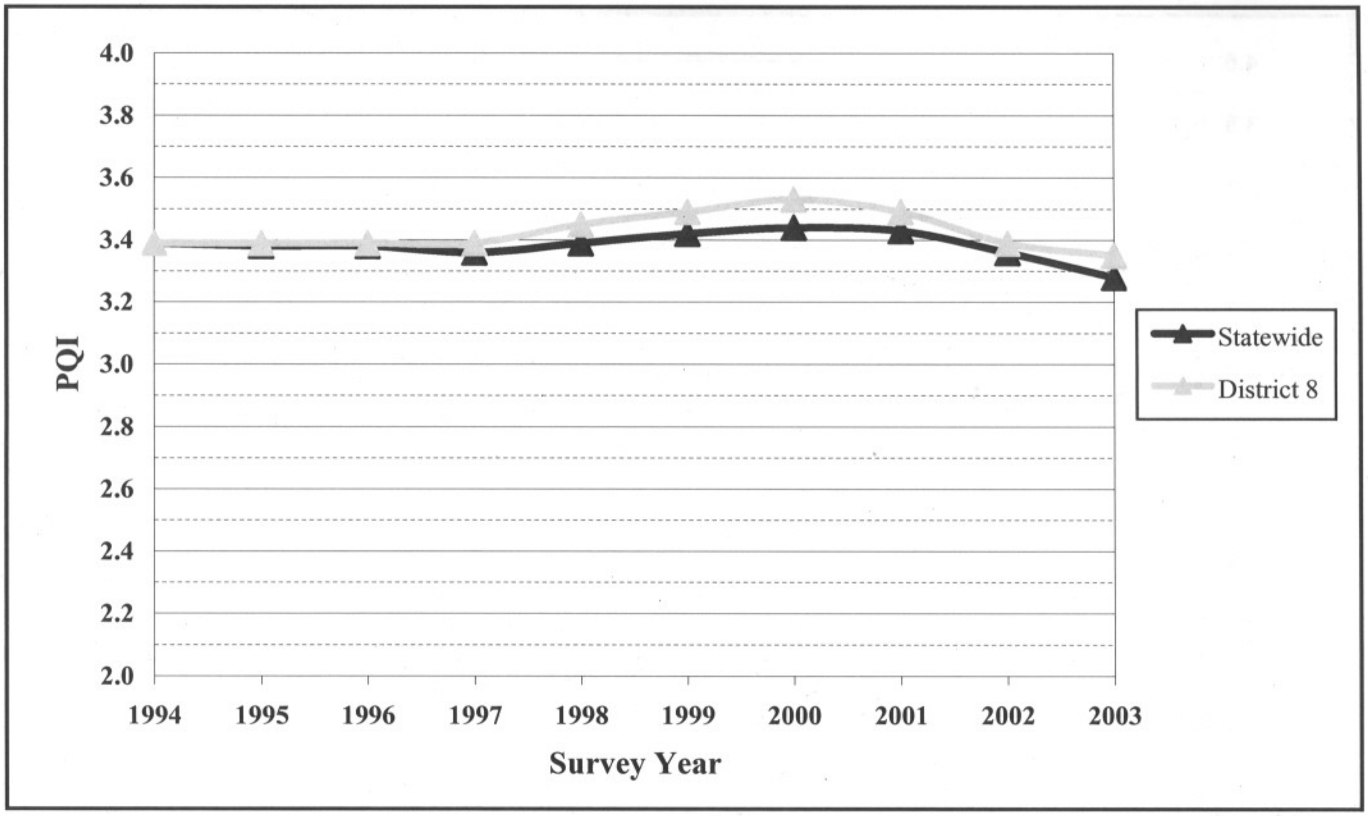


Figure 6-8 Metro Pavement Quality Index (PQI), 1994-2003

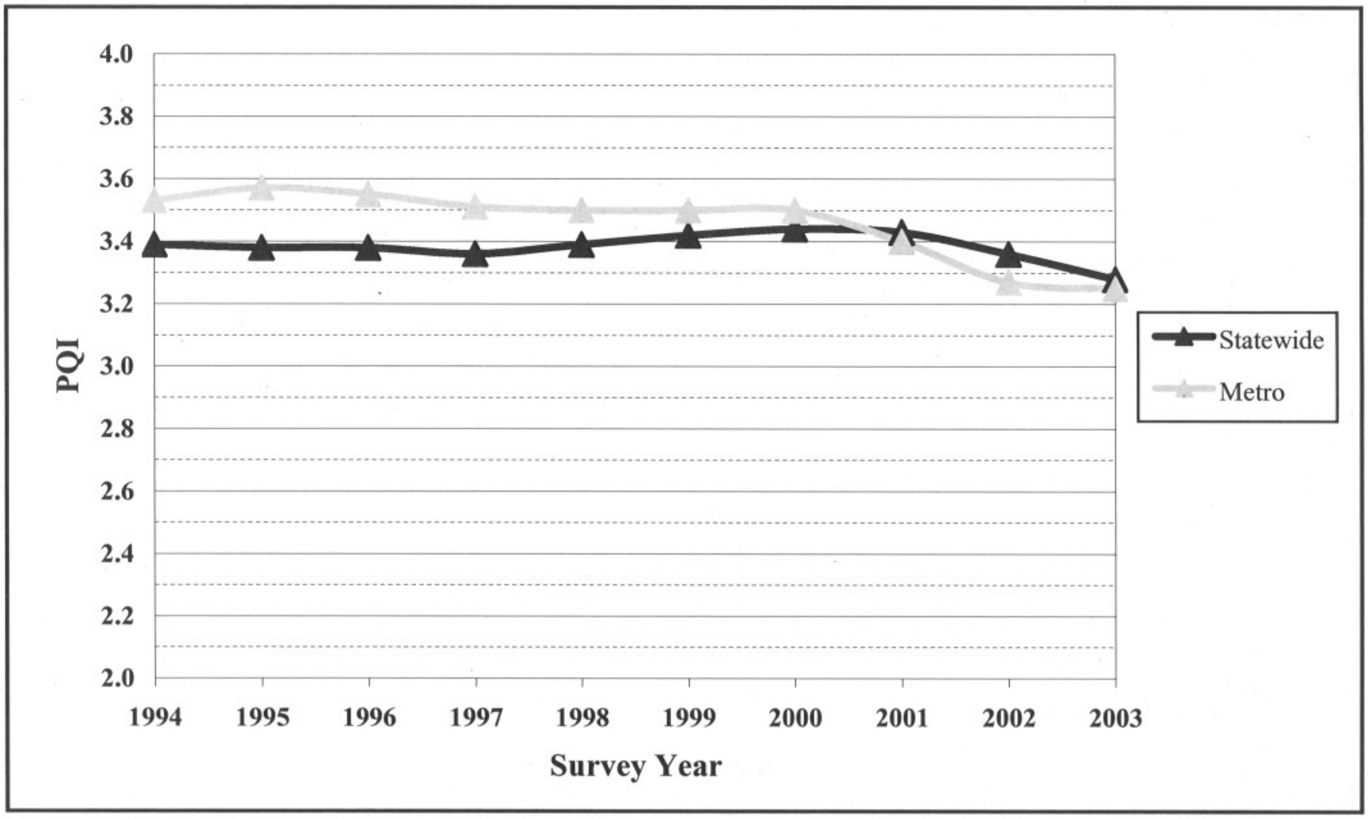


Figure 6-9 District 1 Present Serviceability Rating (PSR), 1994-2003

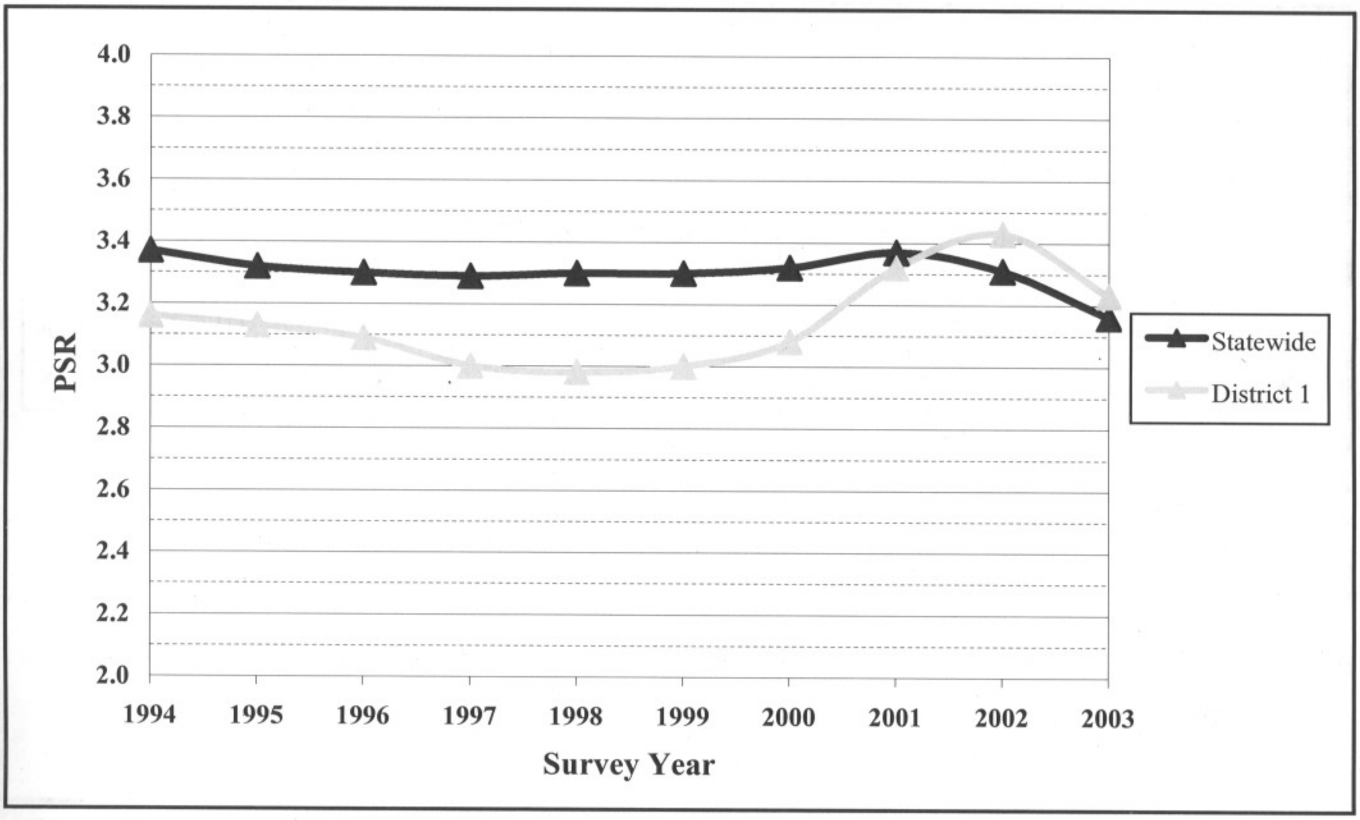


