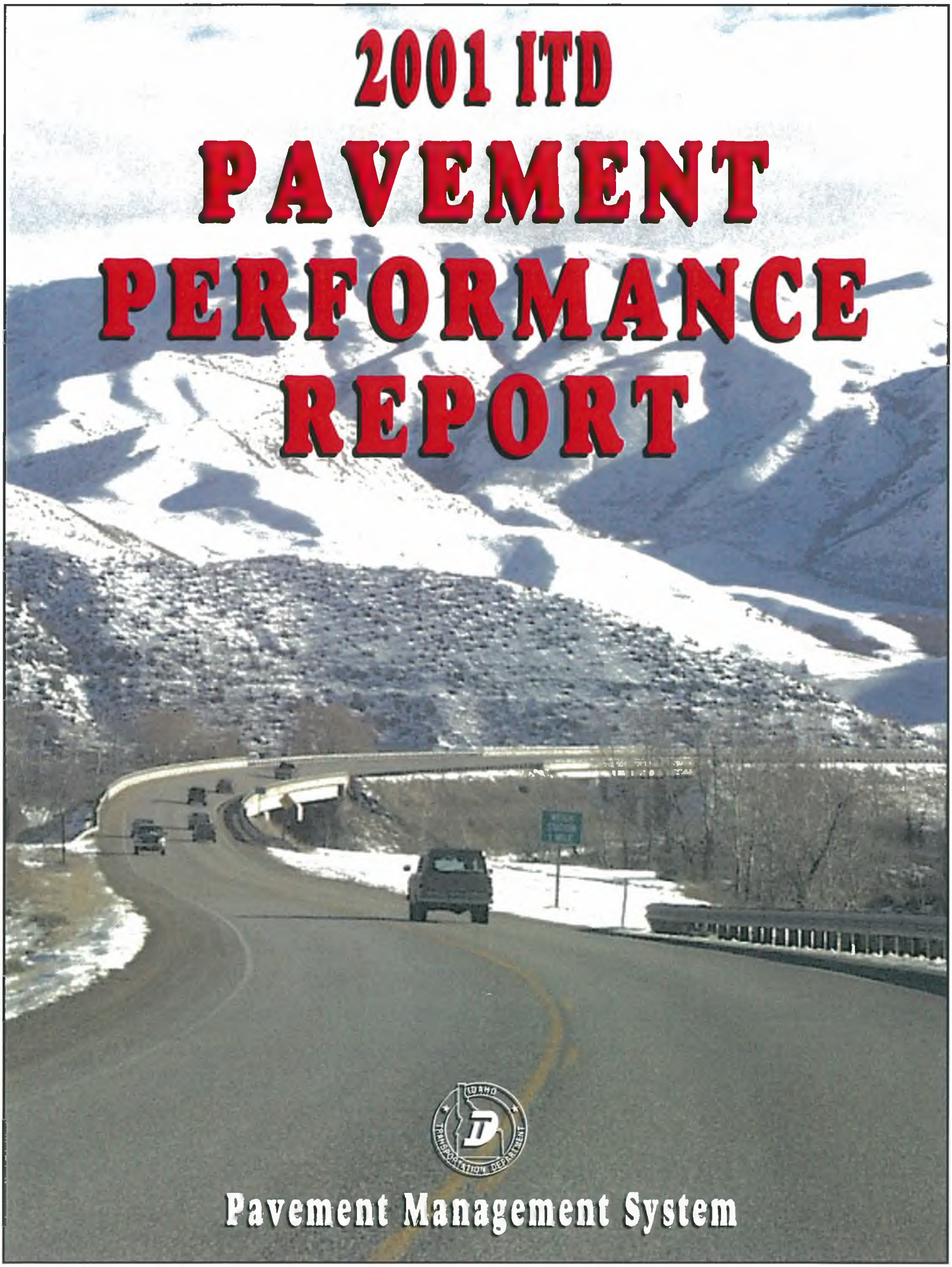
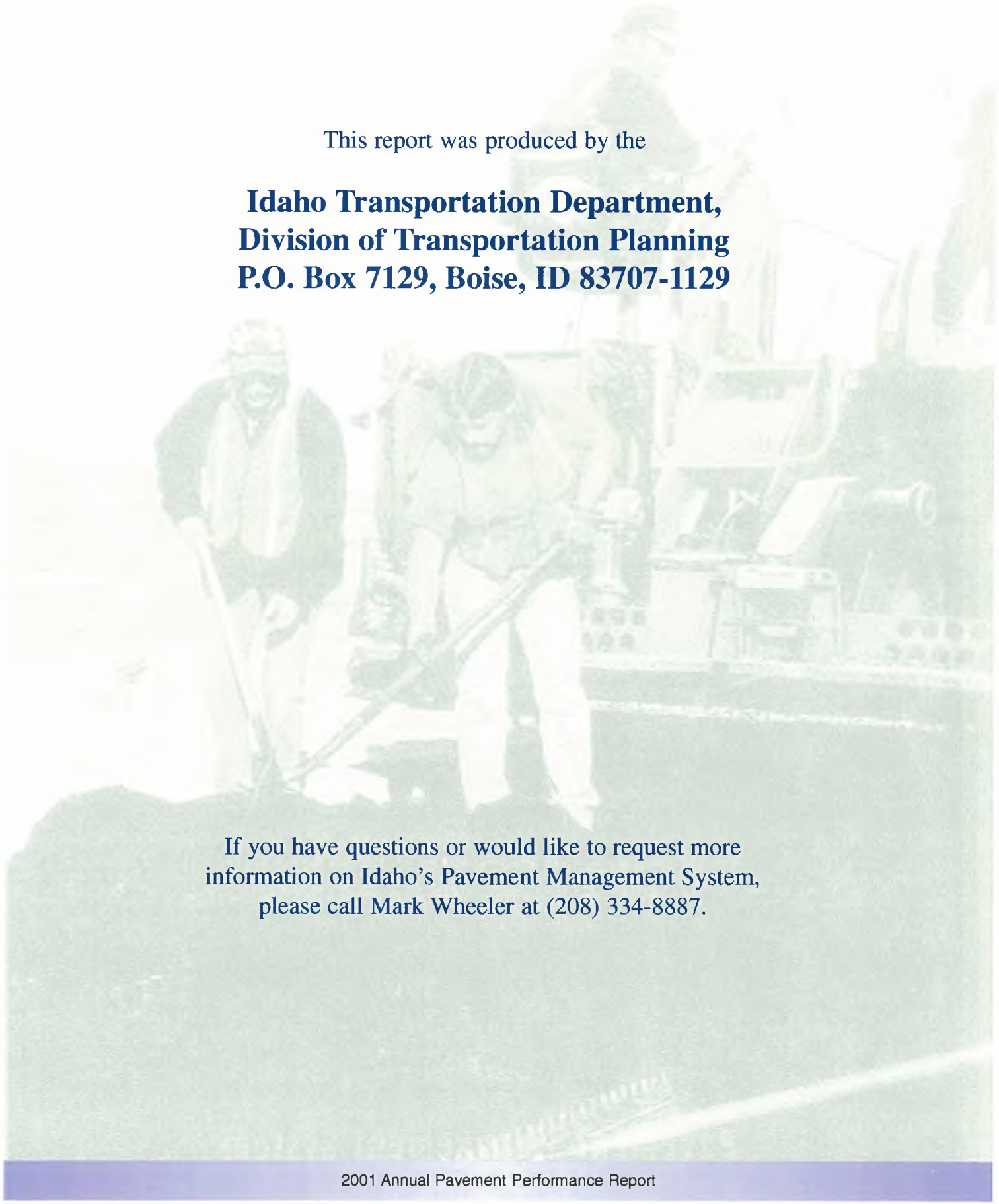
2001 ITD PAVEMENT PERFORMANCE REPORT



Pavement Management System



This report was produced by the

Idaho Transportation Department,
Division of Transportation Planning
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If you have questions or would like to request more information on Idaho's Pavement Management System, please call Mark Wheeler at (208) 334-8887.

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PURPOSE

PURPOSE

This report provides information regarding the condition of pavements on the State Highway System. The following pages contain numerous charts, graphs, and maps of past and present pavement condition based upon cracking, roughness, and rutting. This information was obtained from Idaho's Pavement Management System (PMS).

This report is comprised of the following sections:

- Executive Summary
- Pavement Management - System Overview
- General Information
- Pavement Condition
- Needs Analysis
- Sealcoats
- Summary

EXECUTIVE SUMMARY

ACHIEVEMENTS

The Idaho Transportation Department has made significant progress toward reducing deficient pavements and giving motorists a safer and smoother ride. Pavement deficiencies on the State Highway System have been reduced from almost 40% in 1993 to an estimated 17% by the end of calendar year 2001. Reducing pavement deficiencies is a high priority for the department and has been accomplished by:

- The Idaho Transportation Board committing $31 million annually for pavement rehabilitation
- Utilizing the $15.2 million Restricted Highway Fund to repair and maintain deficient highways
- Establishing department efficiency measures
- Consolidating programs and applying the cost savings to pavement-rehabilitation projects
- Partnering with the private sector allowing the department to stretch highway dollars
- Utilizing a successful maintenance / preventative maintenance program which slows the rate of pavement deterioration
- Improving the way we collect, analyze, and report pavement data

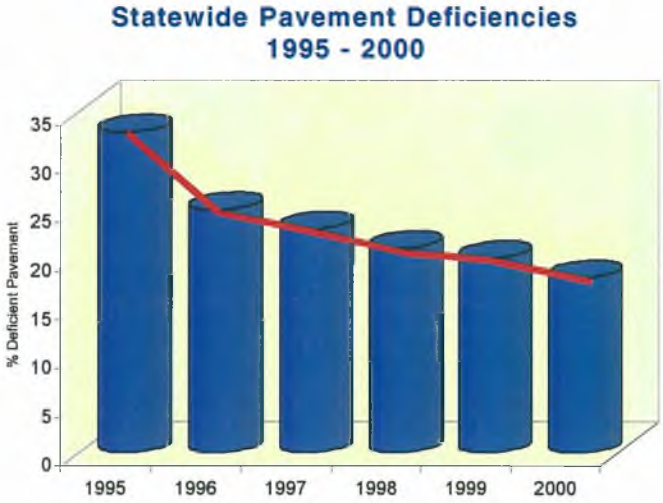


Figure 1.

NEEDS

Pavements on the State Highway System have shown a great deal of improvement in recent years, but there is still much work left to do. Figure 2 below is a summary of current statewide needs by functional class. The estimated repair costs on the state highway system alone total nearly $360 million and this is just one piece of the total transportation pie. Capacity, congestion, safety, and economic development all compete with pavement-improvement needs for limited funding.

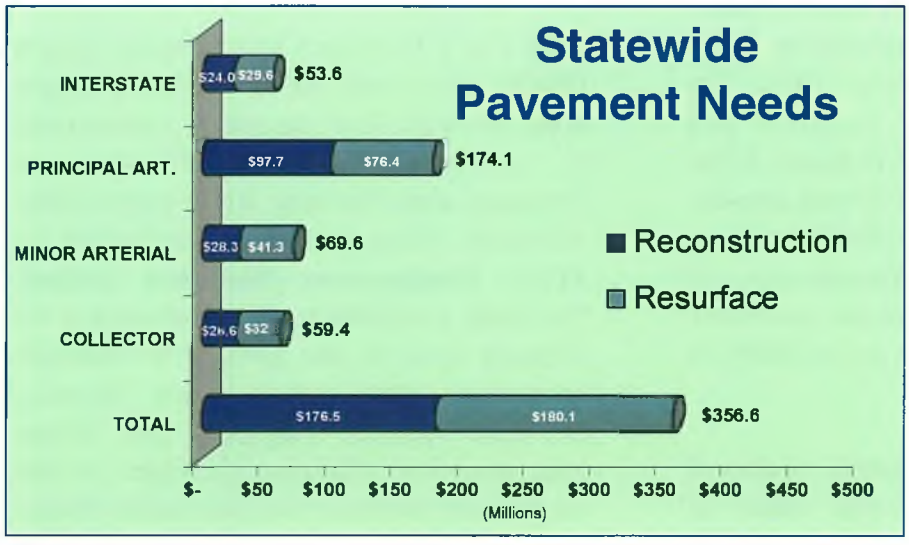


Figure 2.

Because Idaho's growing population and economy are likely to create a demand for more and heavier trucks, the department must continue its commitment to protect and maintain Idaho's investment in pavements on the State Highway System.

Section 1
PAVEMENT MANAGEMENT SYSTEM OVERVIEW

In 1977, the Idaho Transportation Department (ITD) began a review of existing pavement-management programs with the goal of adopting one to fit Idaho's needs. The following year a Pavement Performance Management Information System (PPMIS) was acquired and made operational on ITD's mainframe computer. Since 1978, the PPMIS has been steadily improved and modified to meet conditions in Idaho. It has been tested and refined by ITD and consultant contract, the principal consultant being Pavement Management Systems Ltd., of Ontario, Canada. The last phase, economic analysis and optimization, was completed in July 1986.

Our Idaho State Highway System consists of approximately 5,000 centerline miles of paved highway, including 612 centerline miles of Interstate. For network-level pavement management the system has been divided into about 1,800 sections varying in length from less than one mile to approximately ten miles.

I d a h o 's Pavement Management System (PMS) covers both the network and project level. Network-level pavement management is performed by the Division of Transportation Planning while project-level pavement management is performed by ITD's Headquarters Materials section. Pavement condition testing conducted at the network level is also split, with Materials overseeing skid testing while Planning Services collects roughness and rutting measurements. Planning Services is also responsible for surveying pavement distress (cracking), analyzing network PMS data,

producing reports, and developing and maintaining computer programs needed for pavement management. Deflection data for project-level pavement management is collected, analyzed, and reported by the Materials section.

PAVEMENT-CONDITION TESTING

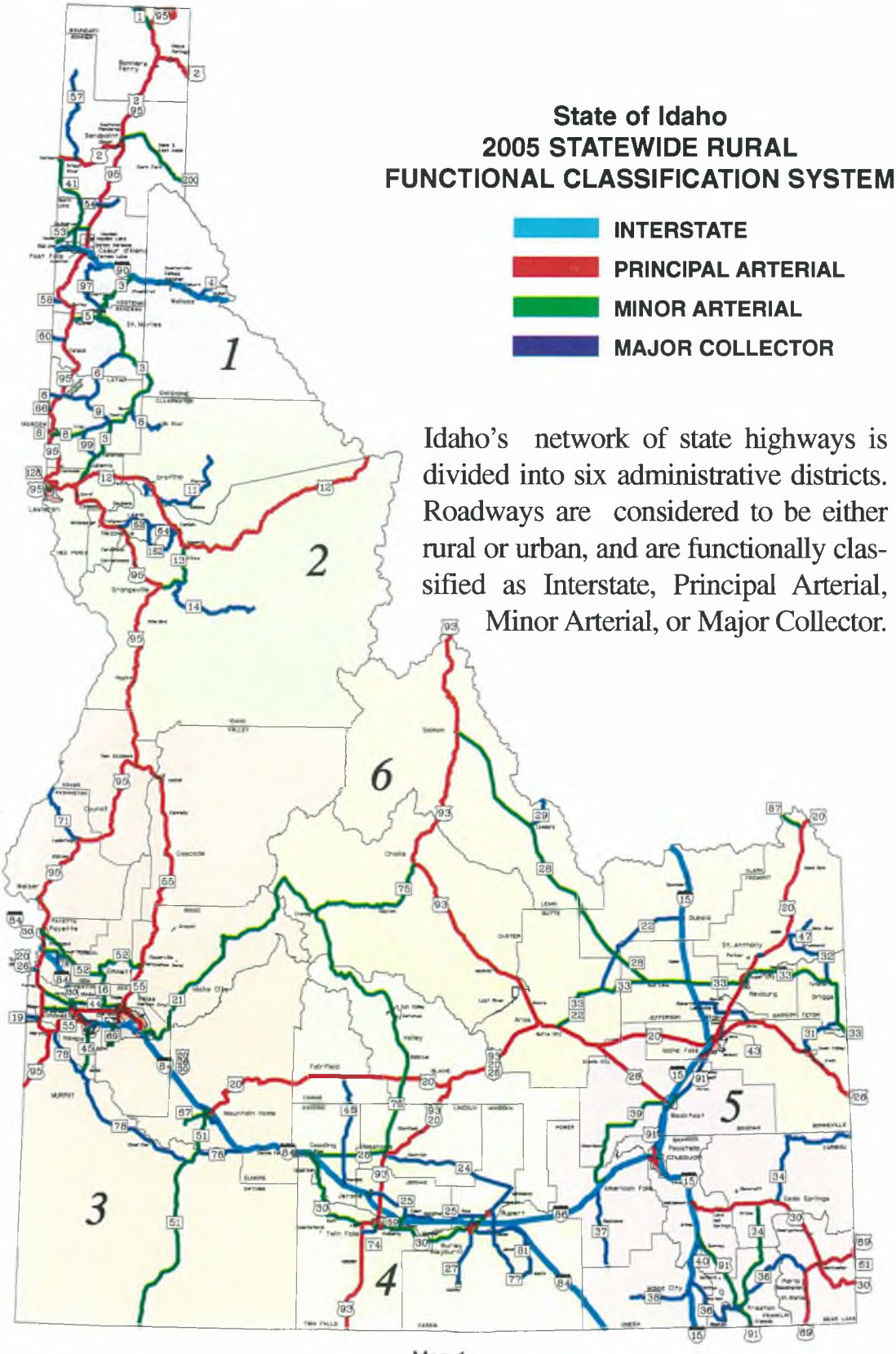
Pavement-condition data is an important component of Idaho's PMS. Two-lane roads are tested in one direction while interstates and divided arterials are tested in both ascending and descending directions. Pavement-condition data elements are collected as follows:

- **Road Roughness -** Roughness is a primary indicator of pavement serviceability; or the ability of a pavement to meet the demands and expectations of motorists. In Idaho, the public's perception of the State Highway System is very important. For that reason, a Roughness Index (RI) was adopted that correlates the longitudinal profile of the road surface to an index based upon the public's perception of road roughness. The (RI) ranges from 0.0 to 5.0 (0.0 being extremely rough and 5.0 being perfectly smooth).