Figure 6-10 District 2 Present Serviceability Rating (PSR), 1994-2003

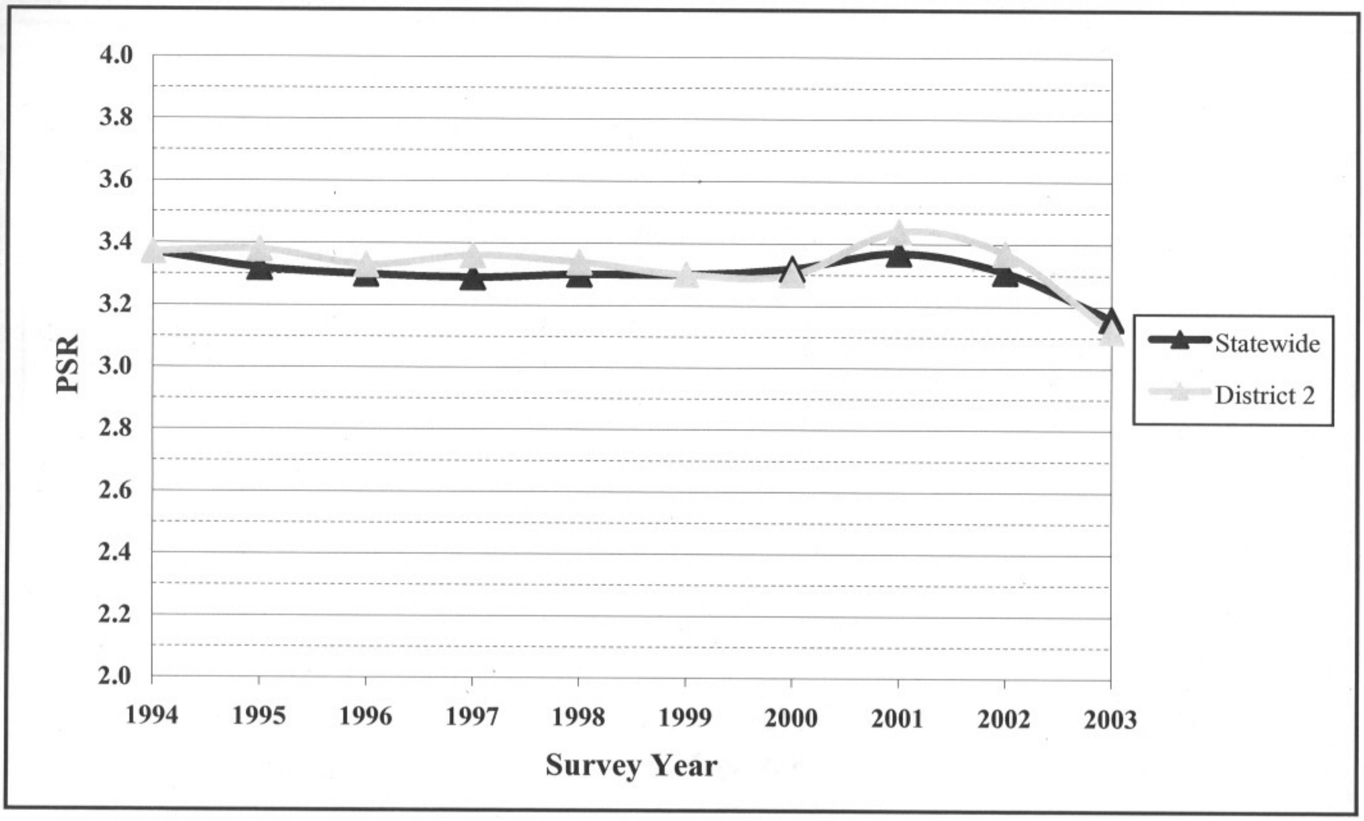


Figure 6-11 District 3 Present Serviceability Rating (PSR), 1994-2003

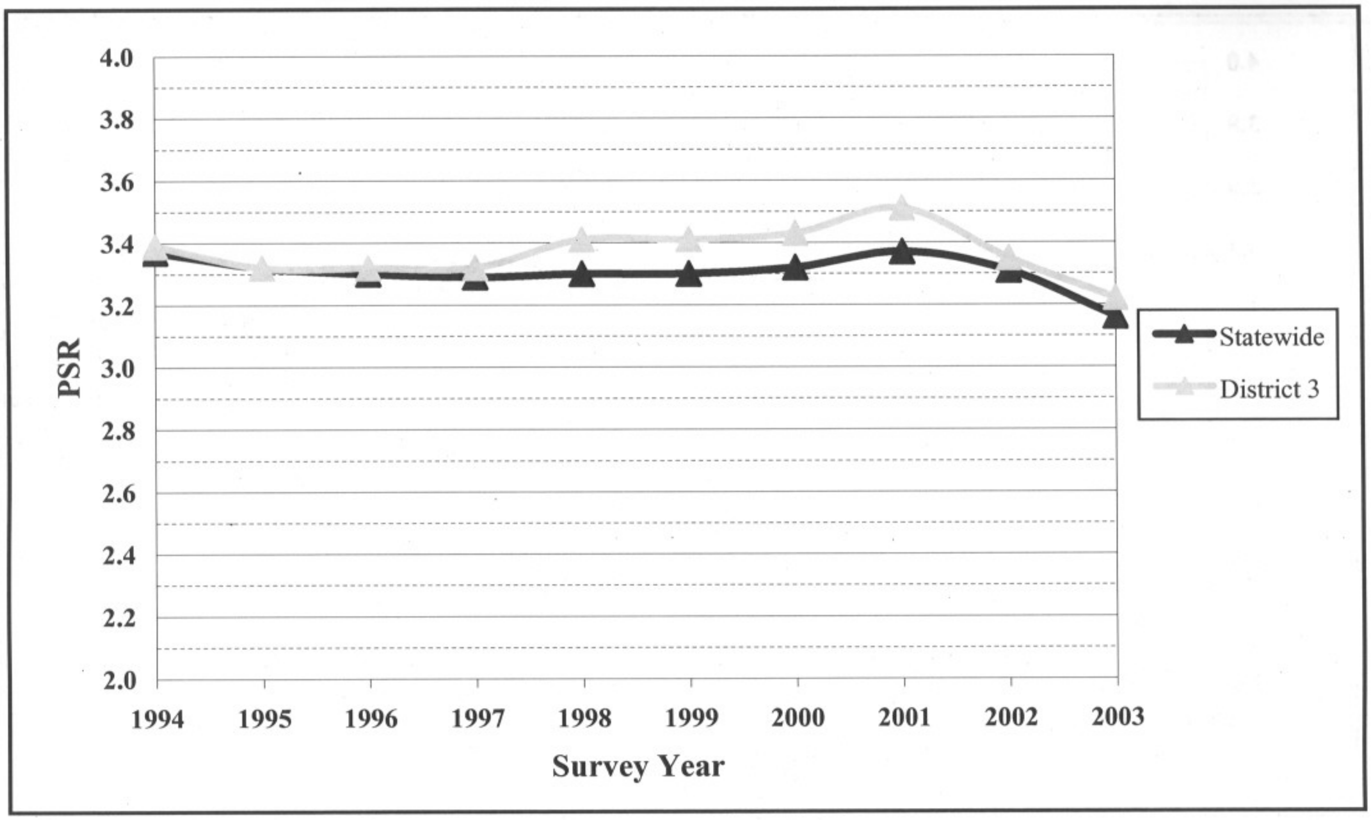