  A South-Dakota-type Profilometer is currently used by ITD to obtain pavement roughness. This instrument uses laser sensors and a personal computer to collect and store road-profile information. The vehicle stores profile and rutting measurements at one-foot intervals traveling at highway speeds, and is mounted in a van operated by Planning Services. Longitudinal profiles of all pavement-management sections statewide are obtained annually.

- **Pavement Distress (Cracking) -** Pavement distress, or cracking, is another important indicator of pavement condition. The video-inspection vehicle used to collect profile information also collects pavement video on the entire State Highway System each year. The Pavement Management Engineer then uses this video to determine the type, extent, and severity of cracking within each PMS section. Based on this input a Cracking Index (CI) is calculated by the computer for each section. The CI is a rating very similar to the RI with 5.0 corresponding to a section with little or no cracking and 0.0 representing a section with severe cracking.

- **Final Index -** A Final Index (FI), which is the average of RI and CI, is used as a single indicator of Pavement Condition in many PMS reports.



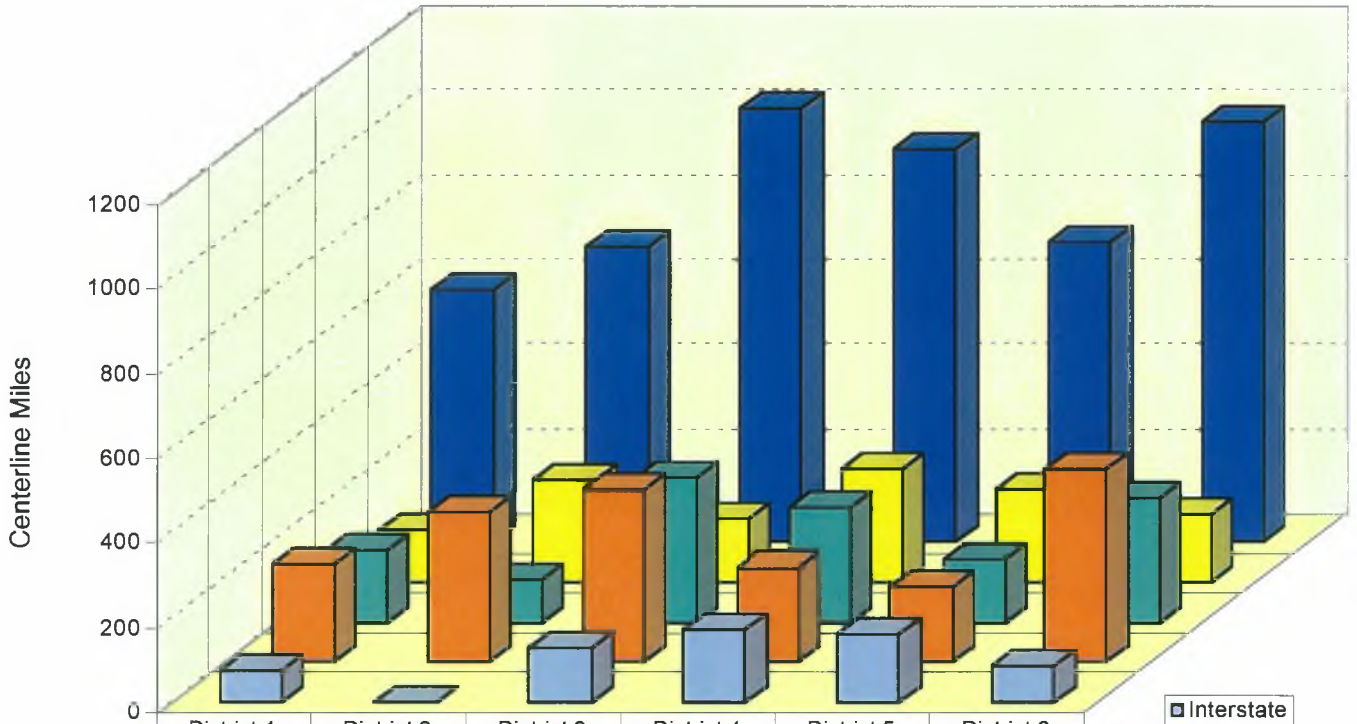
State of Idaho
2005 STATEWIDE RURAL
FUNCTIONAL CLASSIFICATION SYSTEM

- INTERSTATE
- PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- MAJOR COLLECTOR

Idaho's network of state highways is divided into six administrative districts. Roadways are considered to be either rural or urban, and are functionally classified as Interstate, Principal Arterial, Minor Arterial, or Major Collector.

Map 1

2000 CENTERLINE MILES BY DISTRICT



	District 1	District 2	District 3	District 4	District 5	District 6
Interstate	74	0	125	169	160	84
Prncp Art	230	356	408	223	180	456
Minor Art	167	101	341	272	147	294
Collector	123	239	152	268	222	158
TOTAL	594	696	1026	931	709	992

Figure 3.

Centerline mileage, by district and functional class, is shown in Figures 3, 4, and 5. There are 4,948 centerline miles on the state highway system. District 3 is the largest district with 1,026 centerline miles (20.7% of total statewide miles) and District 1 is the smallest of the six districts with 594 centerline miles (12% of total mileage).

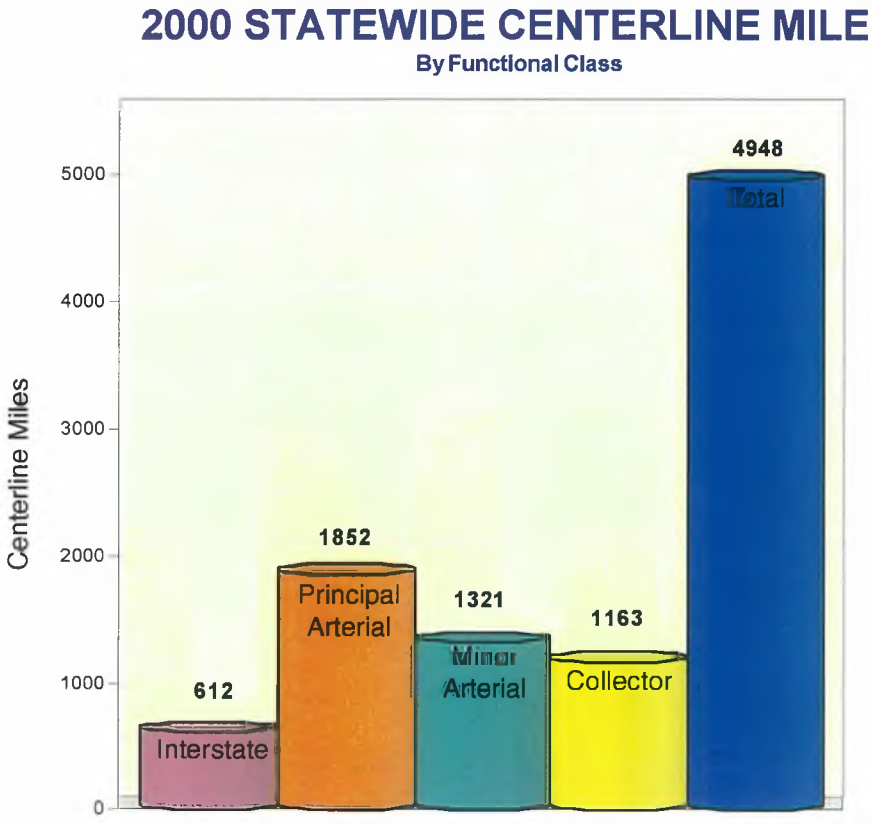


Figure 4.

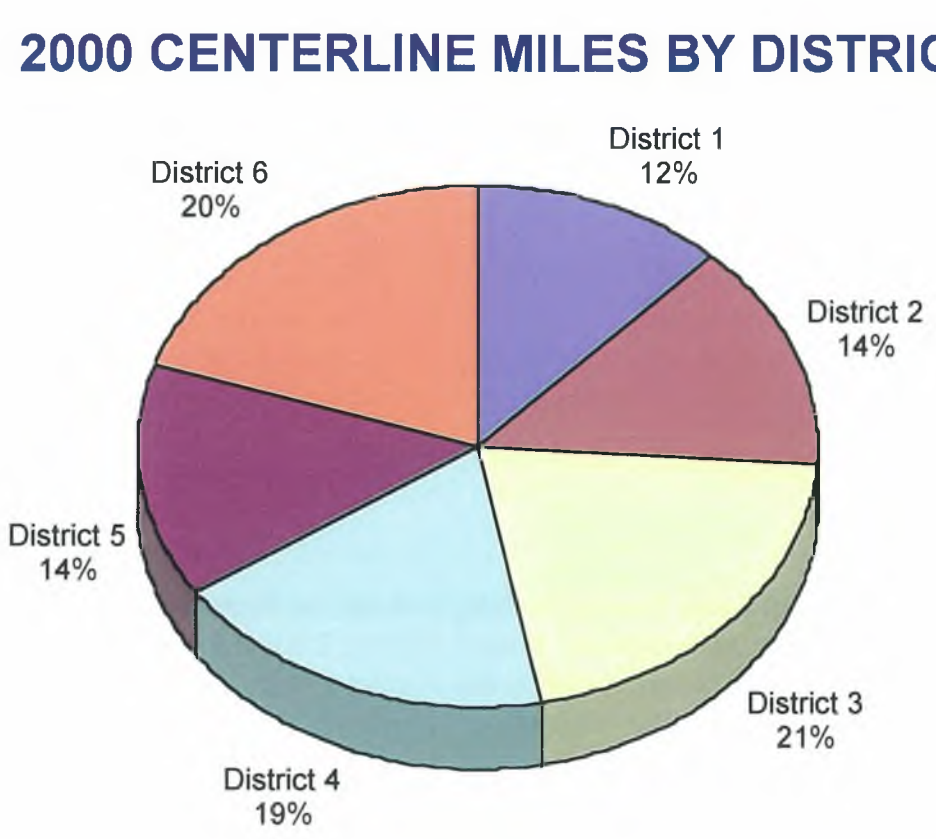
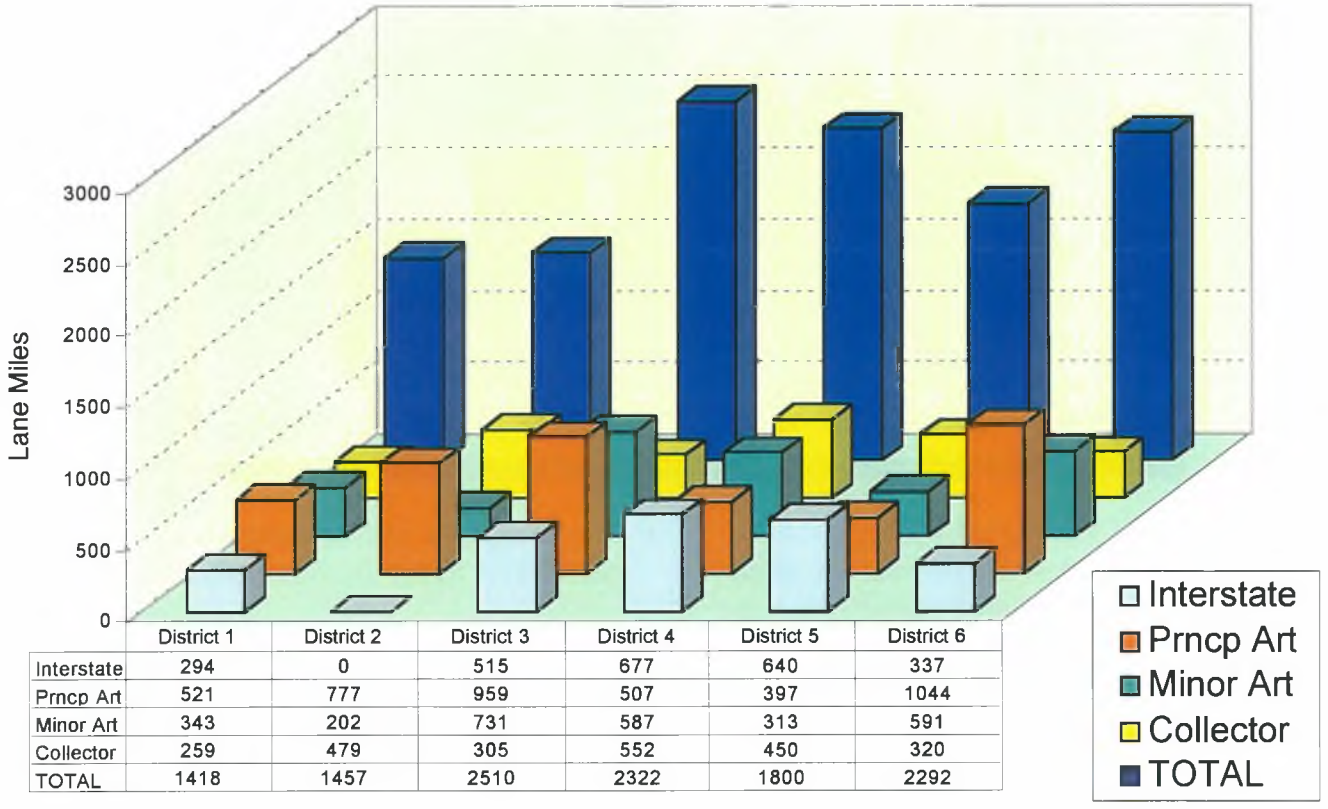


Figure 5.

2000 LANE MILES BY DISTRICT



	District 1	District 2	District 3	District 4	District 5	District 6
Interstate	294	0	515	677	640	337
Prncp Art	521	777	959	507	397	1044
Minor Art	343	202	731	587	313	591
Collector	259	479	305	552	450	320
TOTAL	1418	1457	2510	2322	1800	2292

Figure 6.

Figure 6 is a summary of lane miles by functional class. Lane miles are calculated by multiplying centerline miles by the number of through lanes. The State Highway System has approximately 11,800 lane miles.

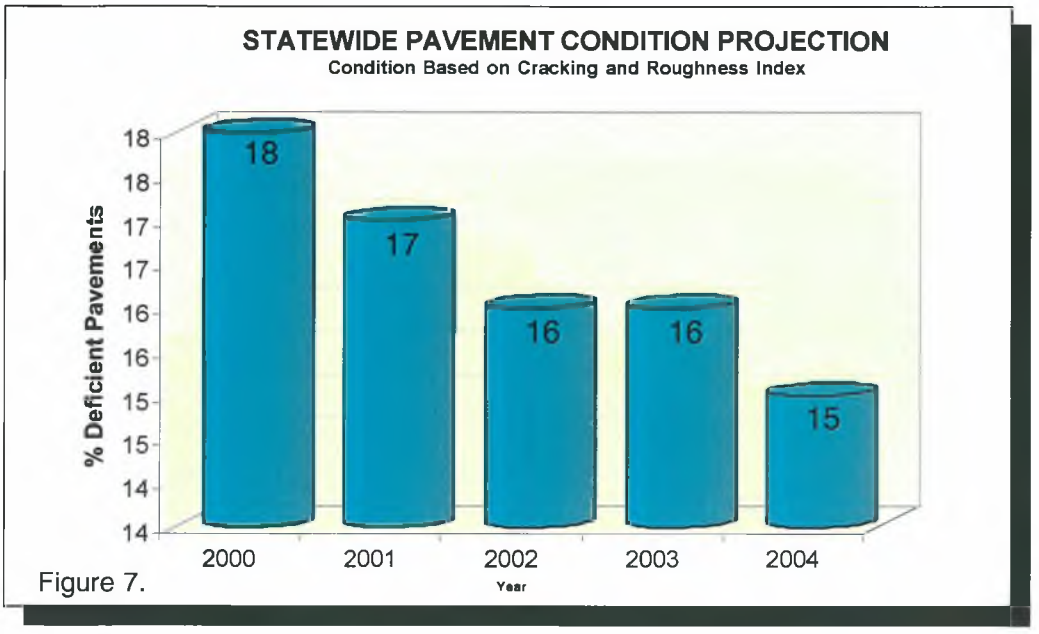


Figure 7.

PAVEMENT CONDITION

Pavement condition assessment is highly dependent upon functional classification and is divided into two categories: (1) interstates and arterials, (2) collectors.

- Pavements on interstates, arterials, and collectors are classified as good if the lower of the Cracking Index (CI) or Roughness Index (RI) is greater than 3.0;
- Interstate and arterial pavements are considered fair if the lower of CI or RI is between 2.5 and 3.0 (2.0 to 3.0 for collectors);
- Poor pavements exhibit indices between 2.0 and 2.5 (1.5 to 2.0 on collectors);
- Interstate and arterial pavements considered to be very poor are those with the lower of the two indices falling below 2.0, or a CI or RI rating below 1.5 for collectors.
- Pavement sections are considered deficient if they are classified as poor or very poor.

The current statewide distribution of good, fair, poor, and very poor pavements, based upon roughness and cracking, is shown on page 10 in Figures 8 and 9.