Figure 6-12 District 4 Present Serviceability Rating (PSR), 1994-2003

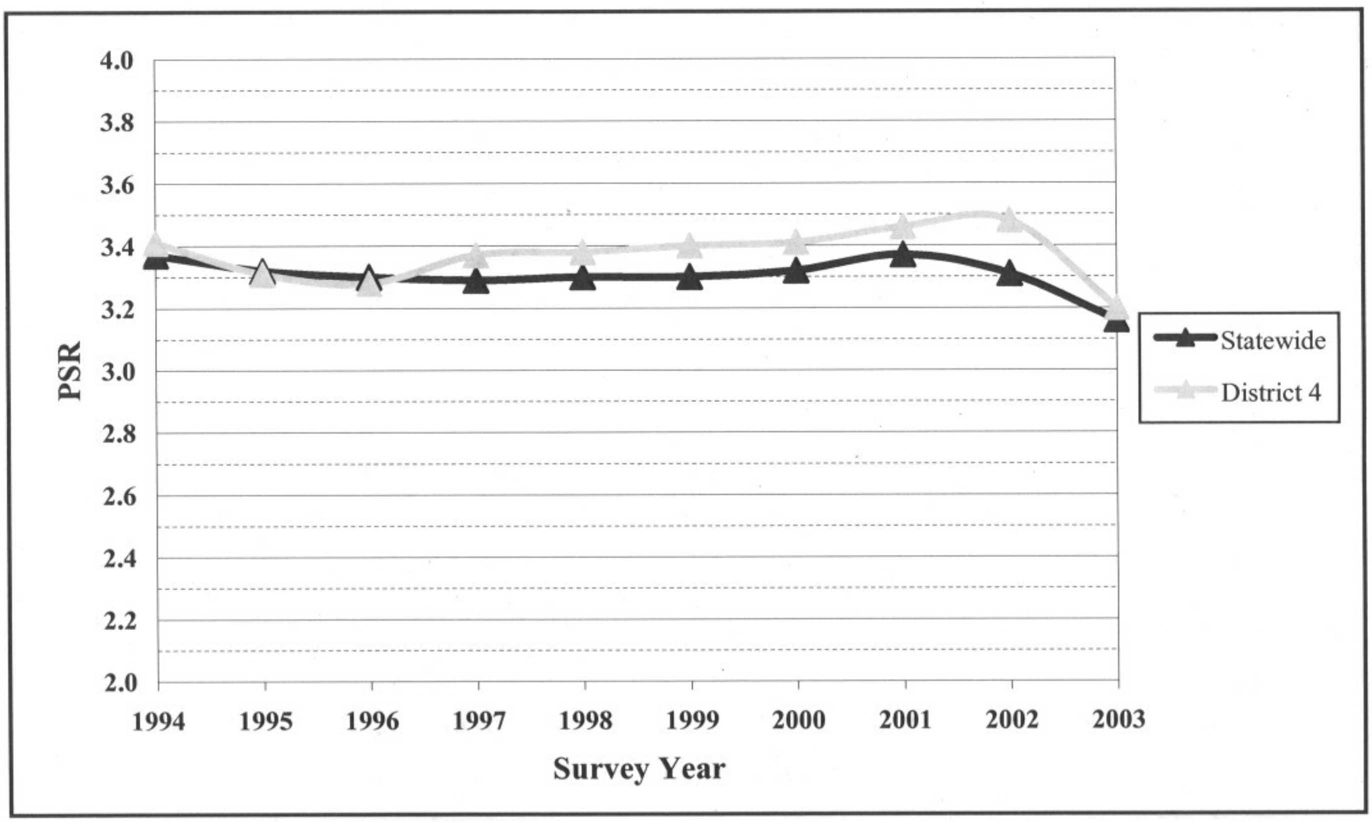


Figure 6-13 District 6 Present Serviceability Rating (PSR), 1994-2003

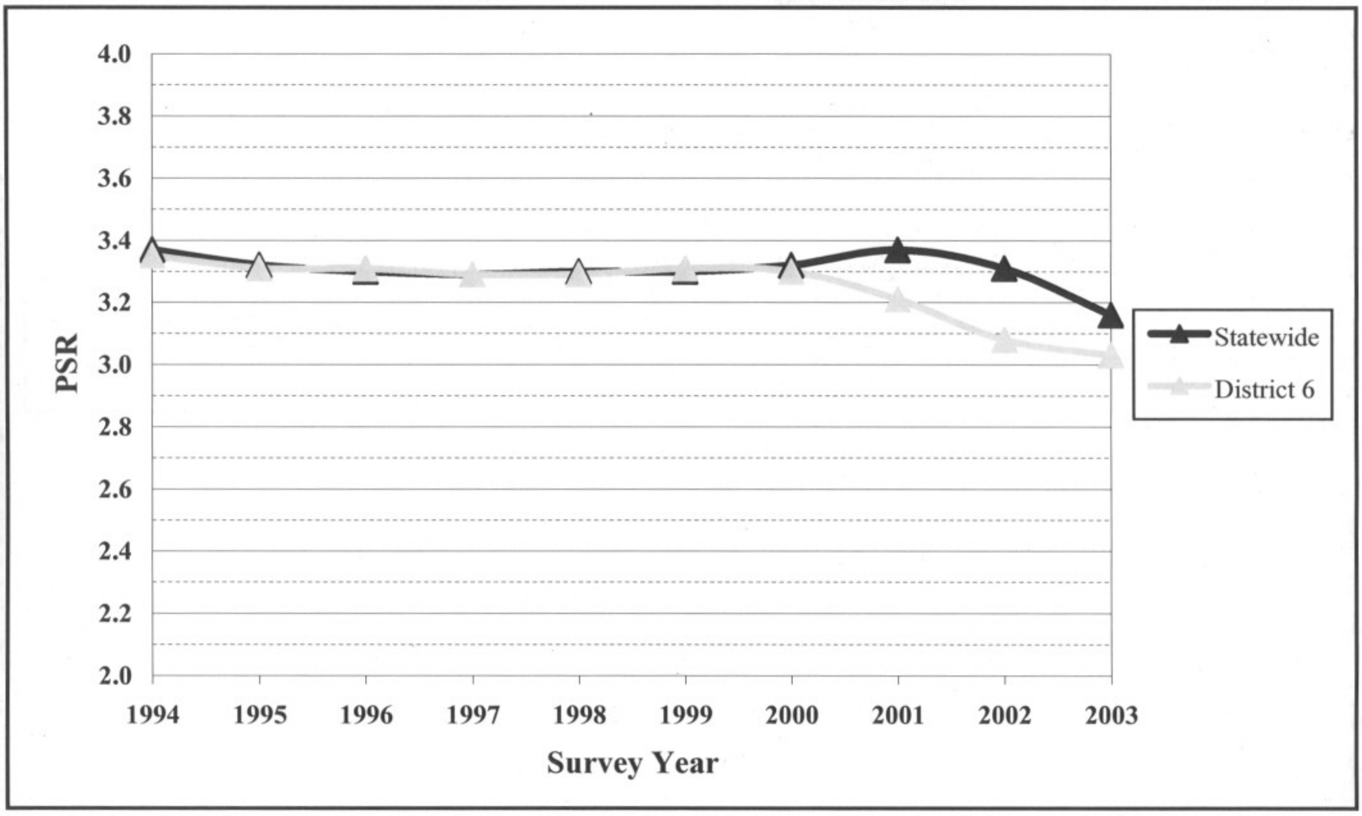