Pavement Condition	Interstates and Arterials	Collectors
	Lower Index of Cracking (CI) or Roughness (RI)	
Good	(CI or RI) > 3.0	(CI or RI) > 3.0
Fair	2.5 ≤ (CI or RI) ≤ 3.0	2.0 ≤ (CI or RI) ≤ 3.0
Poor	2.0 ≤ (CI or RI) < 2.5	1.5 ≤ (CI or RI) < 2.0
Very Poor	(CI or RI) < 2.0	(CI or RI) < 1.5

Distribution of Cracking and Roughness Indices

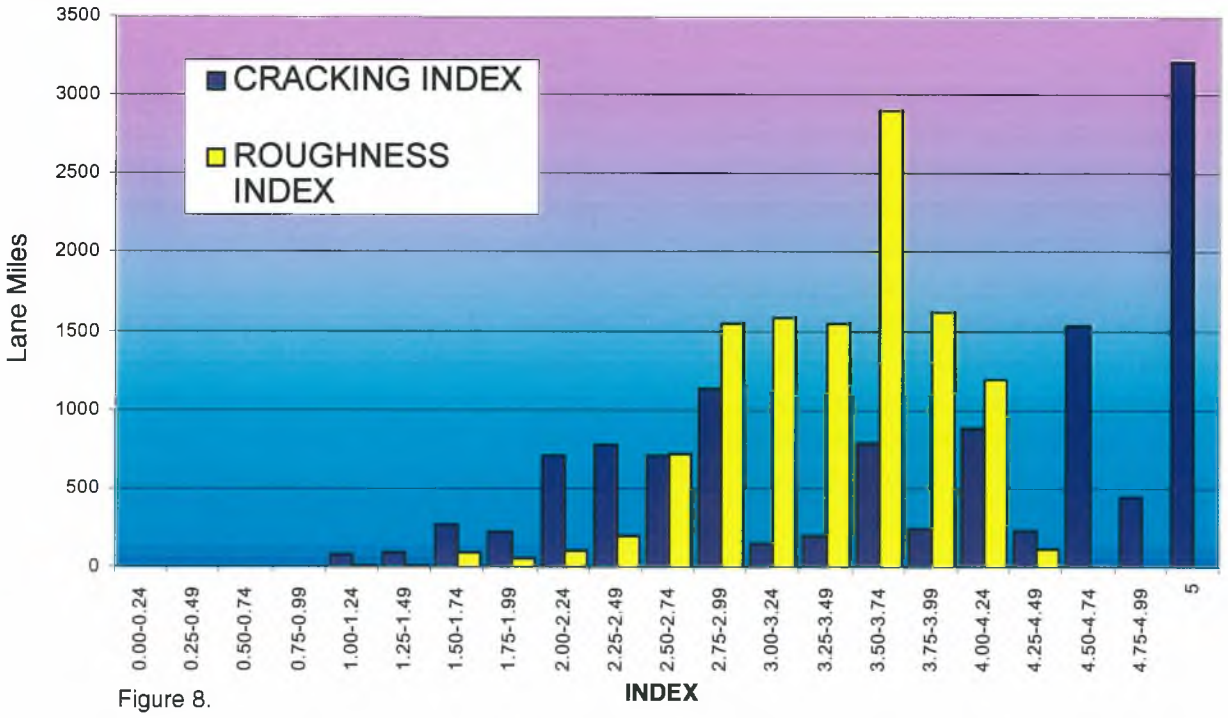


Figure 8.

Distribution of Lowest Index (Cracking or Roughness)

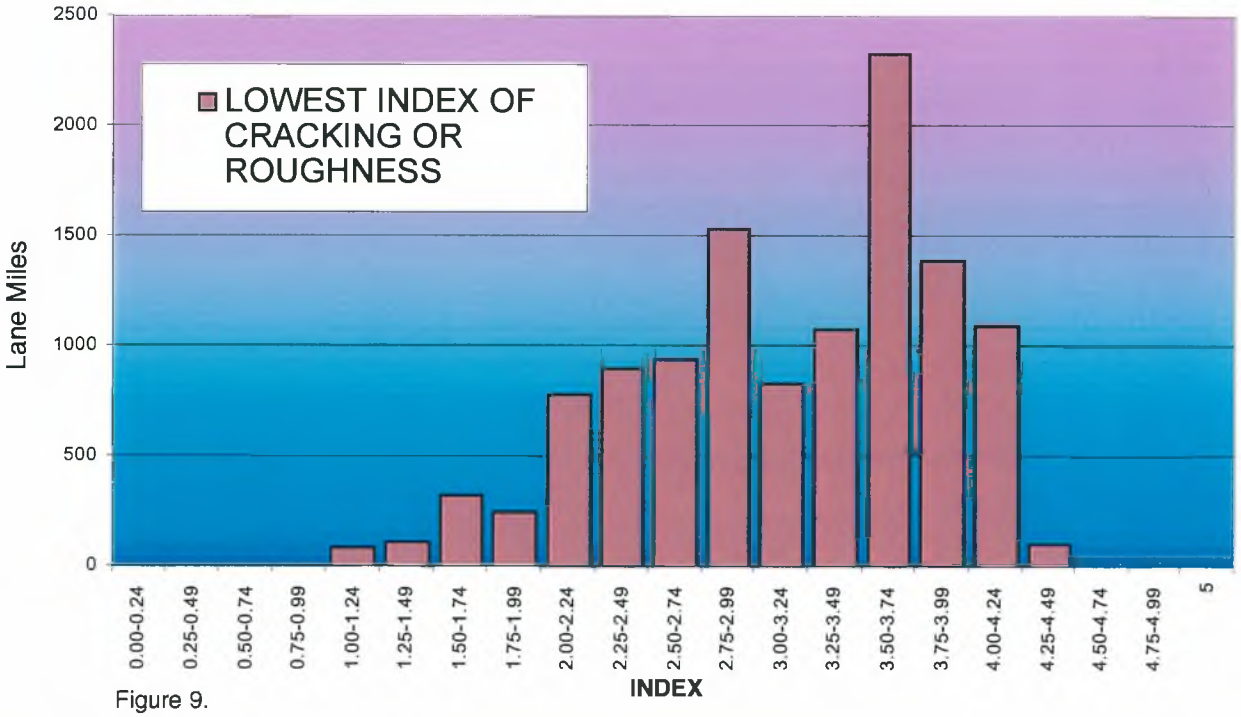


Figure 9.

PAVEMENT CONDITION (continued)

Figures 10 and 11 are summaries of pavement conditions from 1996 through 2000. The percentage of pavements considered good has risen from a statewide low of about 18.7% in 1994 to approximately 58% as shown for the end of calendar year 2000. Fair pavements have declined from approximately 44% in 1994 to 24% for 2000. The percentage of pavements considered poor or very poor has declined from a maximum of almost 38% in 1994 to 18% at the end of calendar year 2000.

Figure 12 is a pie chart representing current pavement condition on the State Highway System in terms of percent "good," "fair," "poor," and "very poor."

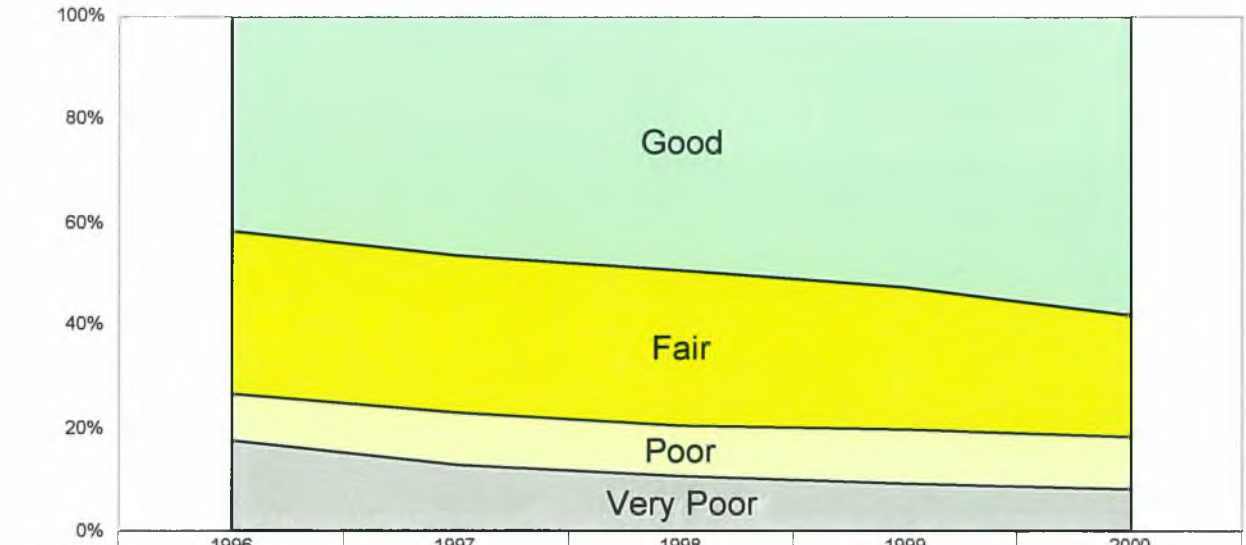
Current pavement condition by district is shown in Figure 13. The percentages in Figure 13 are based on statewide lane miles. For example, 11% of all pavements statewide considered good, and 15% of all pavements considered very poor are located in District 1.

Figure 14 is also a summary of pavement condition based on total lane miles in each district, as opposed to statewide mileage. For example: 11% of District 1 roadways are considered very poor; and 64% of District 5 roadways are considered good.

STATEWIDE PAVEMENT CONDITION

By Lane Miles

Condition based on Cracking and Roughness Index



	1996	1997	1998	1999	2000
Good	4,883	5,438	5,797	6,201	6,833
Fair	3,692	3,595	3,535	3,243	2,777
Poor	1,078	1,207	1,161	1,254	1,176
Very Poor	2,055	1,498	1,270	1,062	970

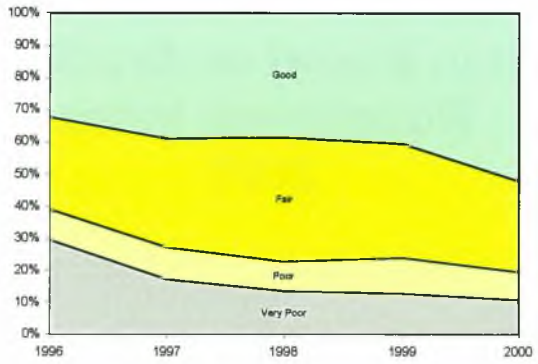
Figure 10.

District Pavement Condition

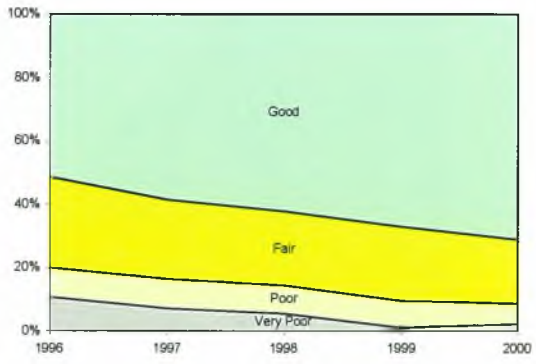
by Lane Miles

Condition based on cracking and roughness indices

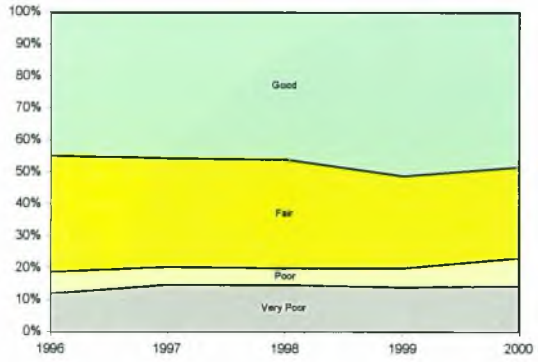
District 1



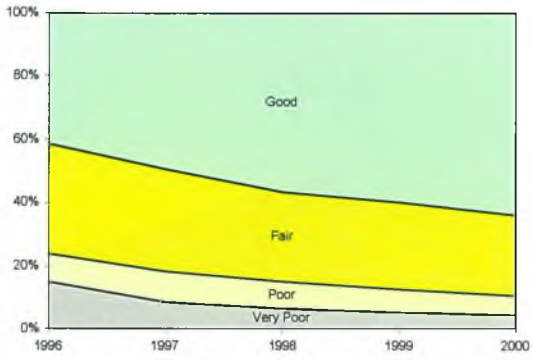
District 4



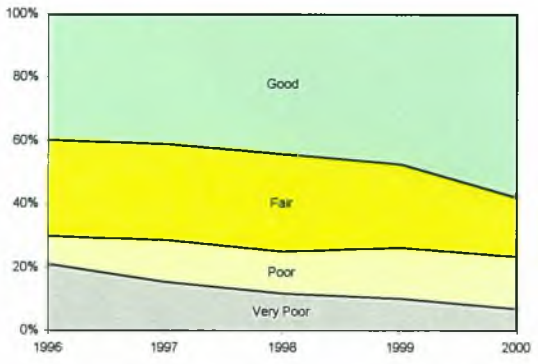
District 2



District 5



District 3



District 6

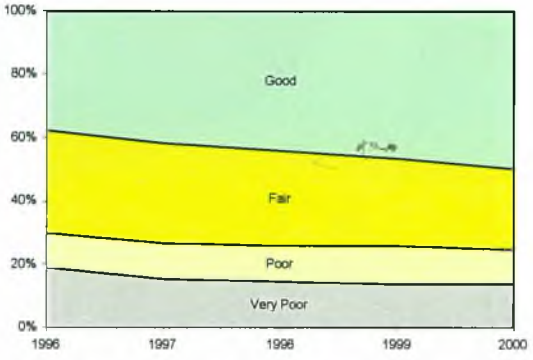


Figure 11.

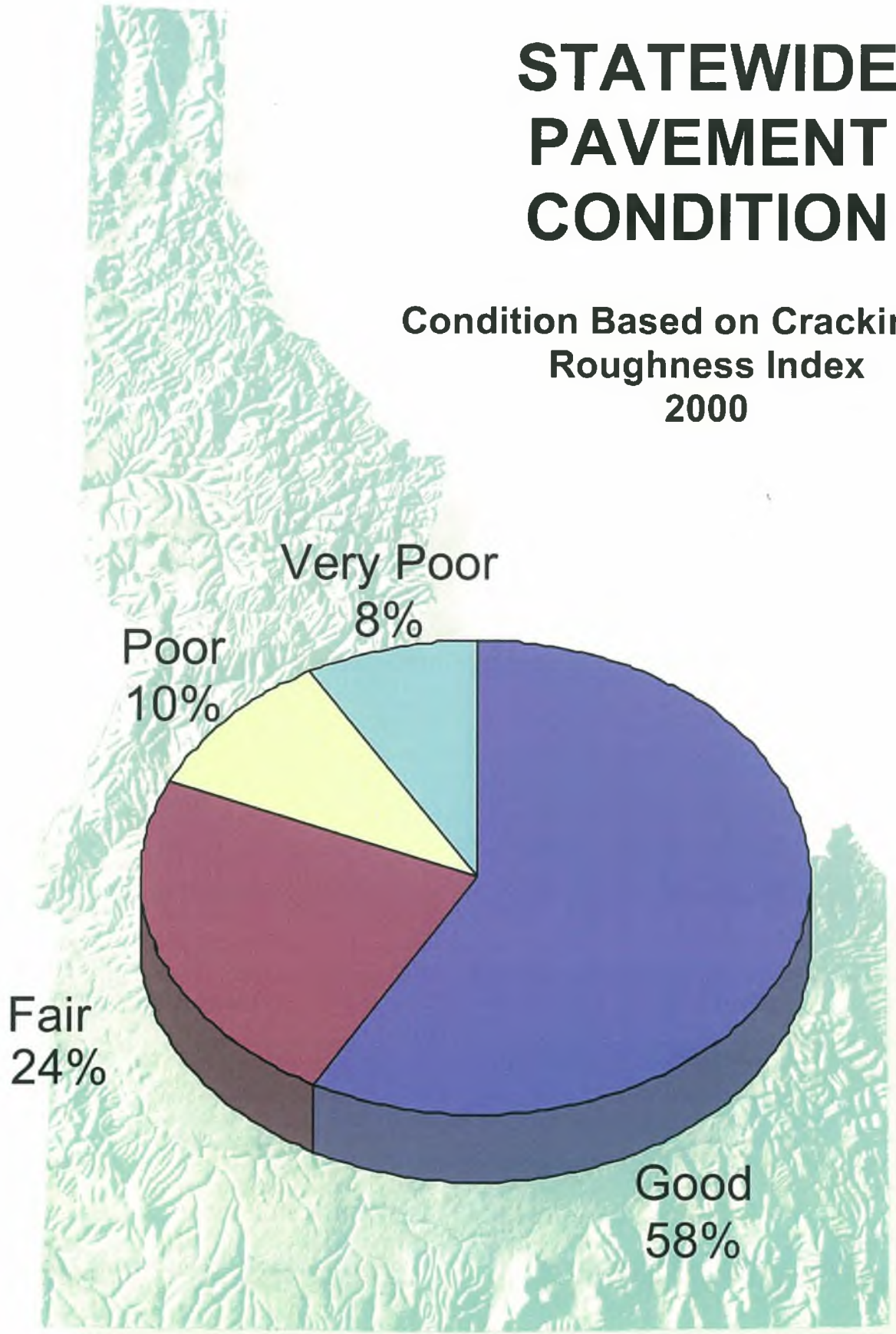

STATEWIDE PAVEMENT CONDITION
Condition Based on Cracking and Roughness Index
2000
Very Poor 8%
Poor 10%
Fair 24%
Good 58%

Figure 12.

2000 Pavement Condition
(District Percentage of Statewide Total)

Condition Based on Cracking and Roughness Indices

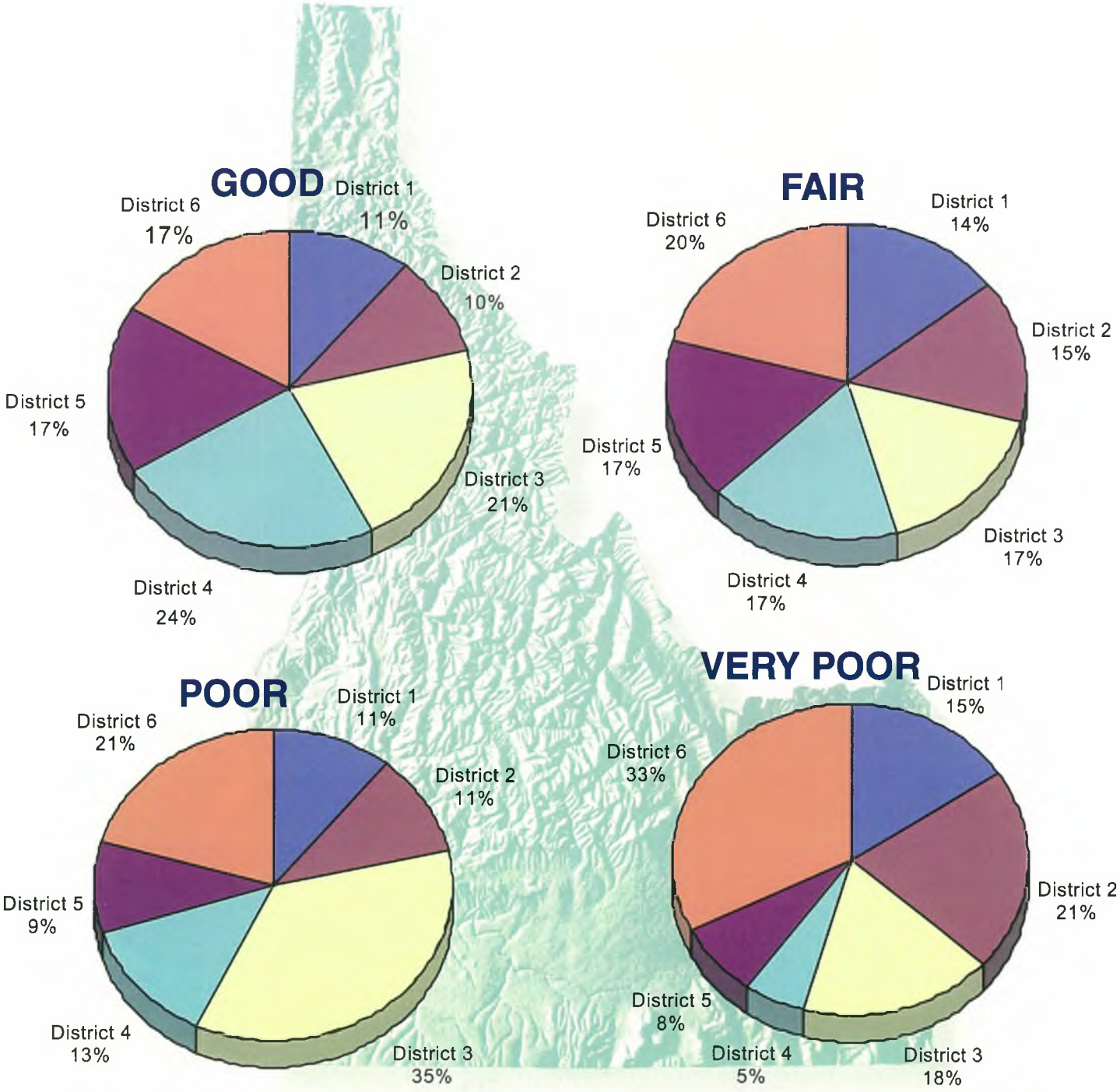


Figure 13.

2000
District Pavement Condition

Condition Based on Cracking and Roughness Indices

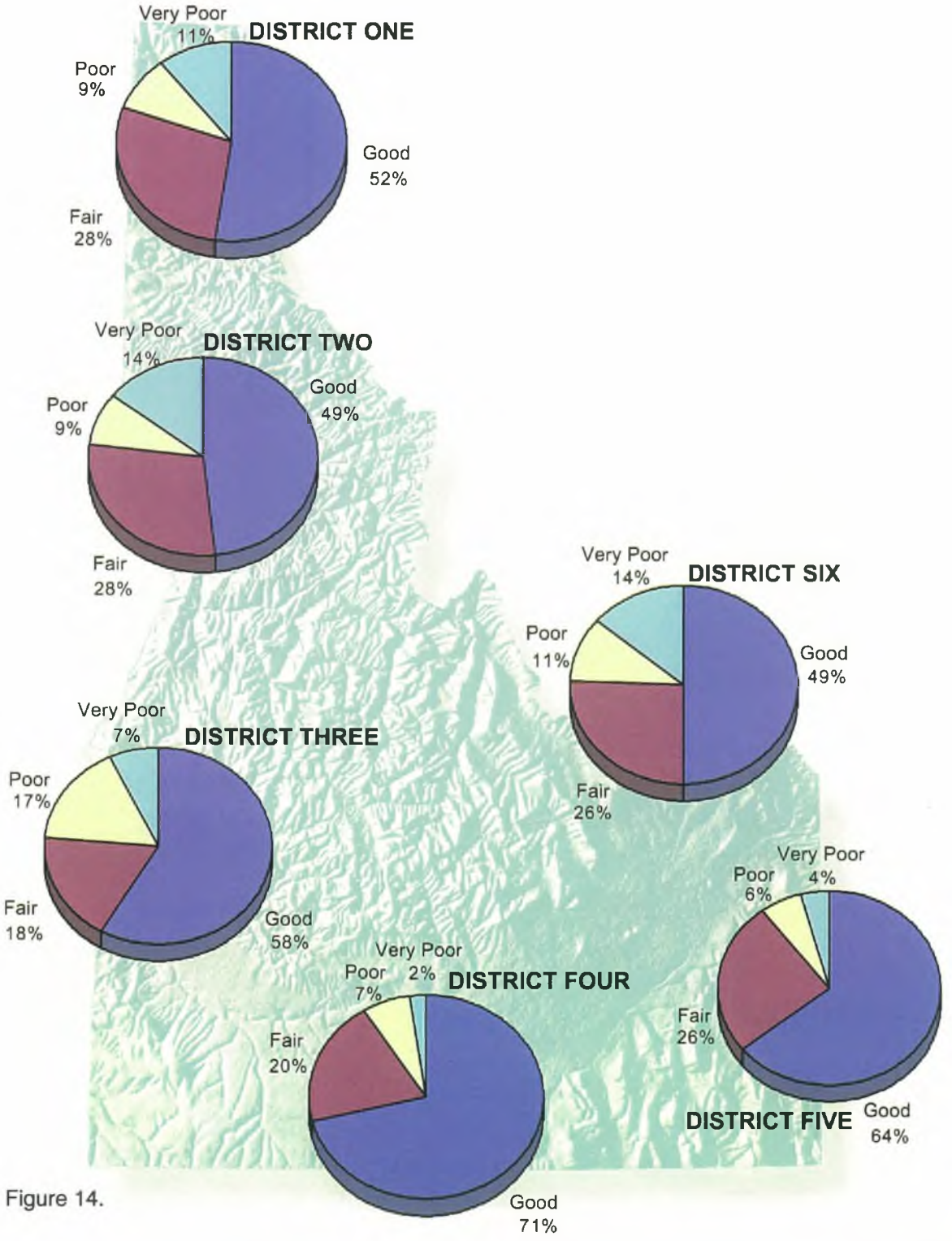


Figure 14.

PAVEMENT DEFICIENCIES BY SYSTEM

The following graphs represent a summary of Idaho's five-year pavement performance on interstates, remaining National Highway System (NHS), and Non National Highway System (Non-NHS) routes.

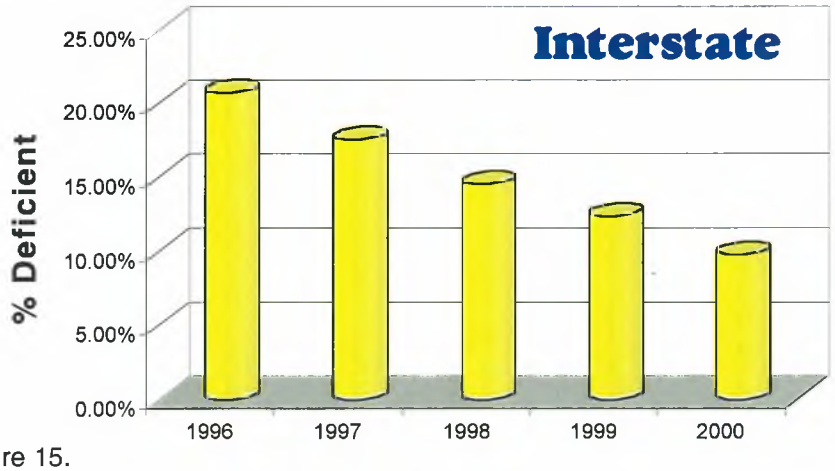


Figure 15.

Interstate highways in Idaho have improved from 23% deficient in 1994 to 8% deficient in 2000, a reduction of 15% in six years.

The remaining (Non-Interstate) NHS routes have improved from 38 percent deficient in 1994 to approximately 22% deficient in 2000, a reduction of 16% in six years.

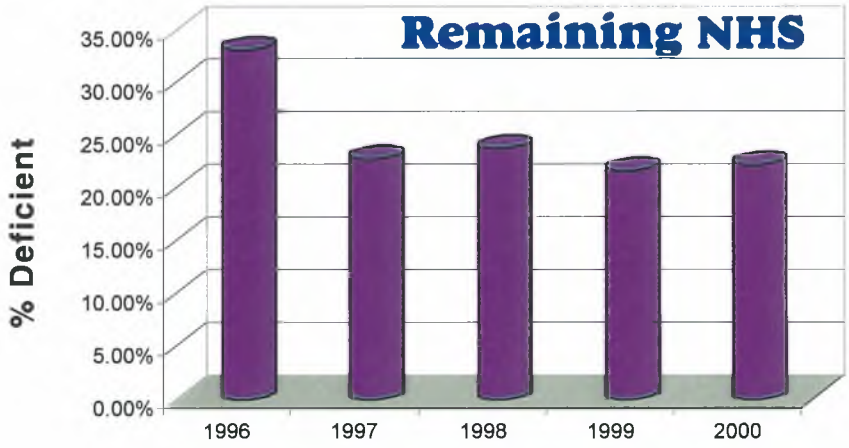


Figure 16.

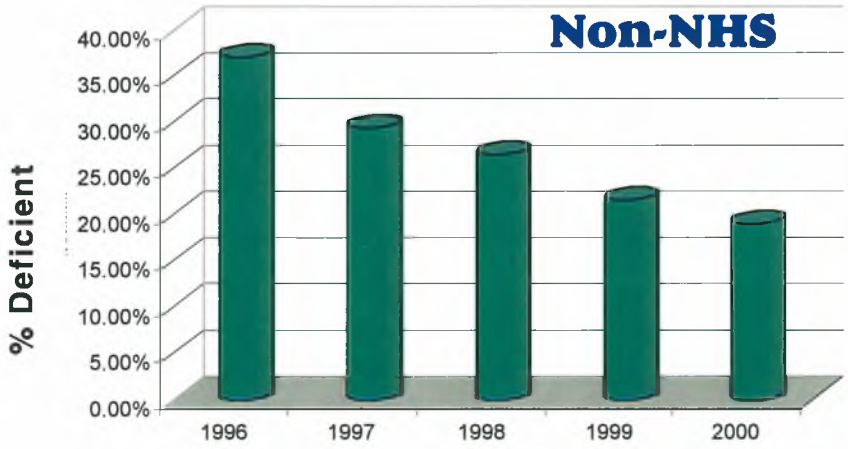


Figure 17.

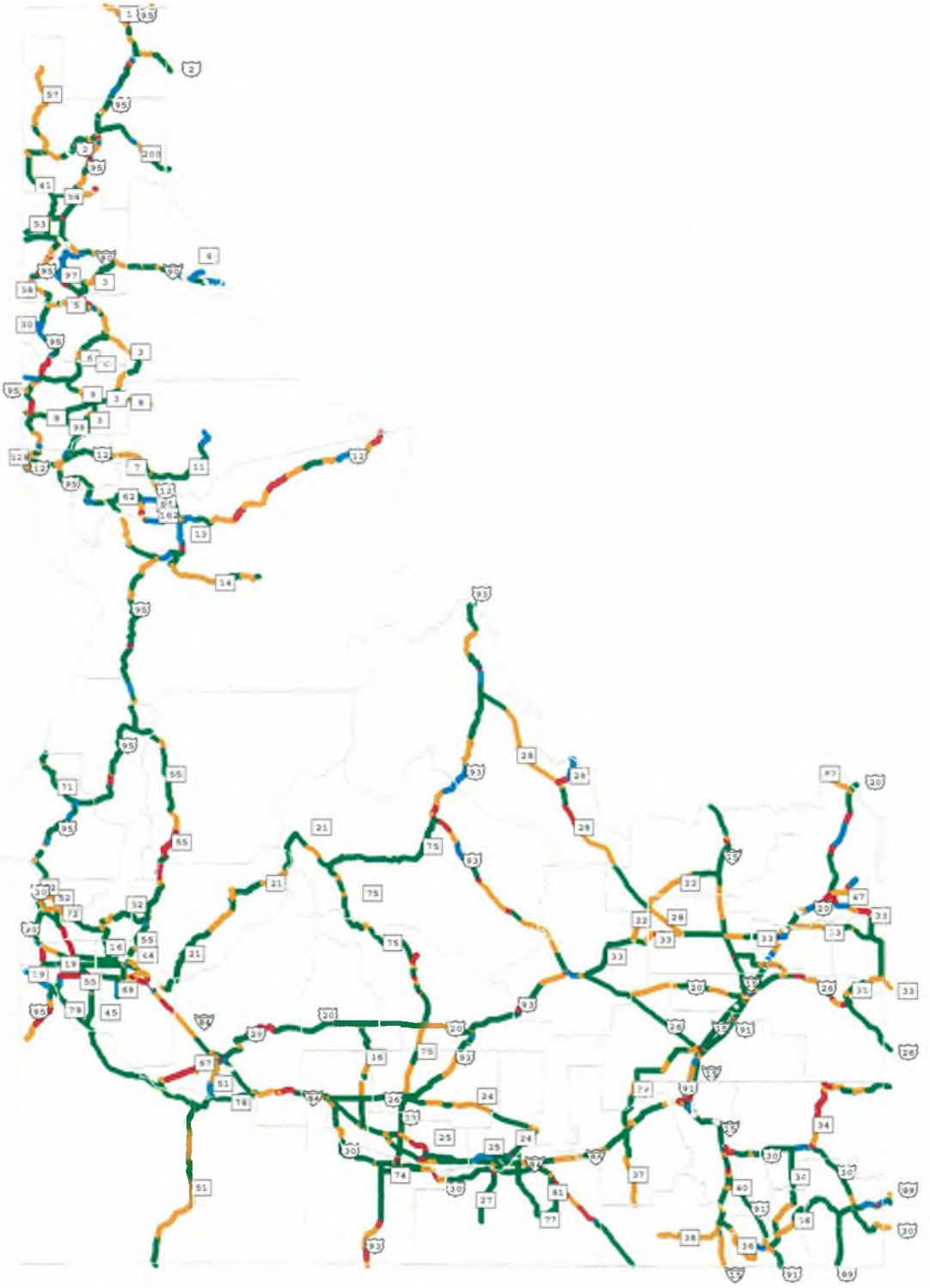
Non-NHS route deficiencies have also been reduced from over 44% in 1994 to 16% in 2000, a reduction of 28% in six years.

State of Idaho

Pavement Condition Map

(11,756 Lane Miles)

Good	Fair	Poor	Very Poor
(6,833 Lane Miles)	(2,777 Lane Miles)	(1,176 Lane Miles)	(970 Lane Miles)



District 1

Pavement Condition Map

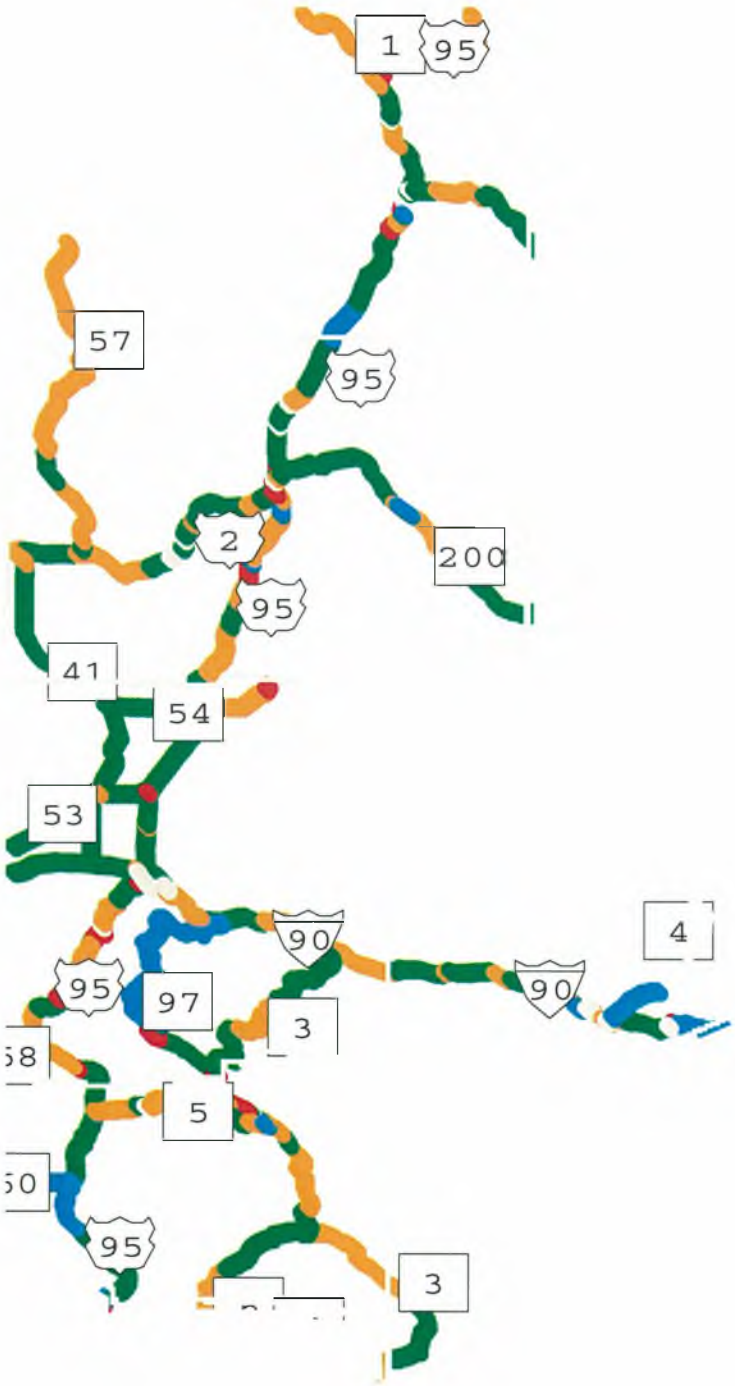
(1,418 lane miles)