Figure 6-14 District 7 Present Serviceability Rating (PSR), 1994-2003

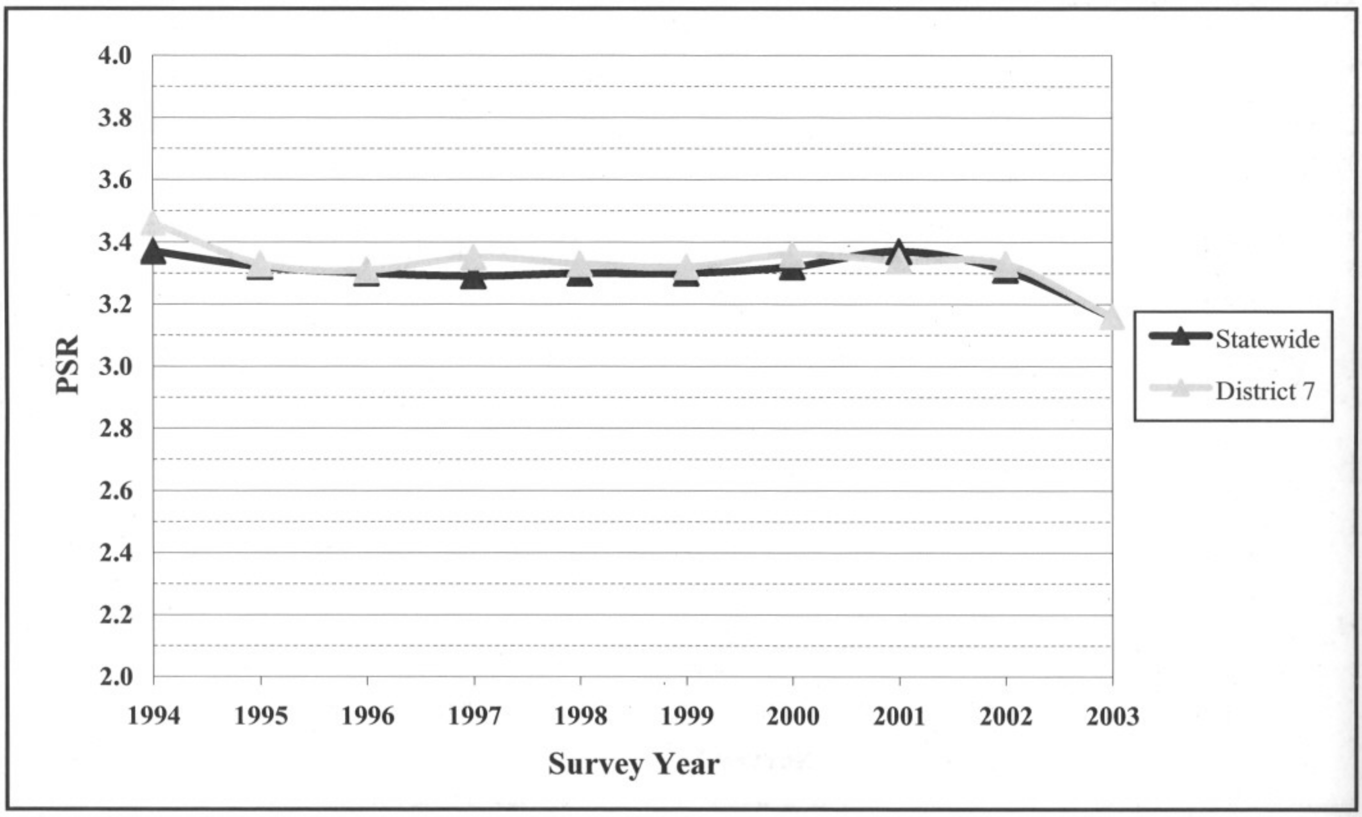


Figure 6-15 District 8 Present Serviceability Rating (PSR), 1994-2003

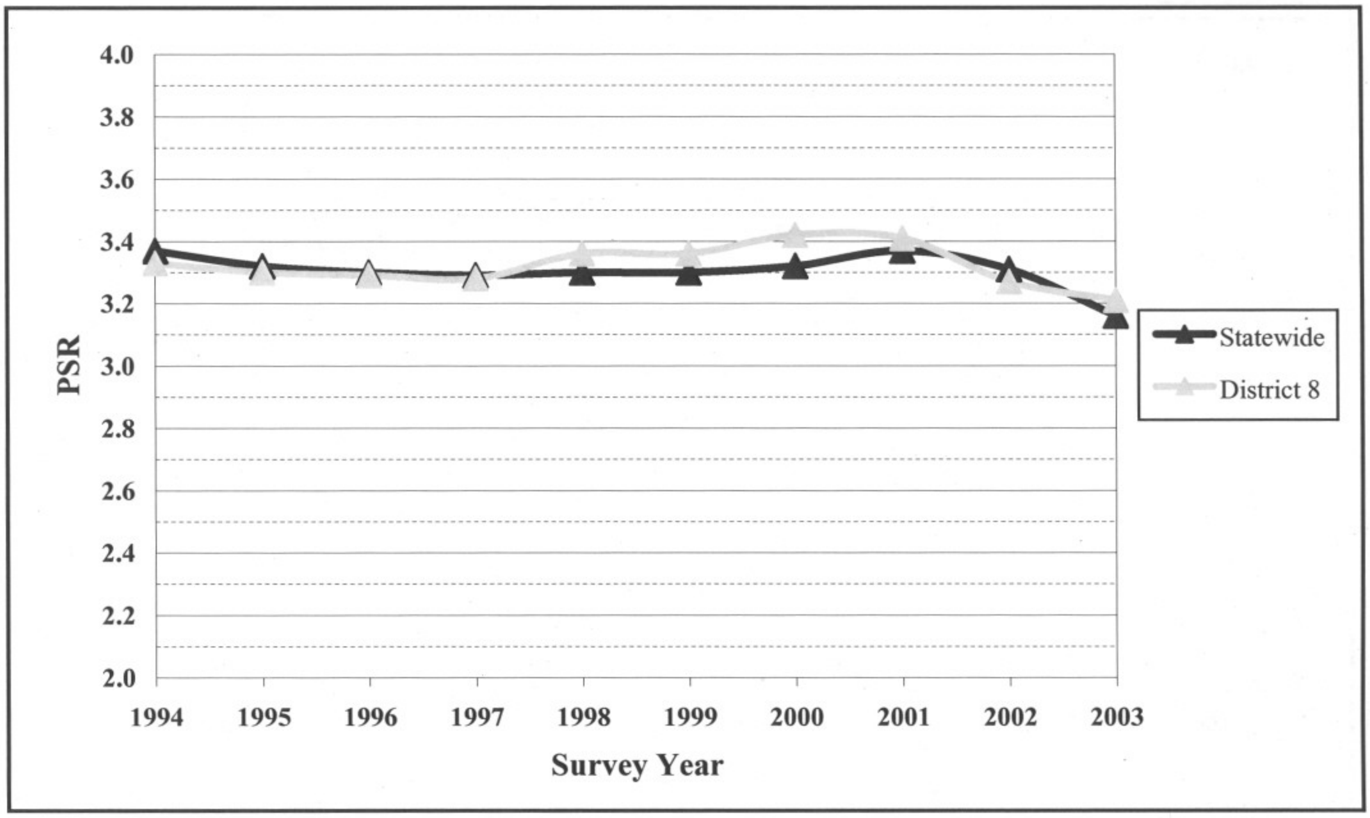