Good
(740 Lane Miles)

Fair
(402 Lane Miles)

Poor
(126 Lane Miles)

Very Poor
(150 Lane Miles)

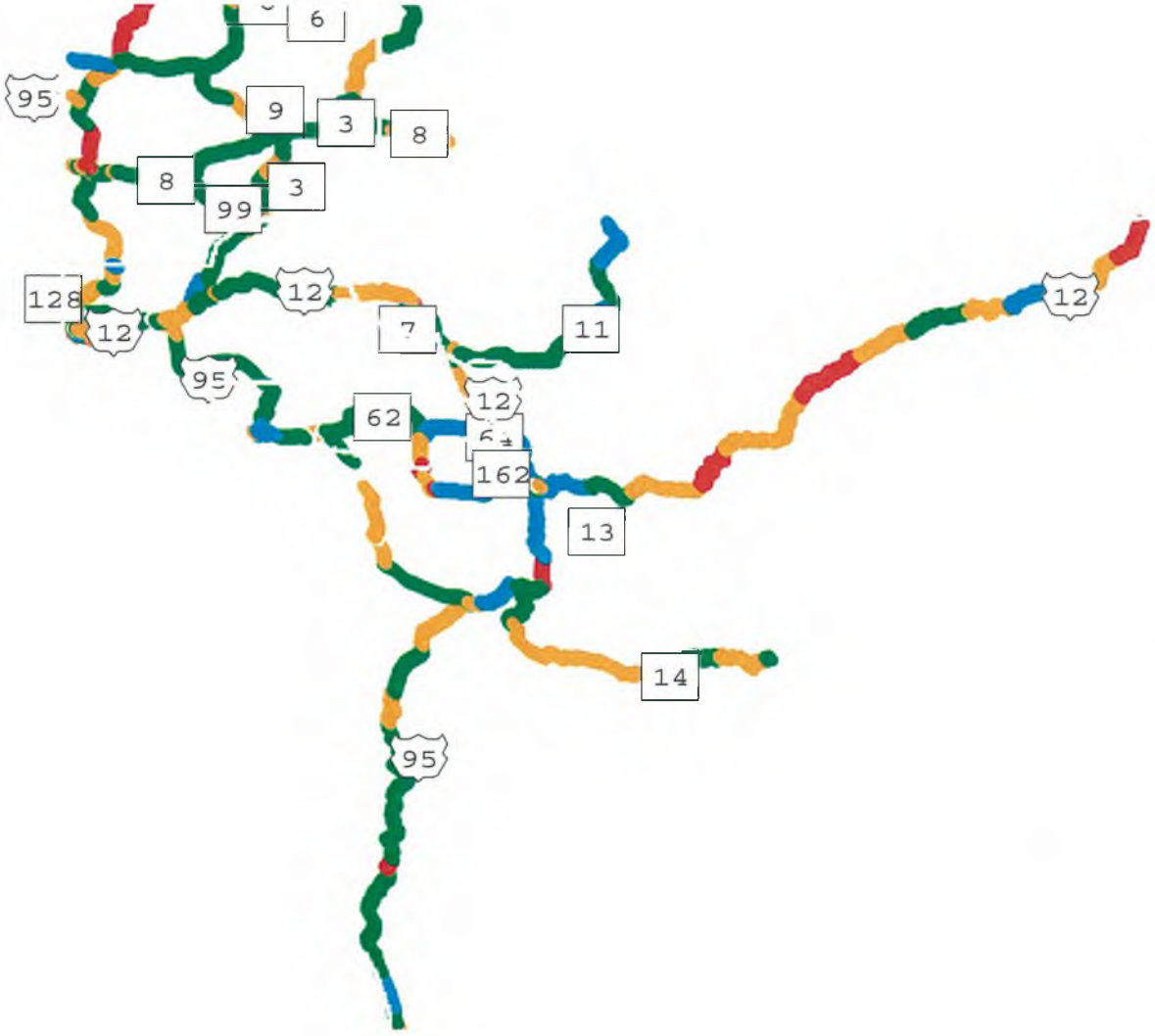


District 2

Pavement Condition Map

(1,432 lane miles)

Good	Fair	Poor	Very Poor
(694 Lane Miles)	(407 Lane Miles)	(126 Lane Miles)	(205 Lane Miles)



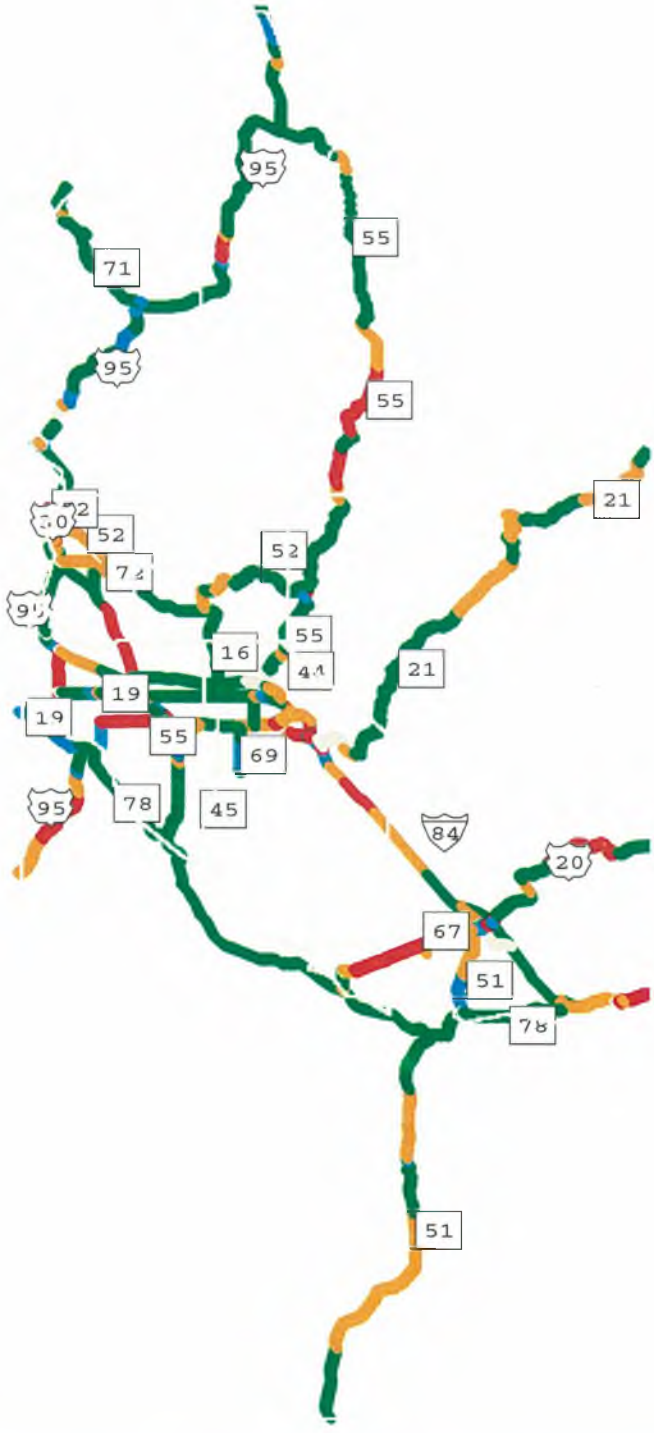
Map 4.

District 3

Pavement Condition Map

(2,510 lane miles)

Good	Fair	Poor	Very Poor
(1,461 Lane Miles)	(459 Lane Miles)	(418 Lane Miles)	(172 Lane Miles)



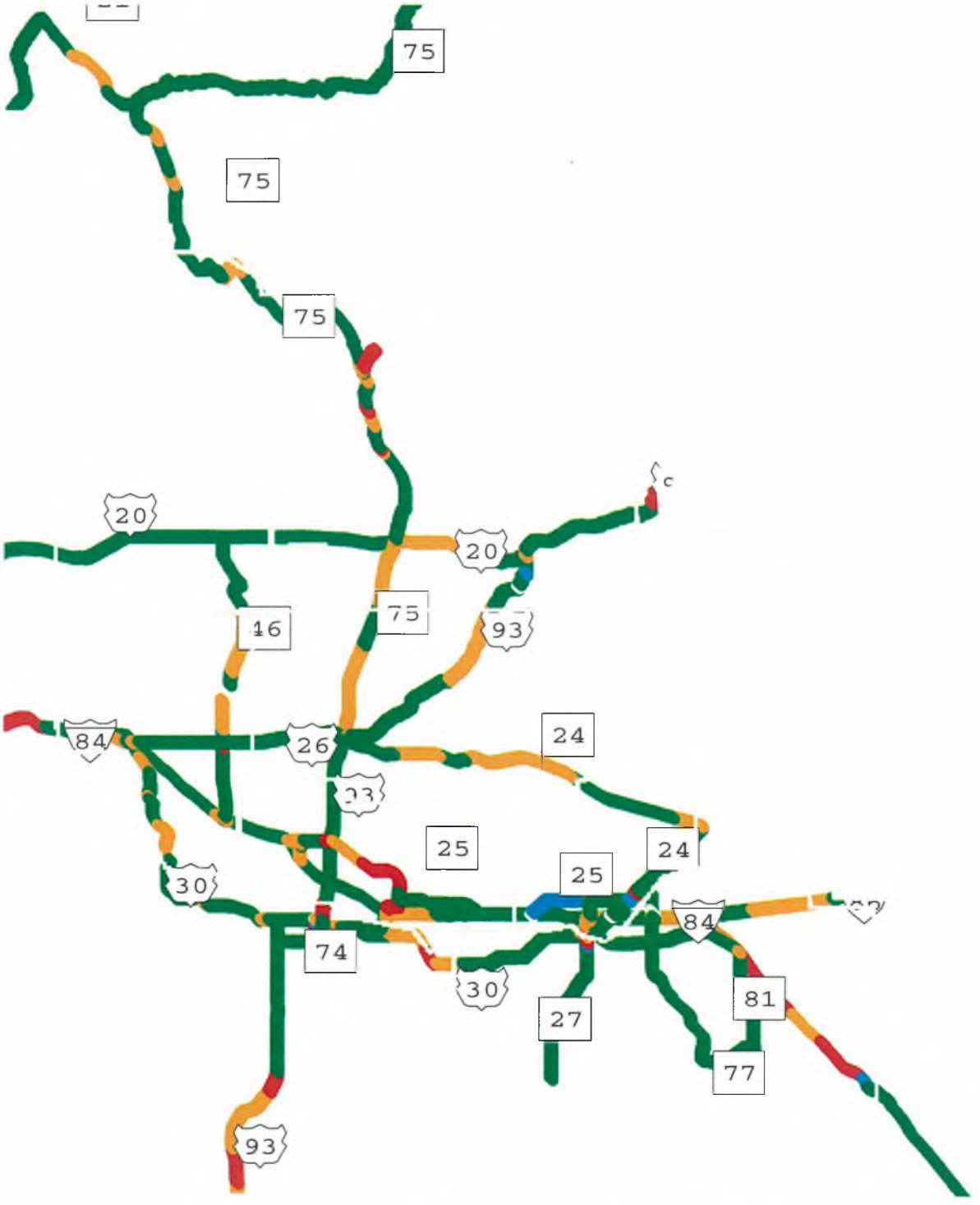
Map 5.

District 4

Pavement Condition Map

(2,323 lane miles)

Good	Fair	Poor	Very Poor
(1,649 Lane Miles)	(466 Lane Miles)	(154 Lane Miles)	(53 Lane Miles)

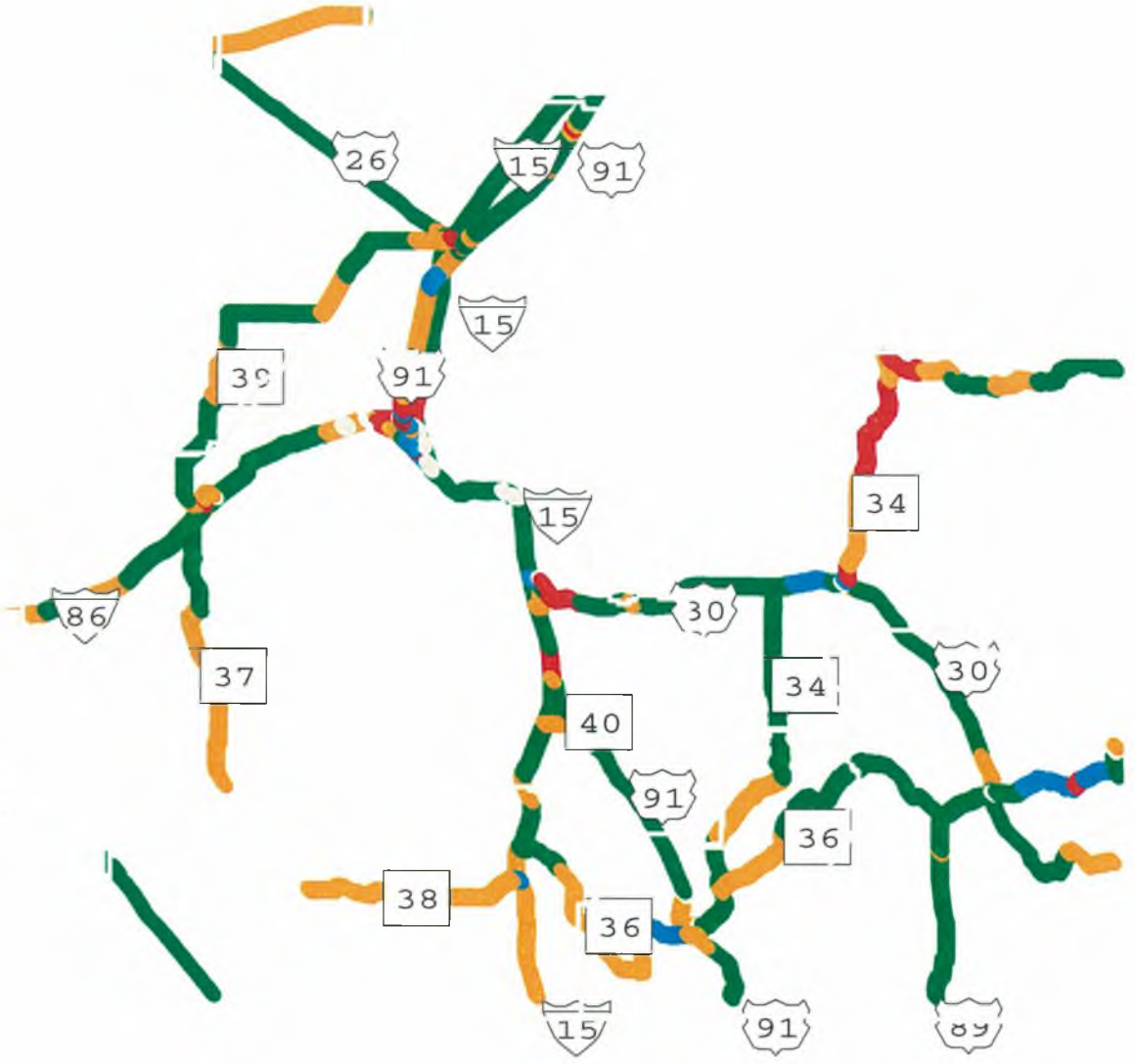


District 5

Pavement Condition Map

(1,800 lane miles)

Good	Fair	Poor	Very Poor
(1,153 Lane Miles)	(461 Lane Miles)	(110 Lane Miles)	(76 Lane Miles)



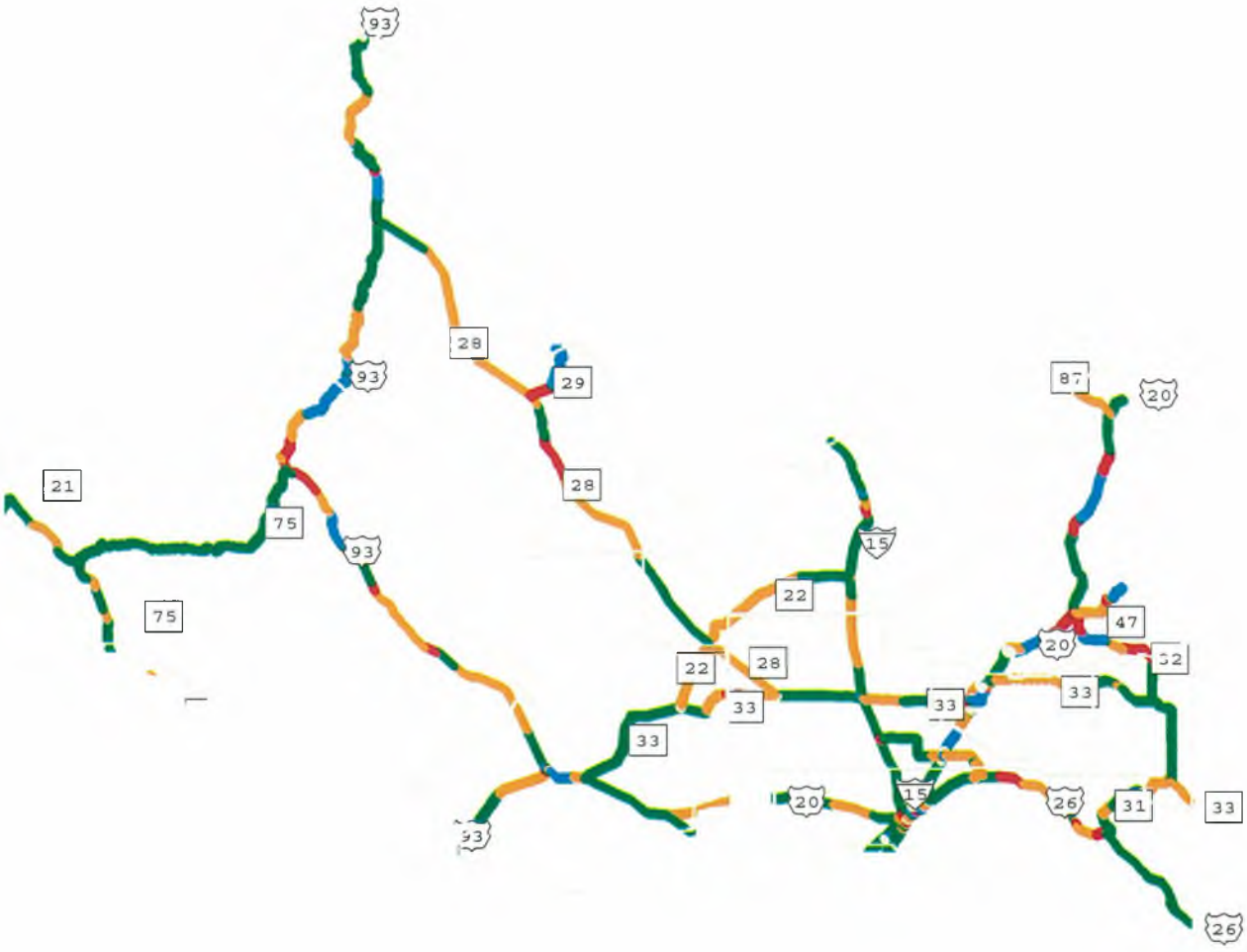
Map 7.