Figure 6-16 Metro Present Serviceability Rating (PSR), 1994-2003

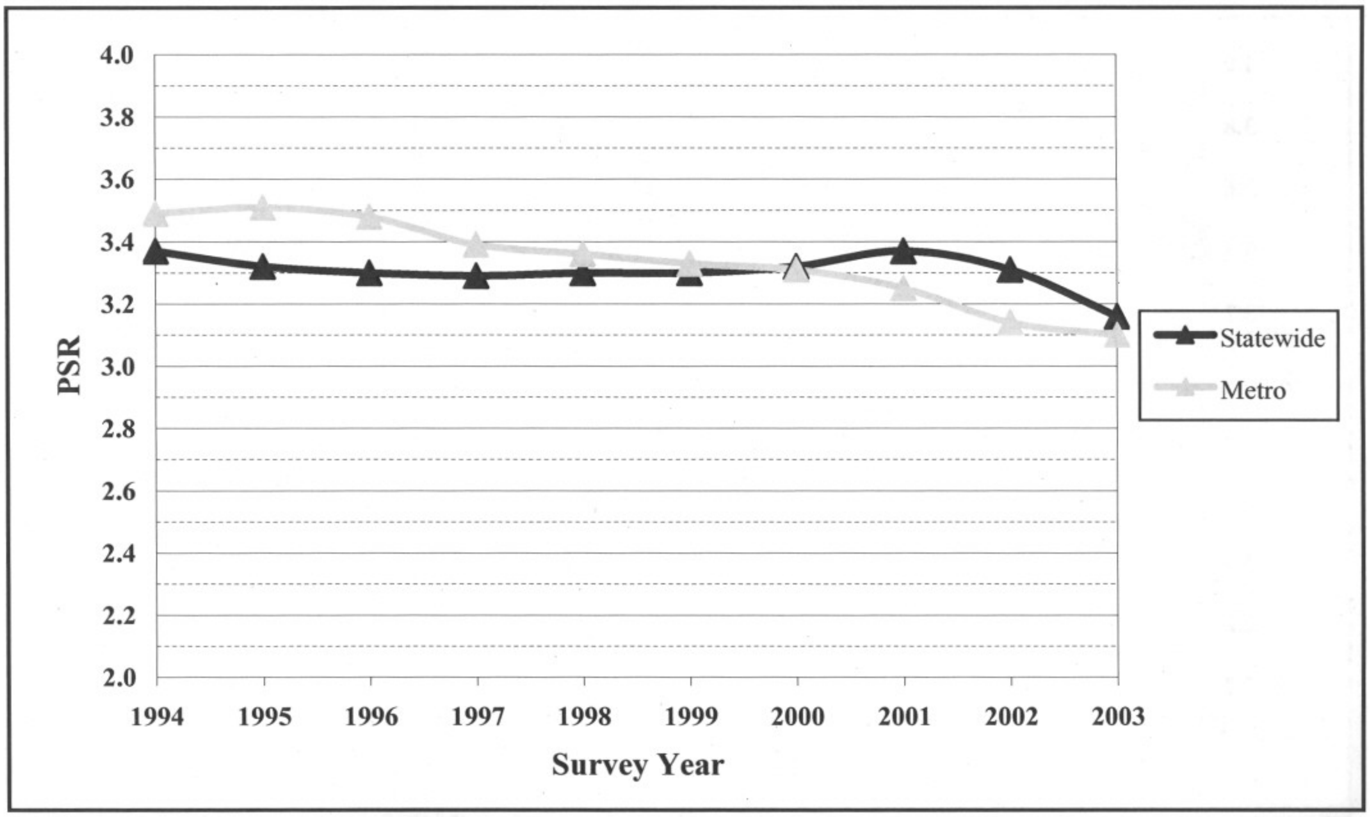


Figure 6-17 District 1 Surface Rating (SR), 1994-2003

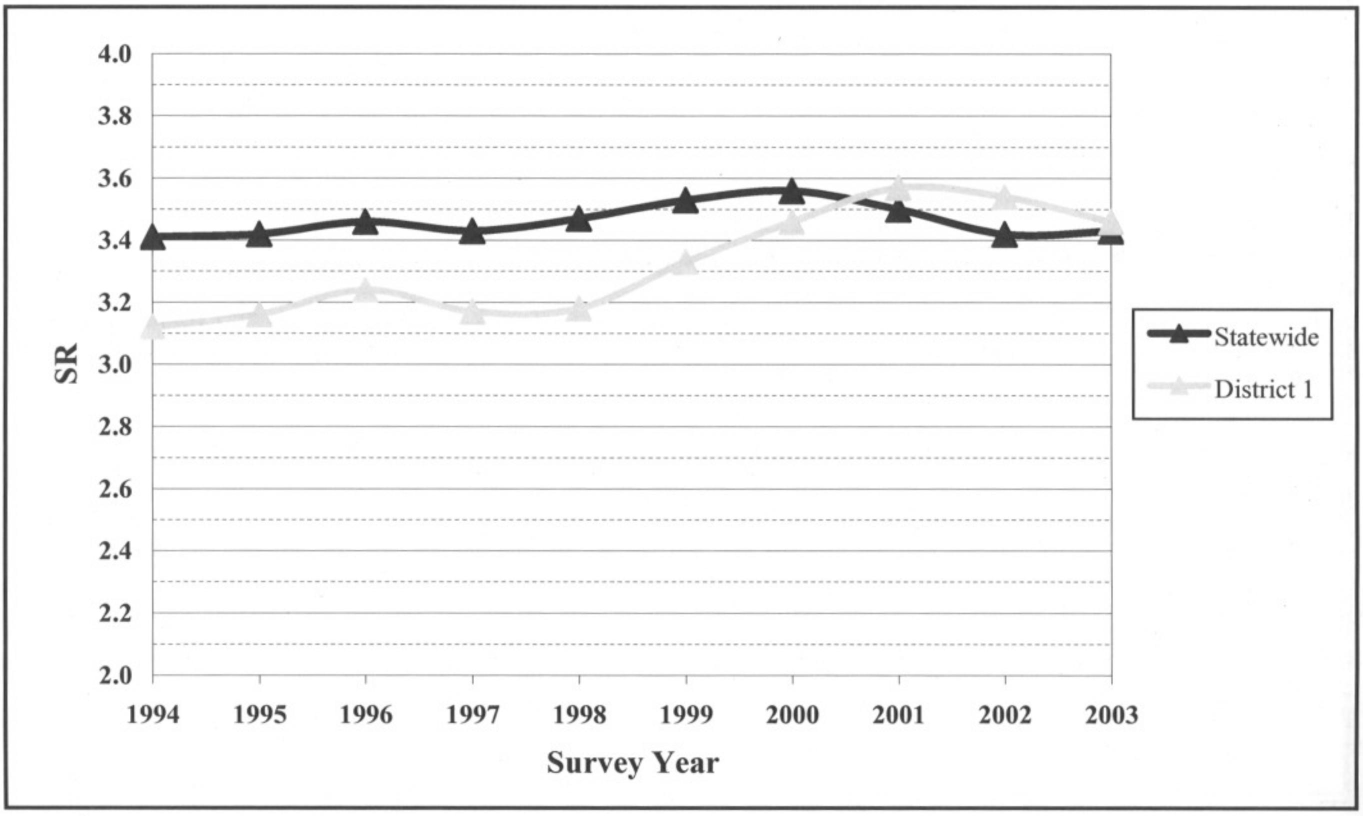


Figure 6-18 District 2 Surface Rating (SR), 1994-2003