District 6

Pavement Condition Map

(2,273 lane miles)

Good	Fair	Poor	Very Poor
(1,135 Lane Miles)	(581 Lane Miles)	(242 Lane Miles)	(315 Lane Miles)



Map 8.

Section 4
NEEDS ANALYSIS

PAVEMENT NEEDS

The pavement-condition needs identified on the following pages were obtained through the Highway Performance Monitoring System - Analytical Package (HPMS-AP).

The HPMS-A/P is a model developed by the Federal Highway Administration (FHWA) to analyze data furnished to them by the states. The results of the analysis are used by the FHWA in policy development and for their bi-annual reports to Congress on the status and performance of the Nation's highways. This model has been adapted in-house and by consultant contract for ITD's use so that we may apply the same types of analysis to Idaho's pavement-management data.

The A/P's function is to analyze highway inventory data and to develop relationships between various levels of capital investment, and the resulting condition of the State Highway System. It is a tool to help predict the effects of any proposed level of capital investment and the corresponding condition, safety, and service characteristics of the highway system. It responds to a variety of questions regarding the levels of investment necessary to accomplish desired objectives.

The Planning Services section has enhanced the program by modifying it to reflect:

- Idaho's costs (based on ITD project history files)
- The department's design standards
- Our minimum tolerable conditions

(continues on next page)

PAVEMENT NEEDS (continued)

The analytical package analyzes data related to:

- pavement condition,
- geometrics,
- roadway cross section,
- operation, and
- access control.

Among its many reports, the program produces a prioritized list of pavement-management sections, year of need, and the type and cost of rehabilitation.

Figure 18 is a graphical representation of pavement needs by district.

The table on page 27 is a summary of current pavement needs by district and functional class. Deficiencies are defined as very poor and poor pavements (based on roughness and cracking).

Deficient pavement is classified as needing either resurfacing or reconstruction, depending on the level and type of deficiency identified for individual pavement sections. Costs are based on the average project costs for Idaho over the last ten years.

The district maps on pages 28 through 33 identify the specific locations of pavement deficiencies and programmed highway projects in each district.

Keeping pace with pavement deterioration is a never-ending challenge. Dedicated, well-trained employees and constant monitoring of pavement conditions across the state allow us to keep the upper hand.

2000
Pavement Needs
(Lane Miles)

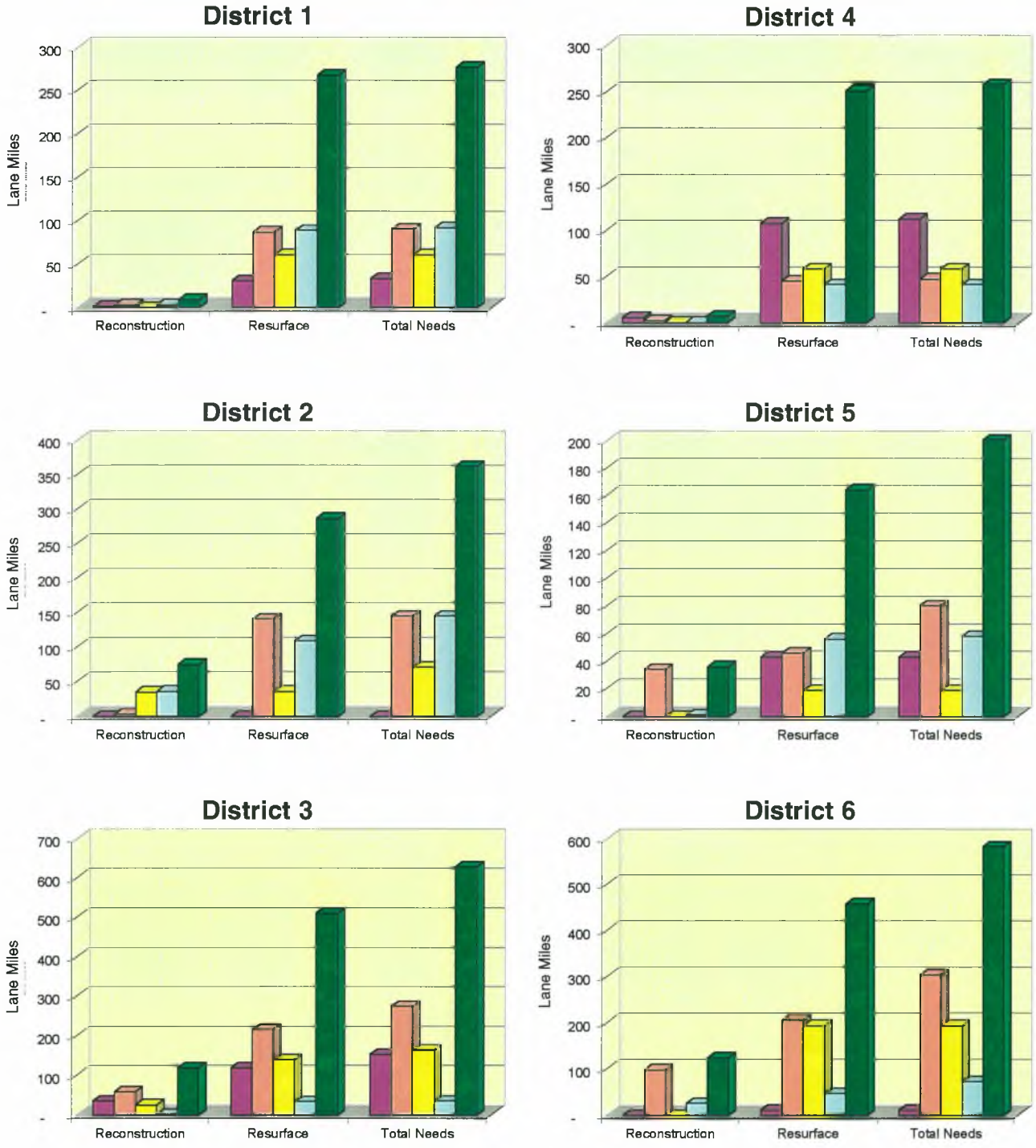


Figure 18.

INTERSTATE PRINCIPAL ART. MINOR ARTERIAL COLLECTOR TOTAL

2000 Pavement Needs
(State Highway System)

DISTRICT 1

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	2	1,111	31	3,762	34	4,873
PRINCIPAL ART.	3	1,669	87	8,239	91	9,908
MINOR ARTERIAL	-	261	61	5,515	61	5,776
COLLECTOR	3	1,407	89	9,725	92	11,132
TOTAL	9	4,448	268	27,241	277	31,689

DISTRICT 2

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	-	-	-	-	-	-
PRINCIPAL ART.	3	2,021	141	16,305	145	18,326
MINOR ARTERIAL	35	18,405	36	3,151	71	21,556
COLLECTOR	36	14,007	109	9,521	145	23,528
TOTAL	75	34,433	287	28,977	362	63,410

DISTRICT 3

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	35	20,287	119	11,110	154	31,397
PRINCIPAL ART.	59	28,654	216	23,115	275	51,769
MINOR ARTERIAL	25	9,598	140	11,852	165	21,450
COLLECTOR	1	223	34	2,522	35	2,745
TOTAL	119	58,762	510	48,599	629	107,361

DISTRICT 4

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	5	2,558	107	9,613	112	12,171
PRINCIPAL ART.	2	988	45	5,007	47	5,995
MINOR ARTERIAL	-	-	58	5,384	58	5,384
COLLECTOR	-	-	41	2,792	41	2,792
TOTAL	7	3,546	251	22,796	258	26,342

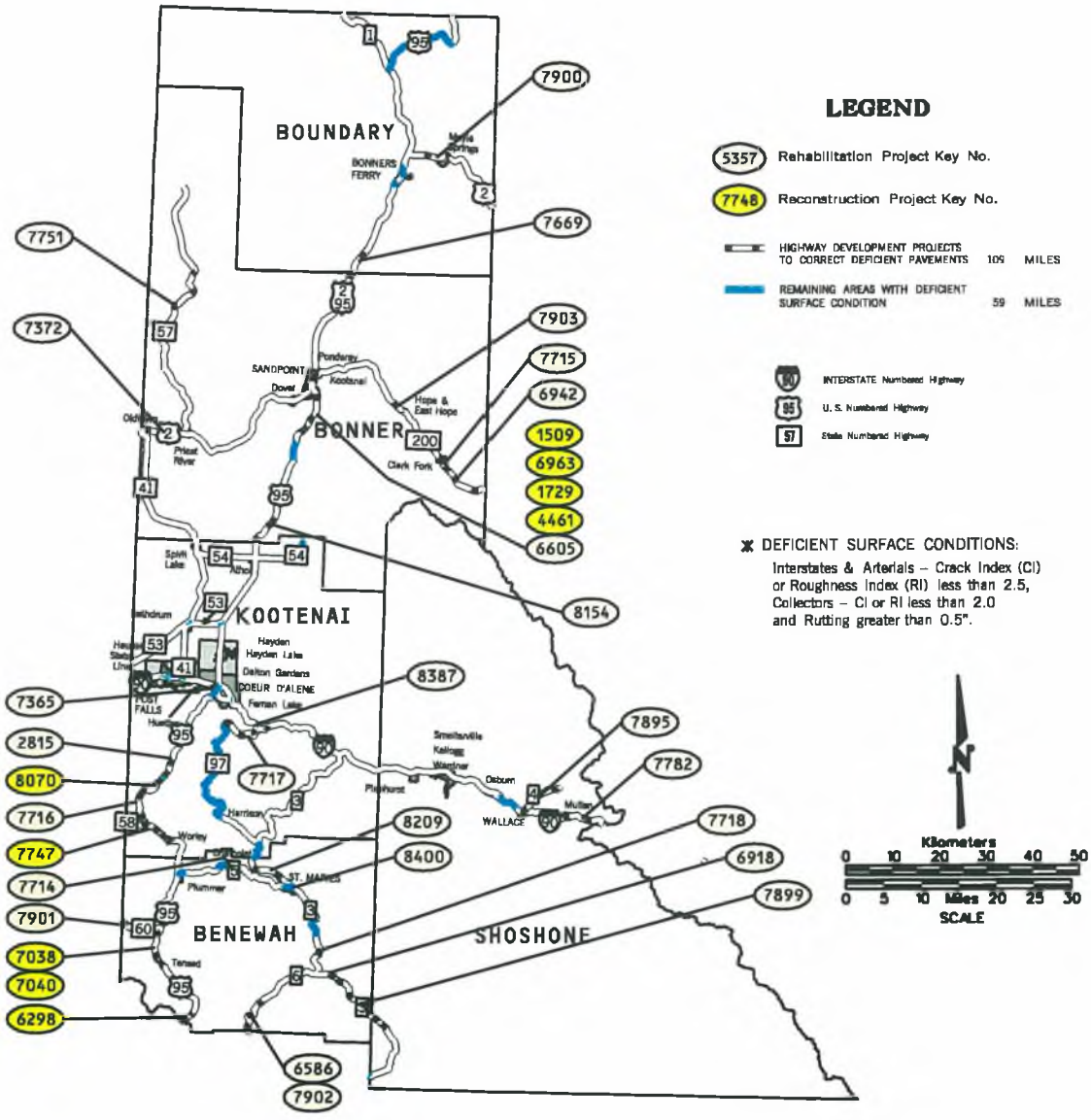
DISTRICT 5

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	-	-	43	4,150	43	4,150
PRINCIPAL ART.	34	17,695	46	5,615	80	23,310
MINOR ARTERIAL	-	-	19	1,617	19	1,617
COLLECTOR	1	671	56	4,326	58	4,997
TOTAL	36	18,366	164	15,708	200	34,074

DISTRICT 6

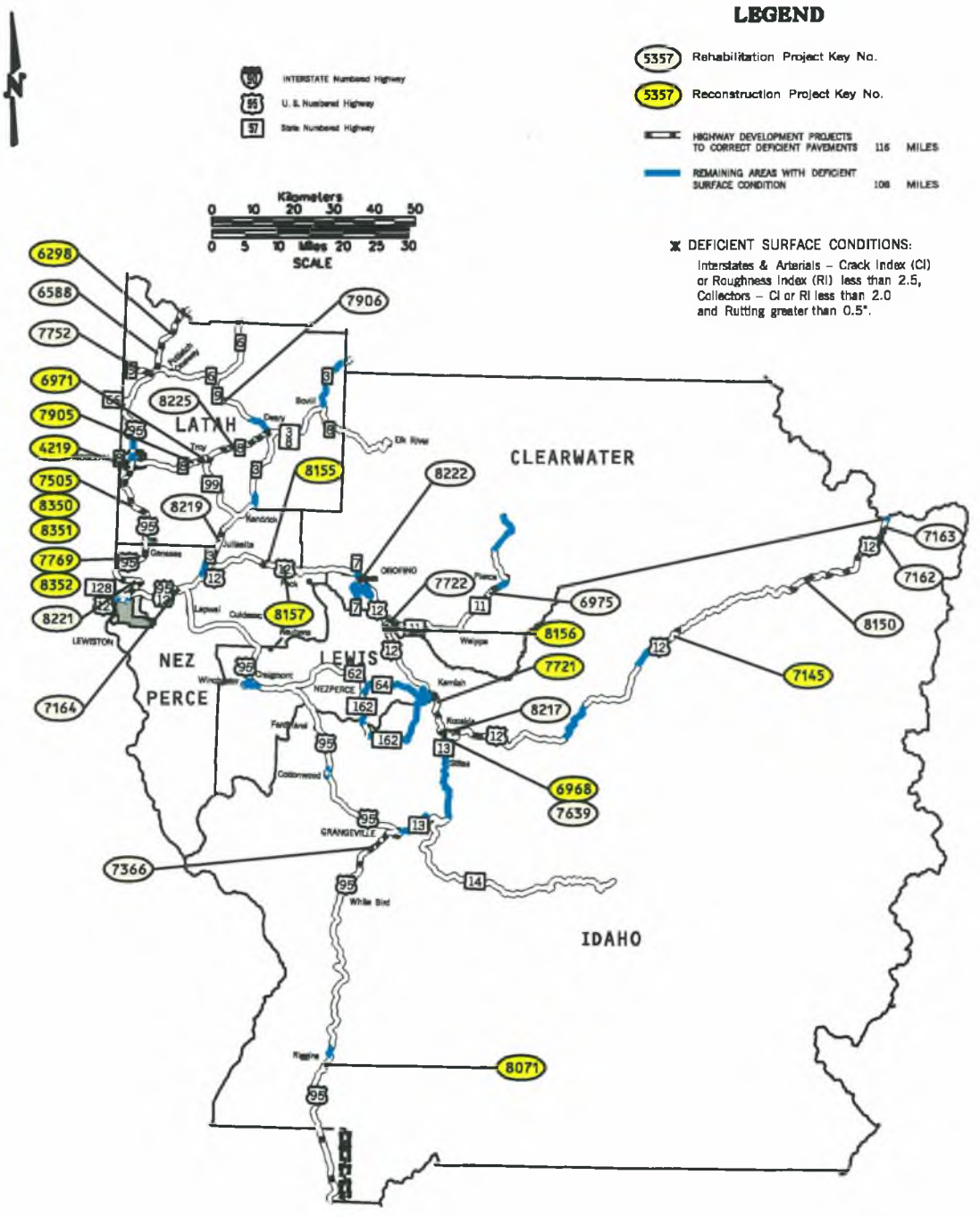
	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	-	-	11	986	11	986
PRINCIPAL ART.	98	46,691	206	18,083	304	64,774
MINOR ARTERIAL	-	-	194	13,785	194	13,785
COLLECTOR	26	10,281	47	3,900	73	14,181
TOTAL	124	56,972	458	36,754	583	93,726
GRAND TOTAL	370	176,527	1,938	180,075	2,385	356,602