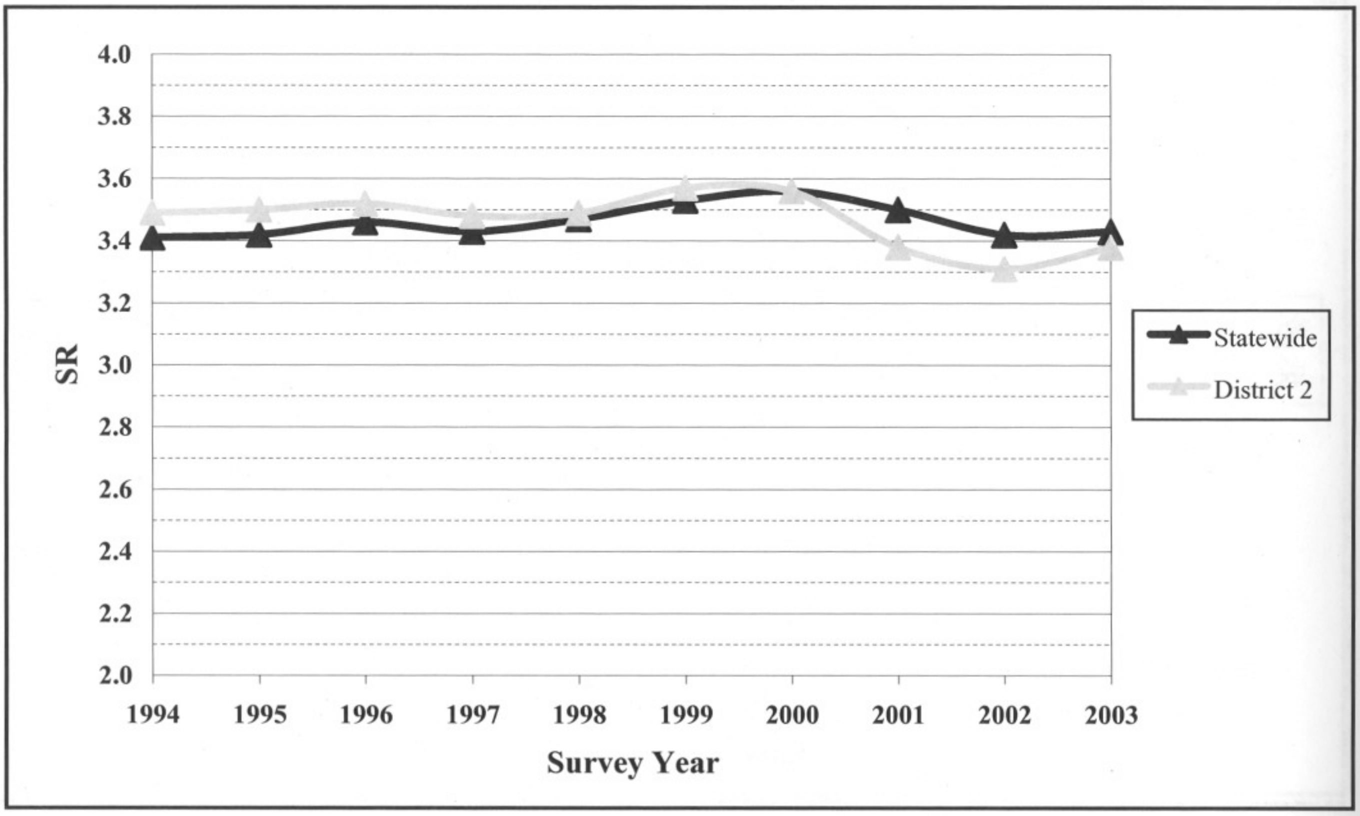


Figure 6-19 District 3 Surface Rating (SR), 1994-2003

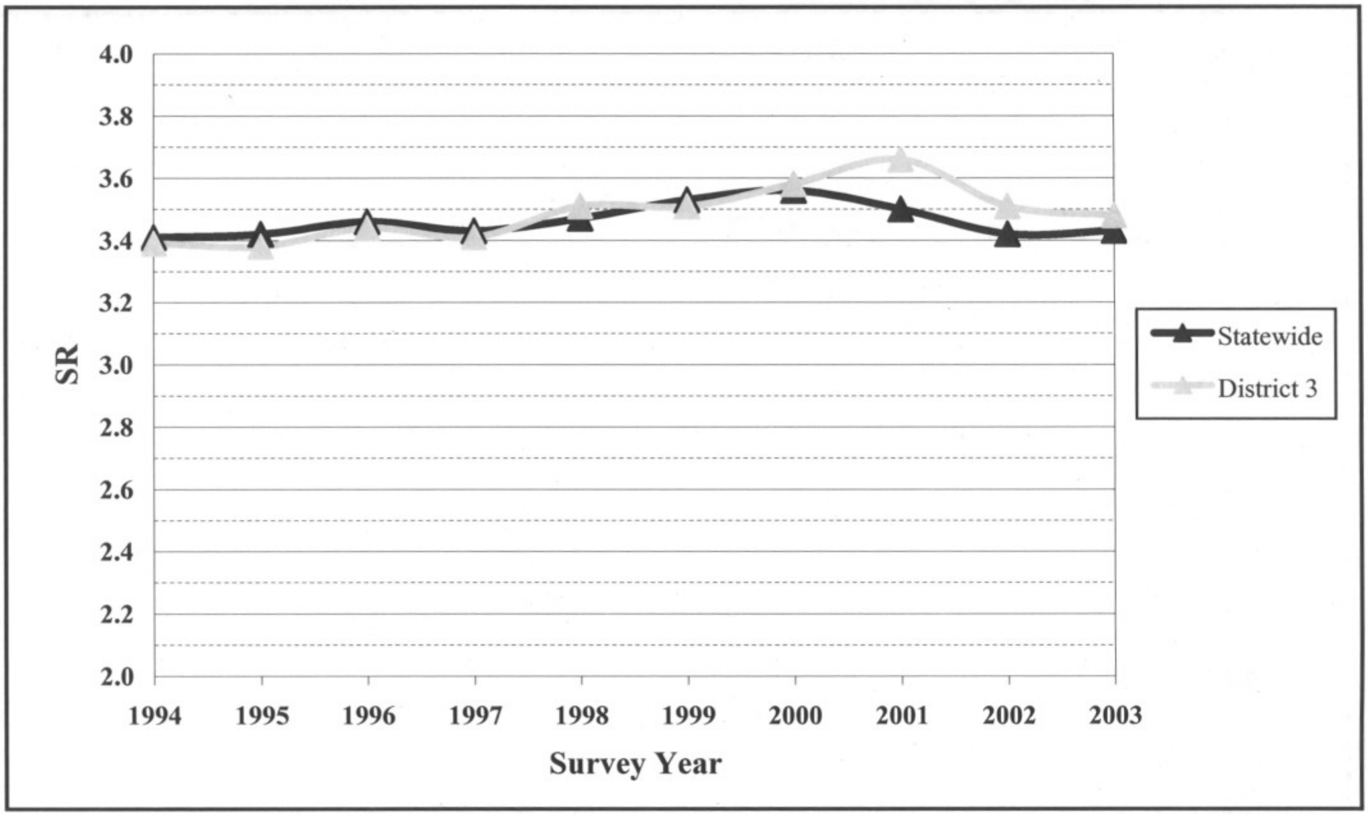


Figure 6-20 District 4 Surface Rating (SR), 1994-2003

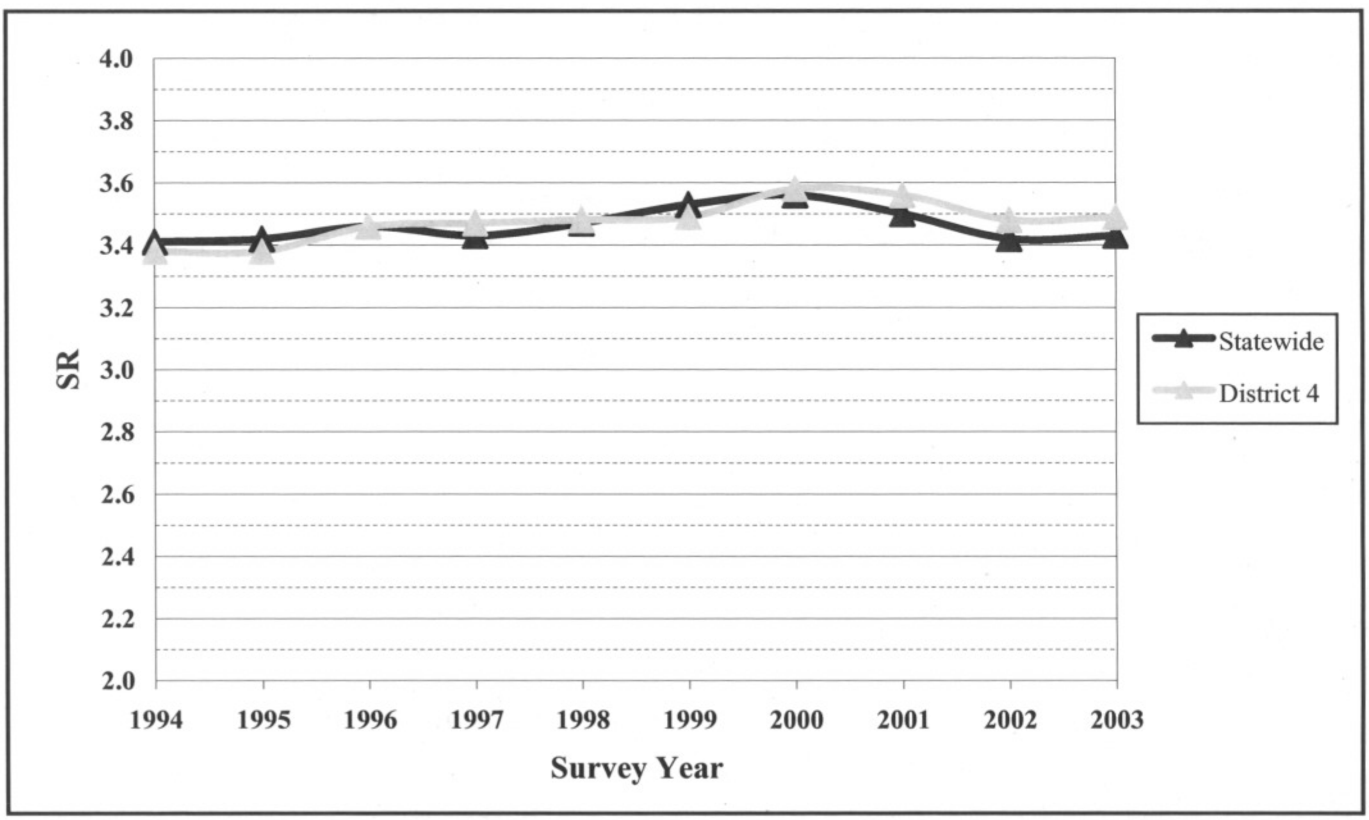


Figure 6-21 District 6 Surface Rating (SR), 1994-2003

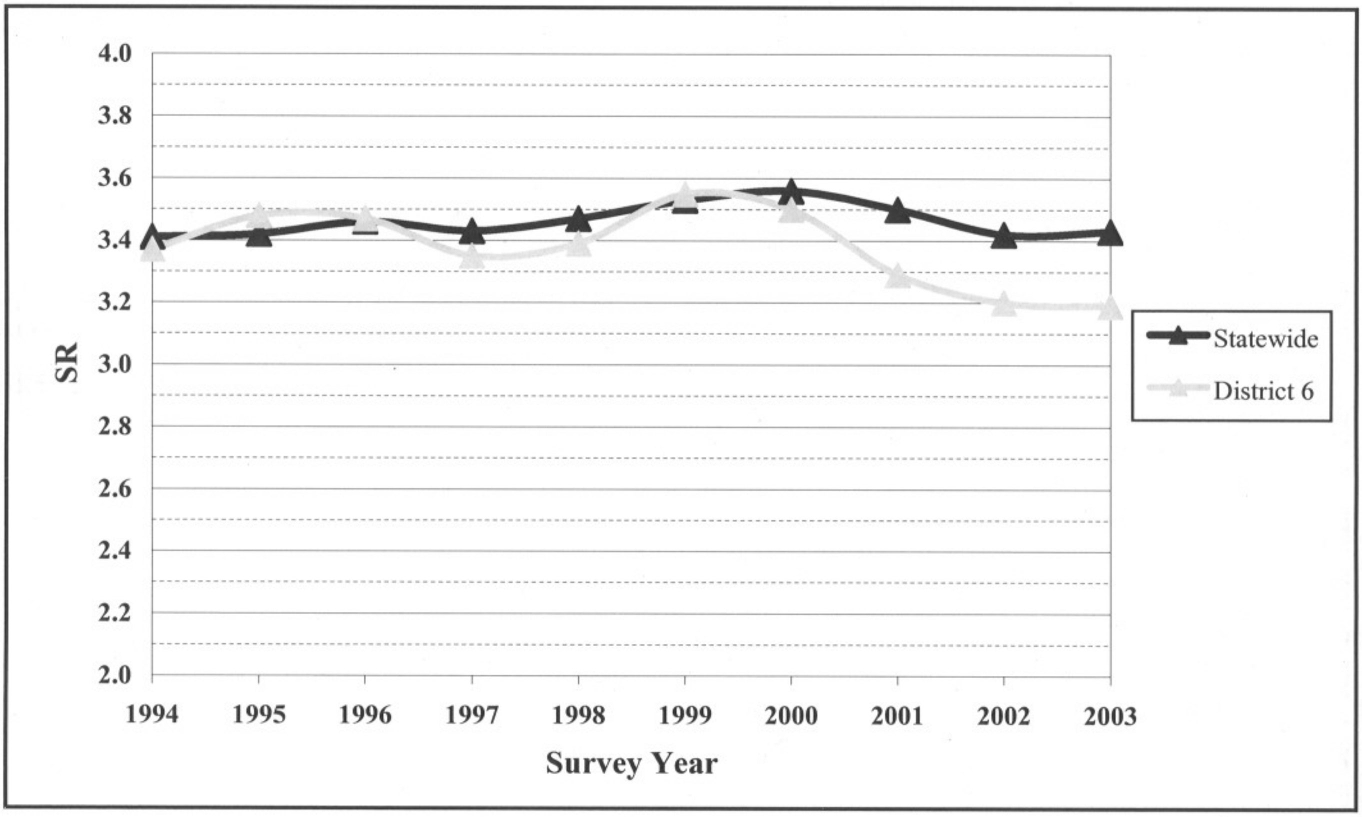


Figure 6-22 District 7 Surface Rating (SR), 1994-2003

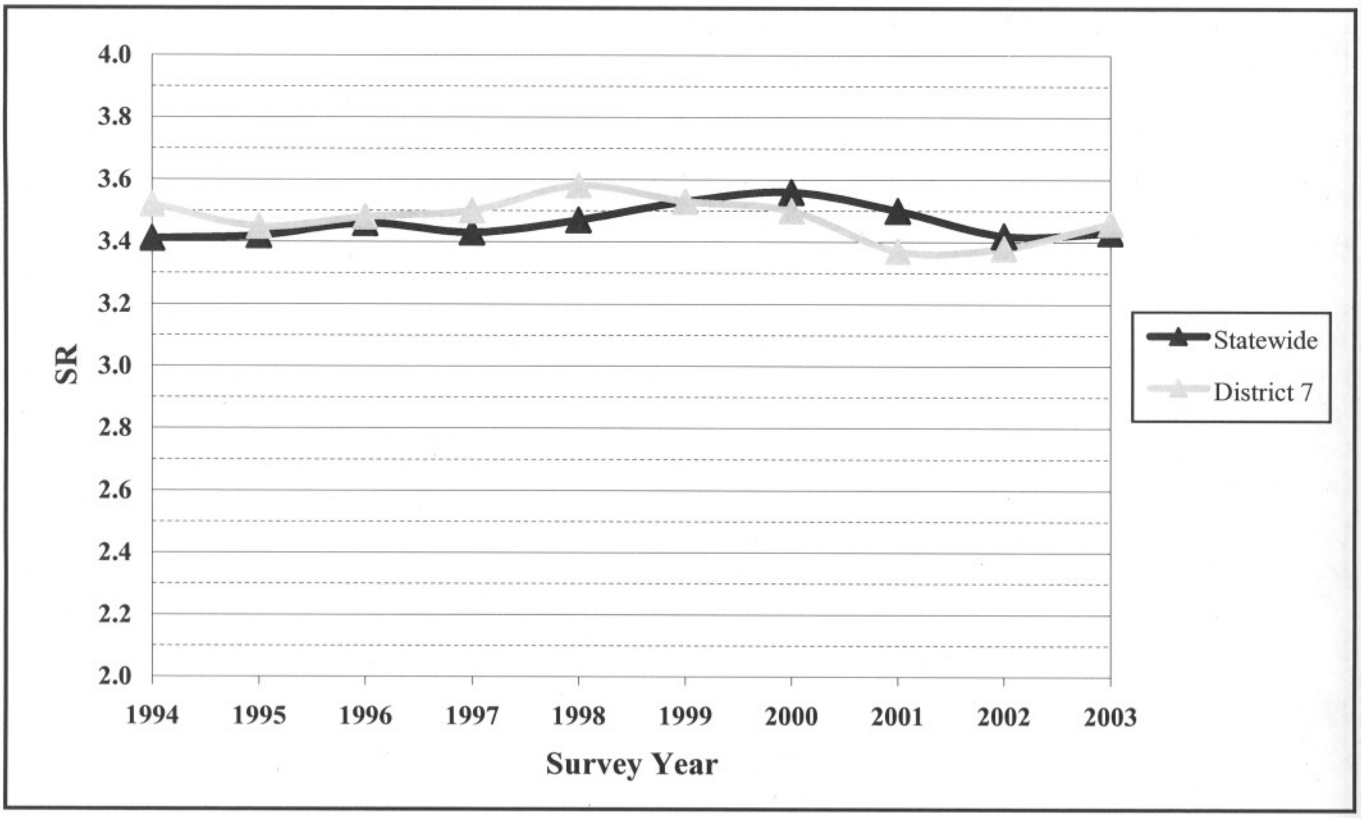


Figure 6-23 District 8 Surface Rating (SR), 1994-2003