DISTRICT 1
Programmed Projects vs. Pavement Deficiencies*
FY 2001 – 2005



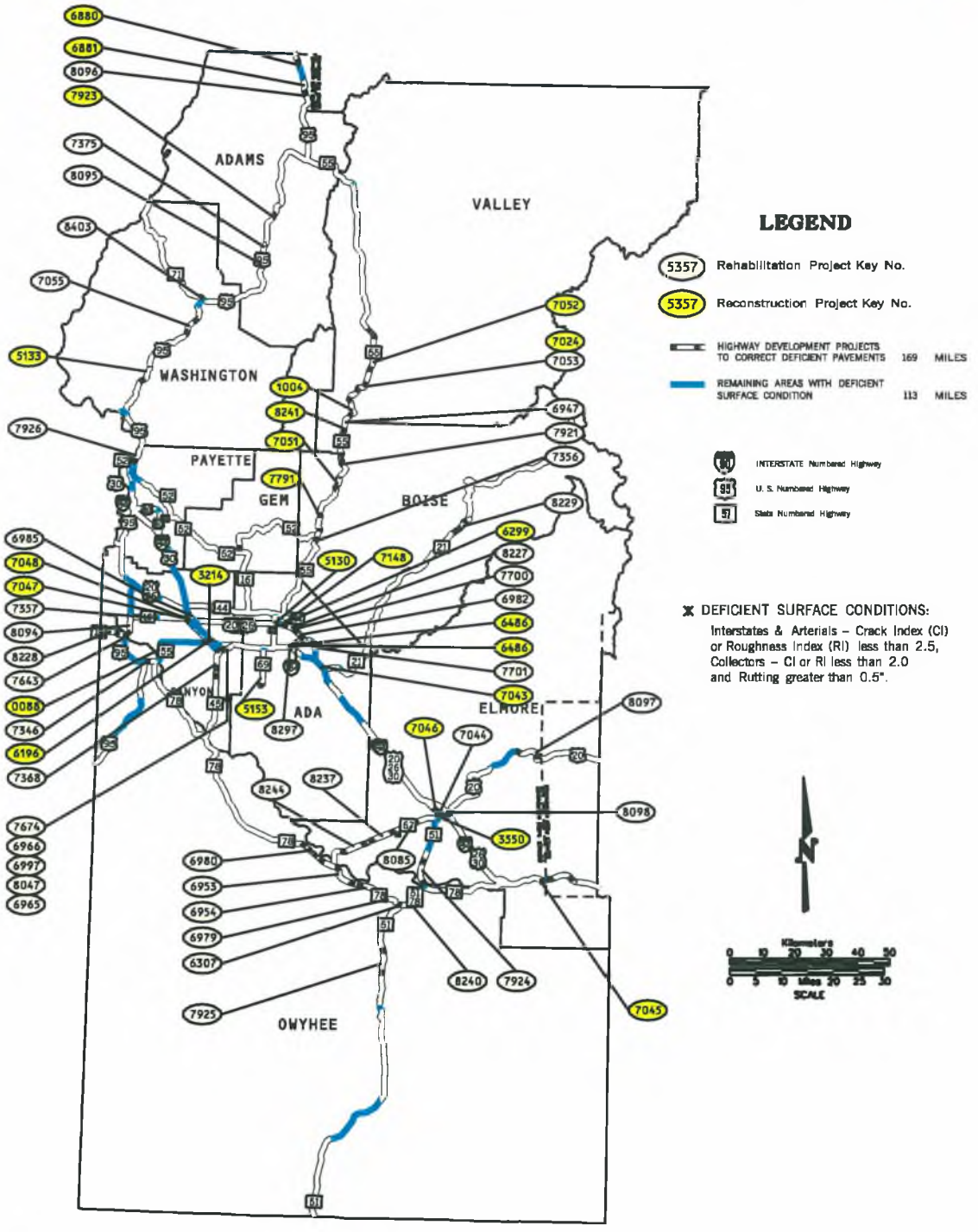
Map 9.

DISTRICT 2
Programmed Projects vs. Pavement Deficiencies*
FY2001 – 2005



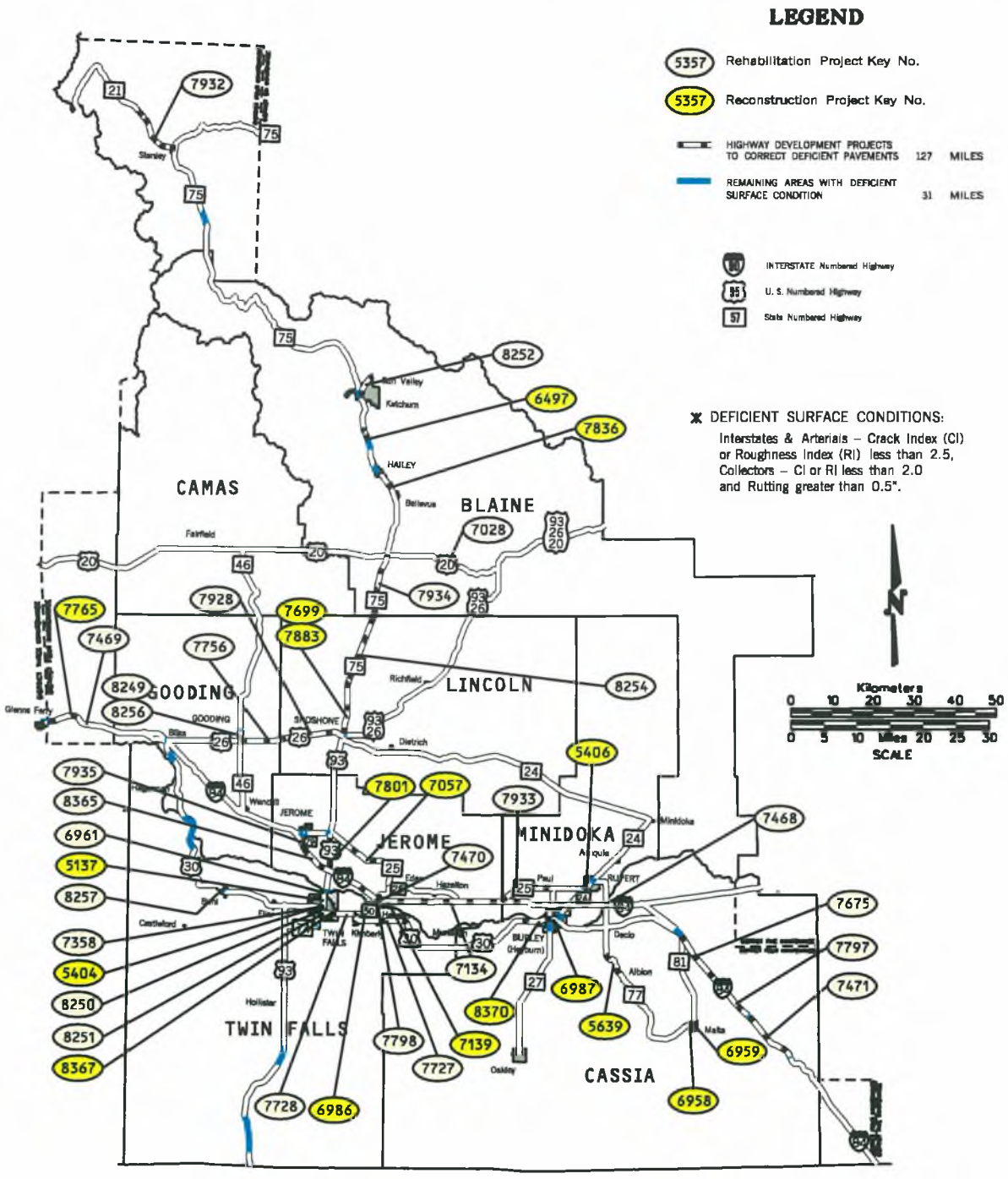
Map 10.

DISTRICT 3
Programmed Projects vs. Pavement Deficiencies*
FY 2001 – 2005



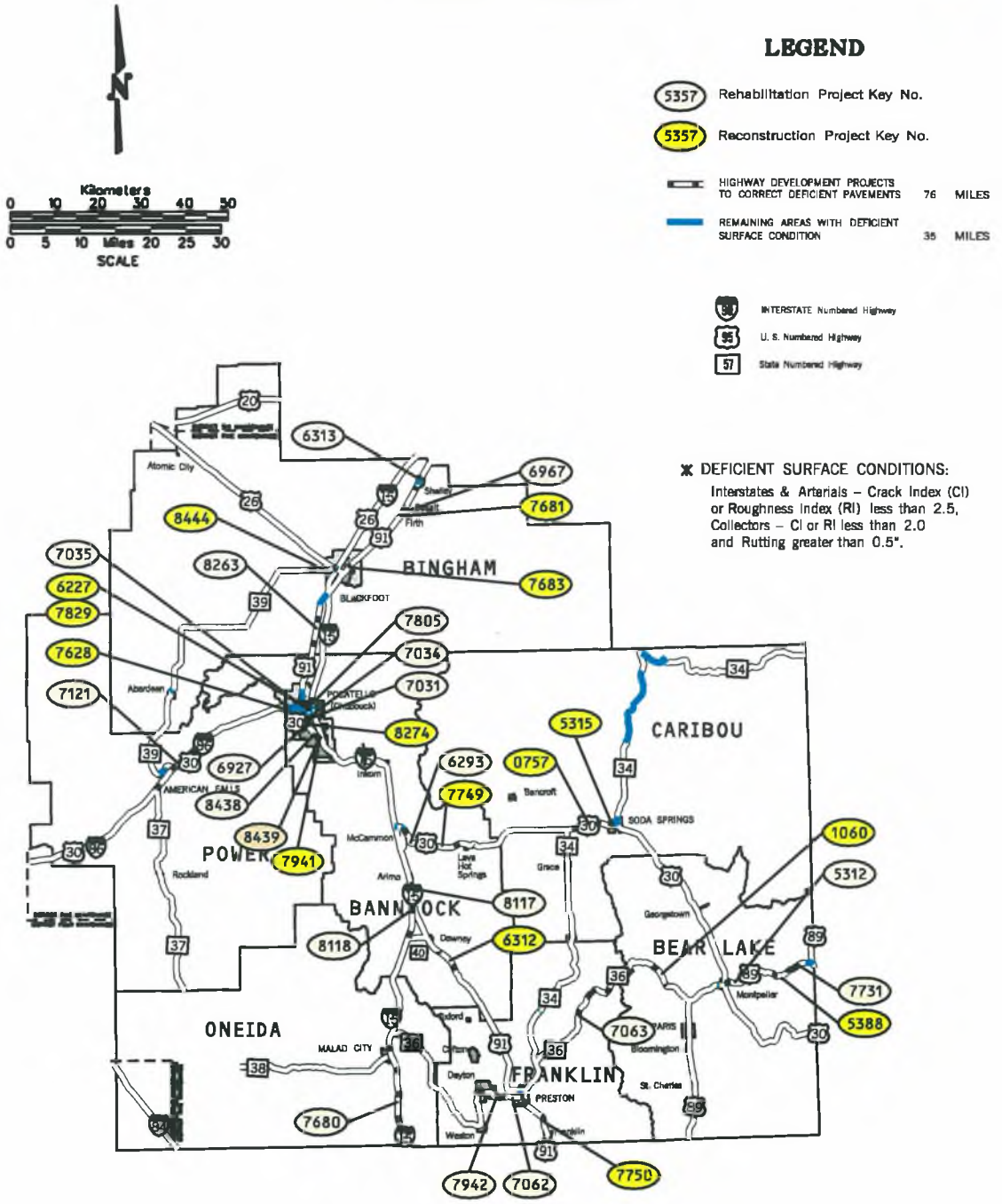
Map 11.

DISTRICT 4
Programmed Projects vs. Pavement Deficiencies *
FY 2001 – 2005

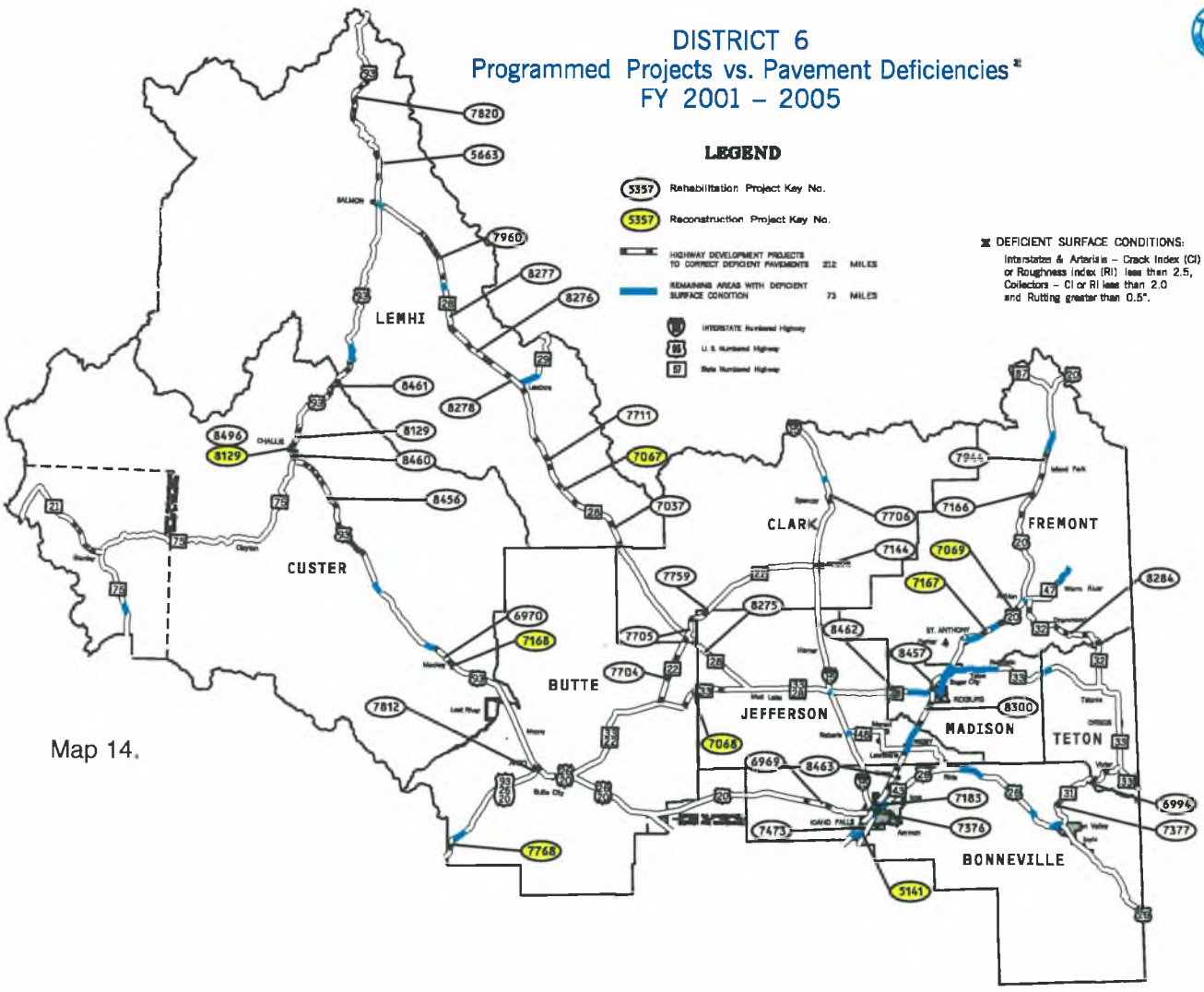


Map 12.

DISTRICT 5
Programmed Projects vs. Pavement Deficiencies *
FY 2001 – 2005



Map 13.


DISTRICT 6
Programmed Projects vs. Pavement Deficiencies*
FY 2001 – 2005
LEGEND
5357 Rehabilitation Project Key No.
5357 Reconstruction Project Key No.
HIGHWAY DEVELOPMENT PROJECTS TO CORRECT DEFICIENT PAVEMENTS 212 MILES
REMAINING AREAS WITH DEFICIENT SURFACE CONDITION 73 MILES
INTERSTATE Numbered Highway
U. S. Numbered Highway
State Numbered Highway
DEFICIENT SURFACE CONDITIONS:
Interstates & Arterials – Crack Index (CI) or Roughness Index (RI) less than 2.5, Collectors – CI or RI less than 2.0 and Rutting greater than 0.5".
LEMHI
CUSTER
BUTTE
CLARK
FREMONT
JEFFERSON
MADISON
TETON
BONNEVILLE
7820
5663
7960
8277
8276
8461
8278
8496
8129
8460
8456
7711
7067
7037
7759
7705
7704
6970
7168
7812
7768
7706
7166
7144
7069
7167
8275
8462
8457
8284
8300
7068
6969
8463
7183
7376
7473
5141
6994
7377

Map 14.

Section 5
SEALCOATS

Sealcoat projects are designed to preserve and maintain rural Idaho highways.

Sealcoats are an important part of the department's preventative-maintenance program. Preventative maintenance slows the rate of pavement deterioration which increases the service life of our highway system. Sealcoats help protect our pavements by reducing damage caused by oxidation and moisture and improve skid resistance.

Figures 19 and 20 provide a five-year look at sealcoats from a statewide perspective. Centerline and lane miles of sealcoat projects are tabulated for years 1996 through 2000.

Figure 21 shows the five-year average of lane miles sealcoated and the percentage of lane miles sealcoated by district.

District 6 has the highest "percentage" of lane miles sealcoated annually (15.8% or 358 lane miles).

Figures 22 through 27 show the miles sealcoated from 1996 to 2000 in each of ITD's six districts.

STATEWIDE FIVE-YEAR SEALCOAT HISTORY
(1996 - 2000)

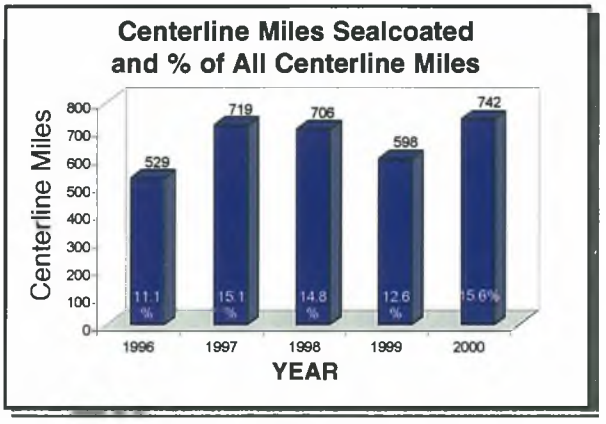


Figure 19

Figure 20

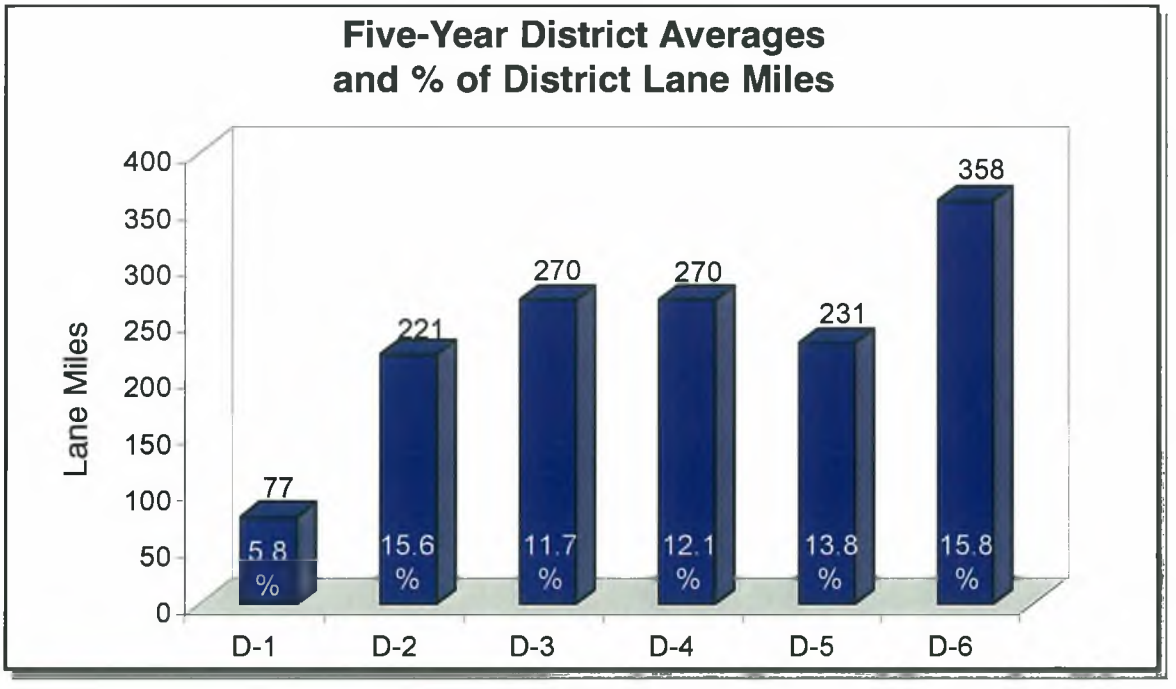
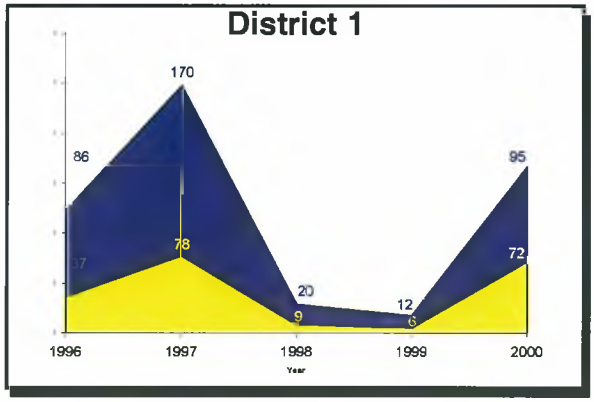
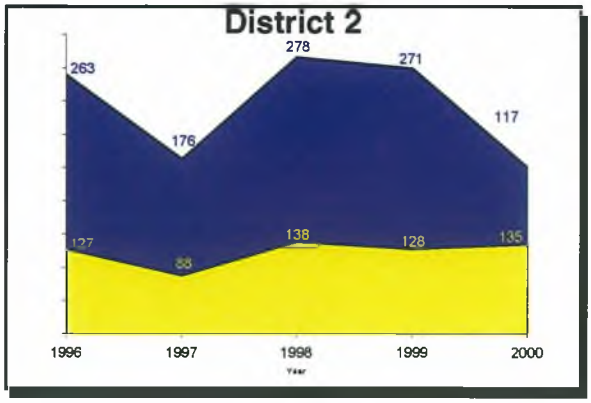


Figure 21

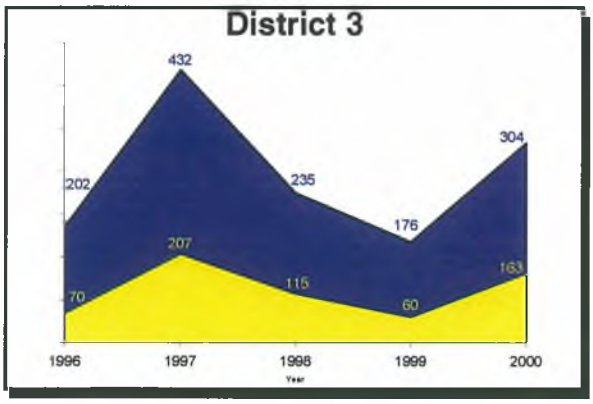
STATEWIDE FIVE-YEAR SEALCOAT HISTORY BY DISTRICT
(1996 - 2000)



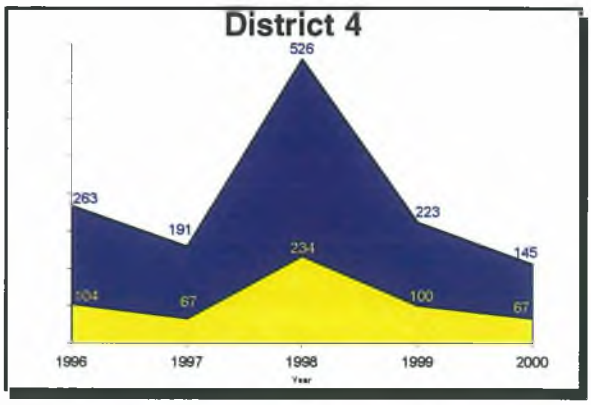
5-Year Lane Mile Average = 77



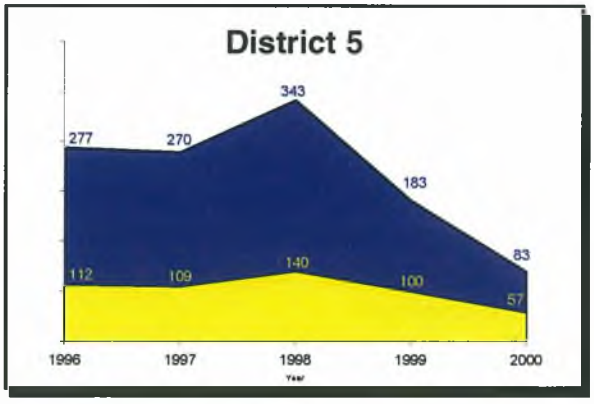
5-Year Lane Mile Average = 221



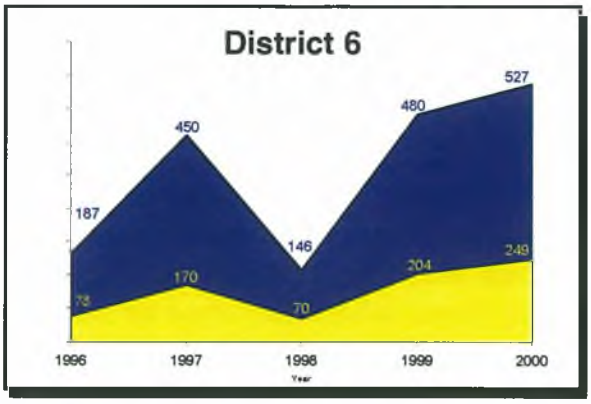
5-Year Lane Mile Average = 270



5-Year Lane Mile Average = 270



5-Year Lane Mile Average = 231



5-Year Lane Mile Average = 358

Lane Miles Centerline Miles

Figures 22 through 27

Section 6
SUMMARY

MAINTENANCE, REHABILITATION, AND RECONSTRUCTION

Idaho is making significant progress in the reduction of pavement deficiencies on the State Highway System. Pavements that are considered deficient have declined from nearly 40% in 1993 to 18% projected for calendar year 2000.

This reduction in deficiencies can be attributed to:

- **Maintenance:** Sealcoats and other activities slow the rate of deterioration. The result of a strong maintenance program is that fewer deficiencies come on the system each year.

- **Rehabilitation:** The minor rehabilitation program has reduced pavement deficiencies. Under this program, pavements are resurfaced before they deteriorate to the point that reconstruction is necessary. The program allows us to keep our pavements in good condition.

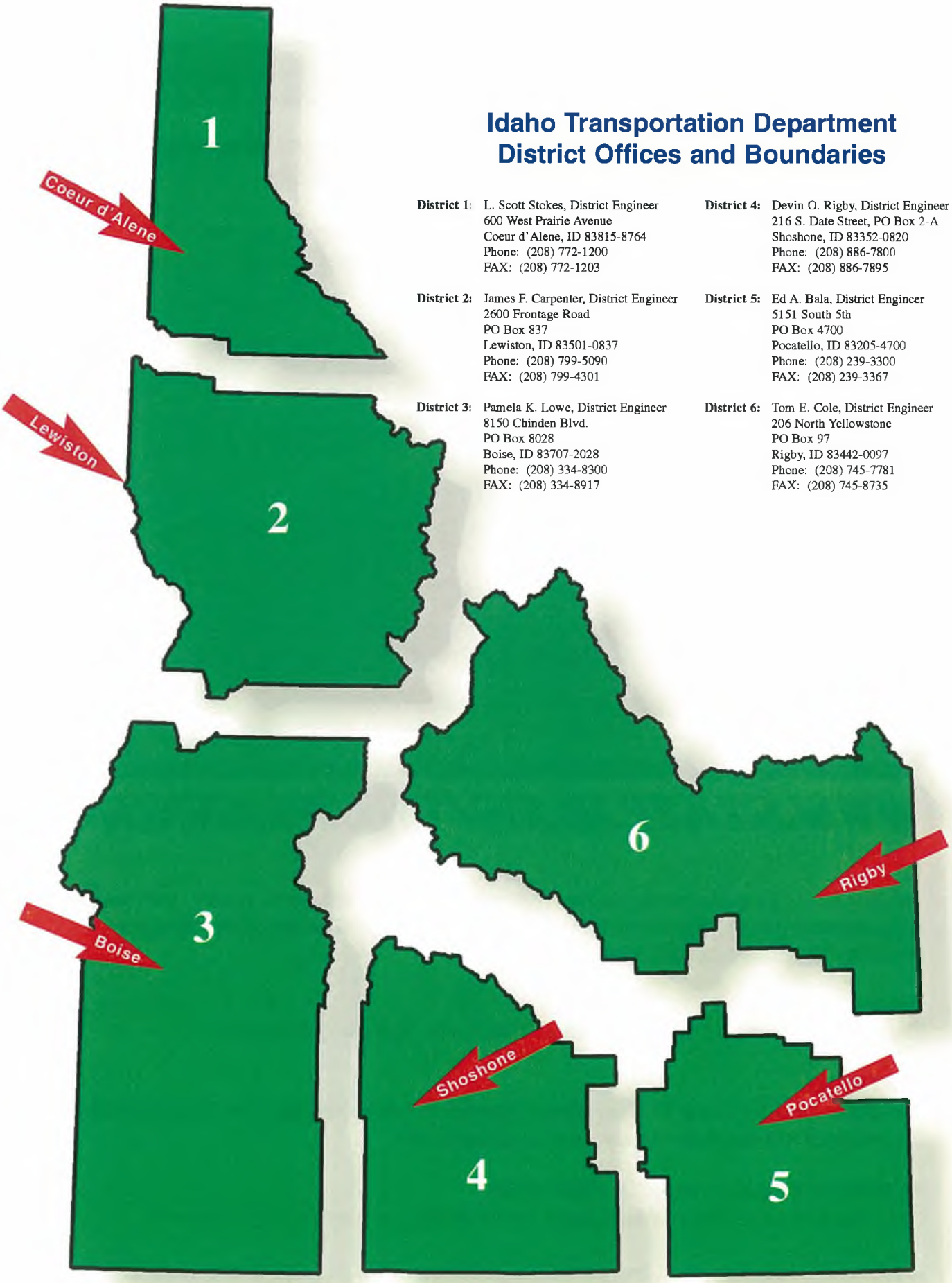
- **Reconstruction:** When pavements have reached the end of their service life an effective reconstruction program is necessary.

Maintenance, rehabilitation, and reconstruction are all appropriate tools that need to be used at different times in the life of a section of pavement. It is important to select the proper tool to use at the appropriate time. Wise future project selections will allow Idaho to continue:

- spending its limited roadway dollars wisely, and

- reducing roadway deficiencies and the rate at which roadways become deficient.

Idaho Transportation Department
District Offices and Boundaries



District 1: L. Scott Stokes, District Engineer
600 West Prairie Avenue
Coeur d'Alene, ID 83815-8764
Phone: (208) 772-1200
FAX: (208) 772-1203

District 2: James F. Carpenter, District Engineer
2600 Frontage Road
PO Box 837
Lewiston, ID 83501-0837
Phone: (208) 799-5090
FAX: (208) 799-4301

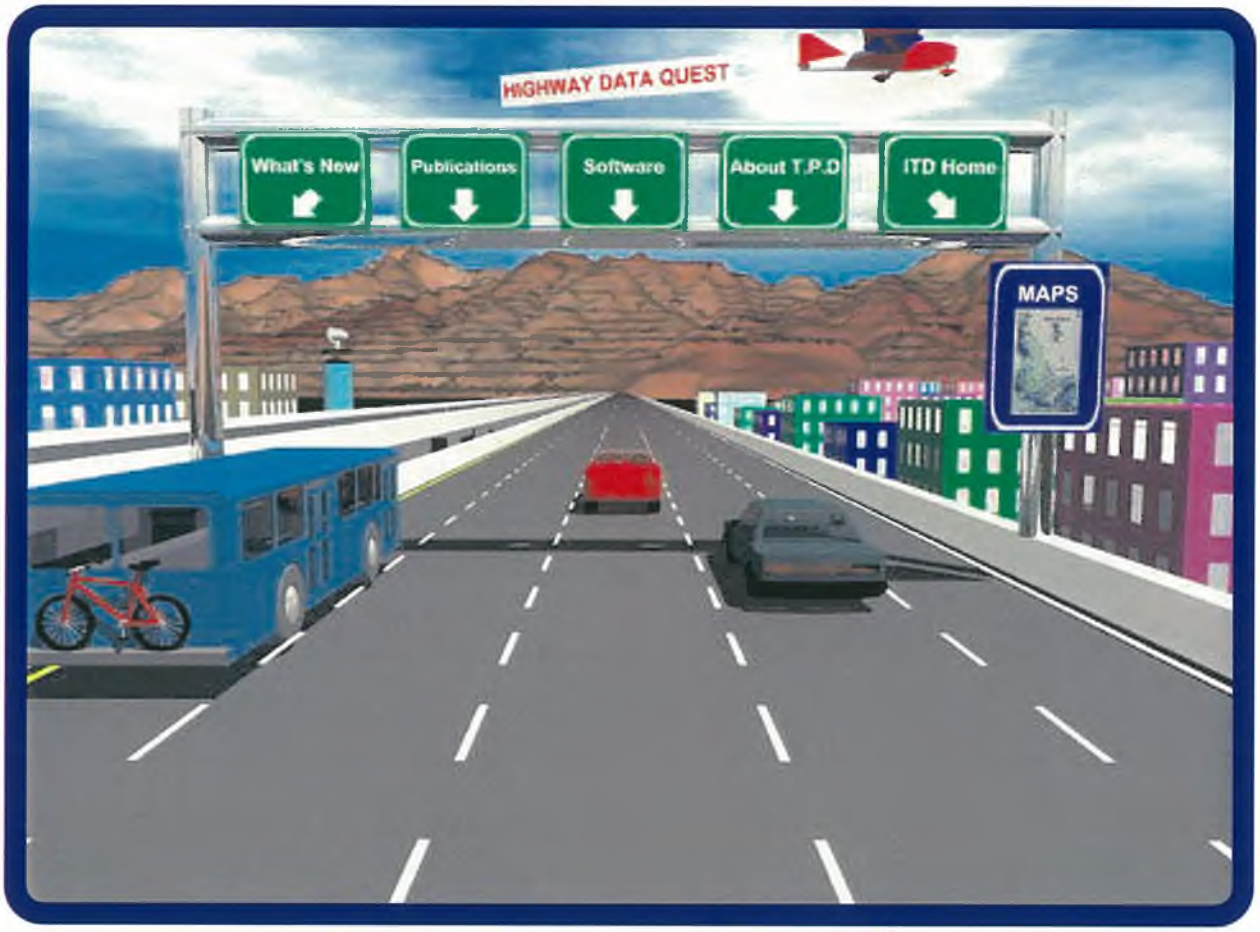
District 3: Pamela K. Lowe, District Engineer
8150 Chinden Blvd.
PO Box 8028
Boise, ID 83707-2028
Phone: (208) 334-8300
FAX: (208) 334-8917

District 4: Devin O. Rigby, District Engineer
216 S. Date Street, PO Box 2-A
Shoshone, ID 83352-0820
Phone: (208) 886-7800
FAX: (208) 886-7895

District 5: Ed A. Bala, District Engineer
5151 South 5th
PO Box 4700
Pocatello, ID 83205-4700
Phone: (208) 239-3300
FAX: (208) 239-3367

District 6: Tom E. Cole, District Engineer
206 North Yellowstone
PO Box 97
Rigby, ID 83442-0097
Phone: (208) 745-7781
FAX: (208) 745-8735

VISIT OUR WEBSITE!



WWW.STATE.ID.US/ITD/PLANNING

The Division of Planning provides a variety of useful highway data, maps, reports, software, and transportation-related links on our web site. Listed below is a sample of the information available at www.state.id.us/itd/planning.

HIGHWAY DATA

Choose from a variety of tabular data about Idaho's state highway infrastructure.

SOFTWARE

The division has developed it's own software that you can download from our site to simplify the process of viewing Idaho's transportation-planning data.

PLANNING TOPICS AND RELATED SITES

Other topics and sites that may have useful transportation planning-related information.

If you need information about transporation in Idaho, our site is just a click away!

Notes

Pavement Management System