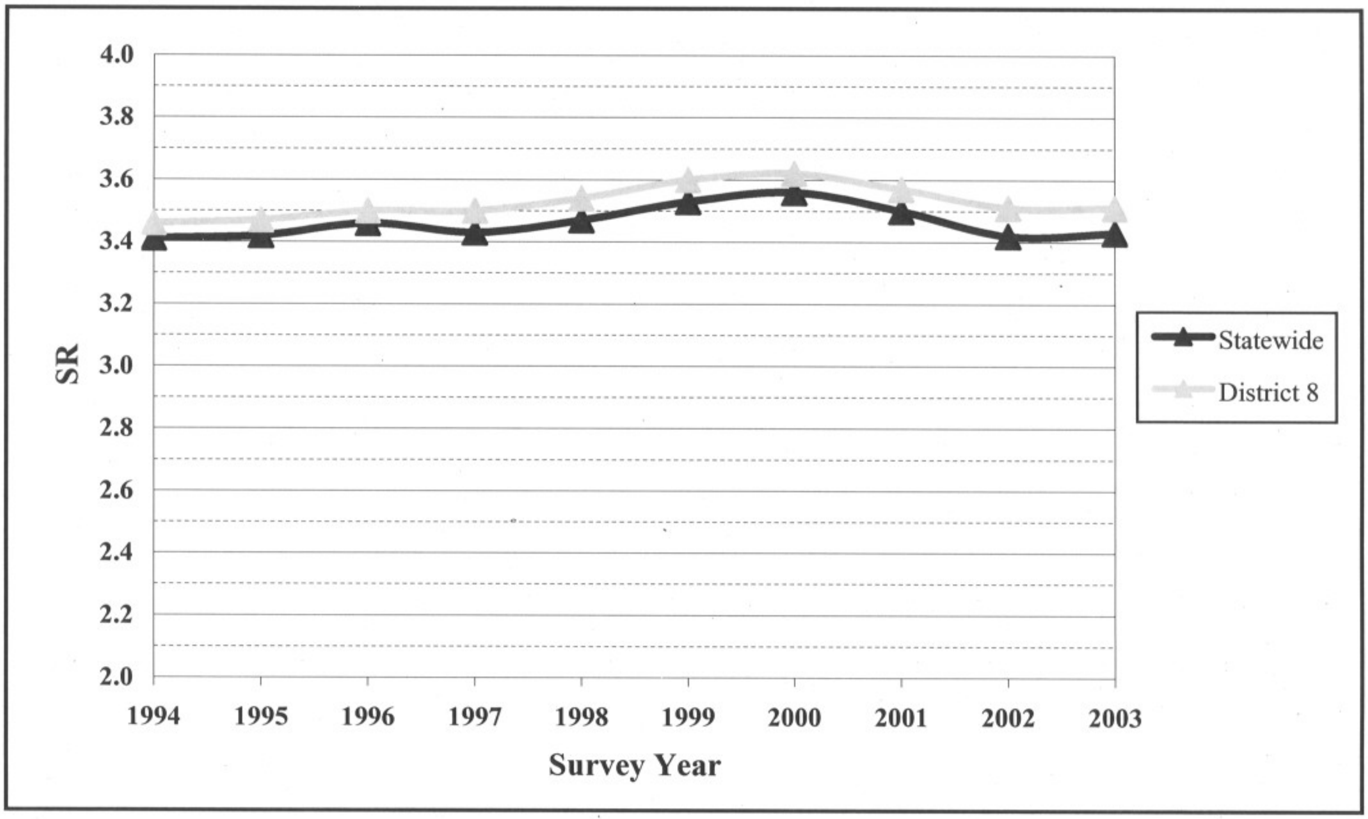
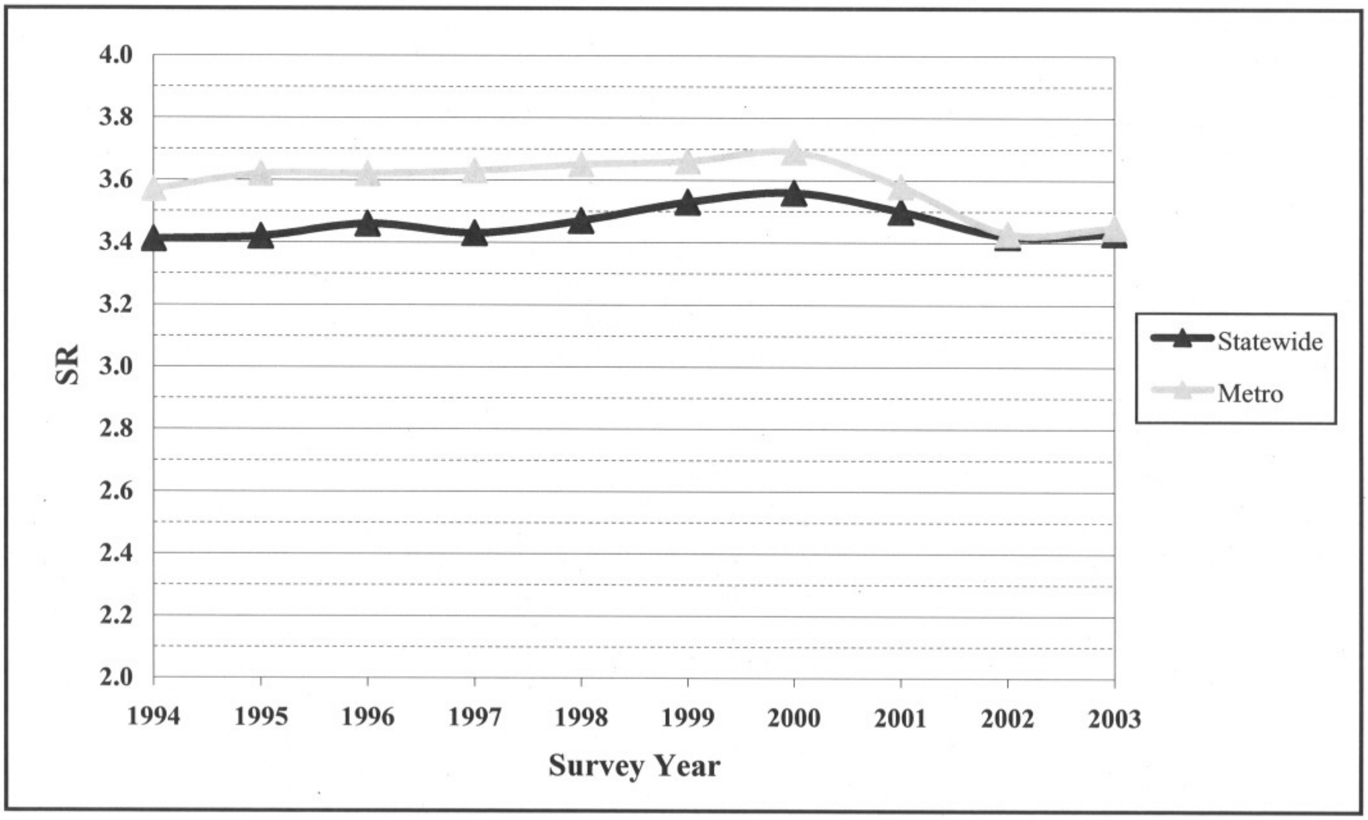


Figure 6-24 Metro Surface Rating (SR), 1994-2003



Office of Materials
Pavement Management Unit
1400 Gervais Avenue, Mail Stop 645
Maplewood, MN 55109

(651) 779-5567