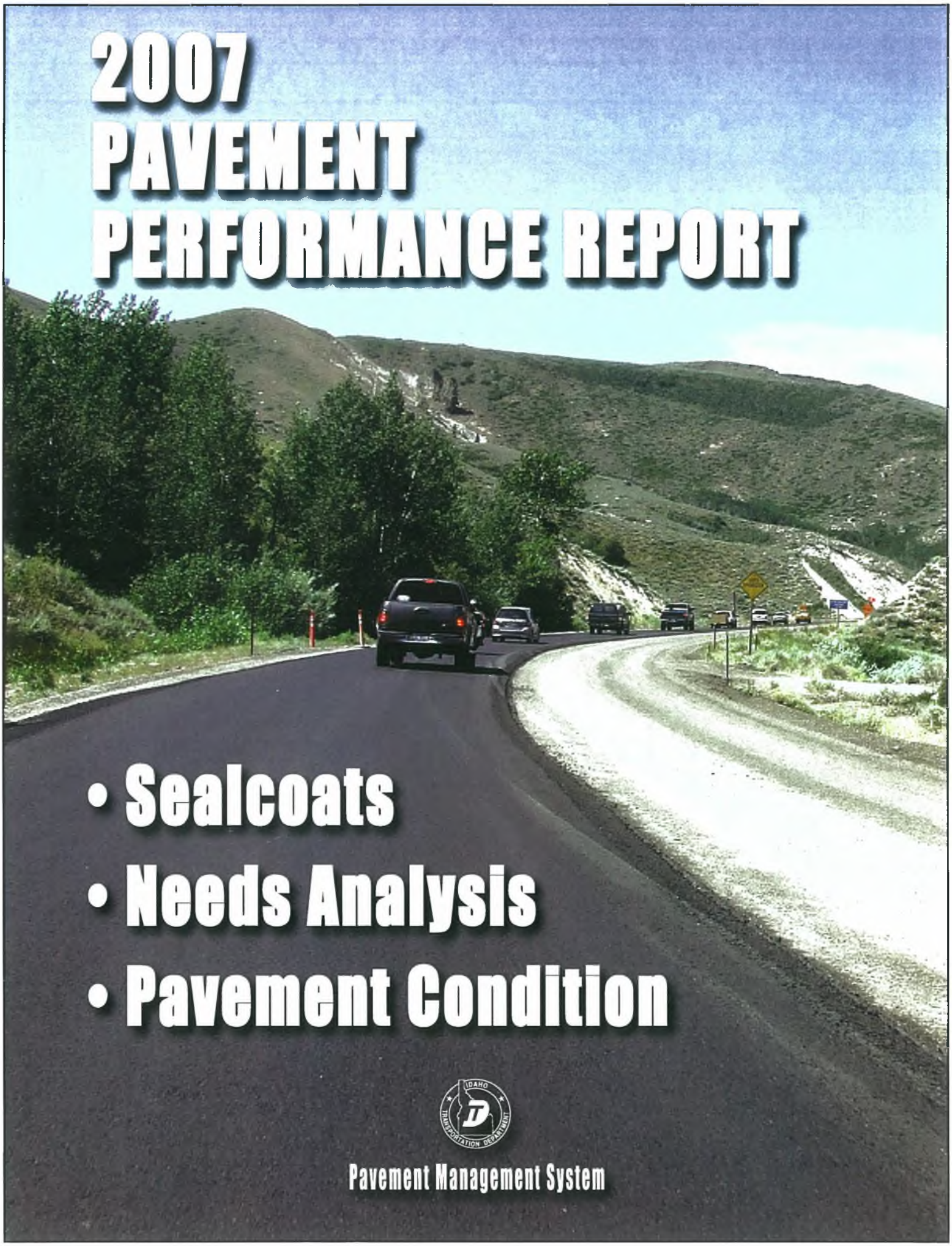
2007 PAVEMENT PERFORMANCE REPORT



- Sealcoats
- Needs Analysis
- Pavement Condition

Pavement Management System

This report was produced by the

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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.

TABLE OF CONTENTS

PURPOSE 1

EXECUTIVE SUMMARY 2

SECTION 1

Pavement Management System Overview 3

SECTION 2

General Information 5

SECTION 3

Pavement Condition 9

SECTION 4

Needs Analysis 24

SECTION 5

Sealcoats 34

SECTION 6

Summary 37

ITD DISTRICT OFFICES

Addresses and Phone Numbers 38

IDAHO'S TRANSPORTATION PLANNING WEB SITE

Summary 39

Rough concrete, as shown in the above photo, is a clear reminder to drivers that many of Idaho's most important highways are aging and in need of repair.

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 20% by the end of calendar year 2006. Reducing pavement deficiencies is a high priority for the department and has been accomplished by:

- 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

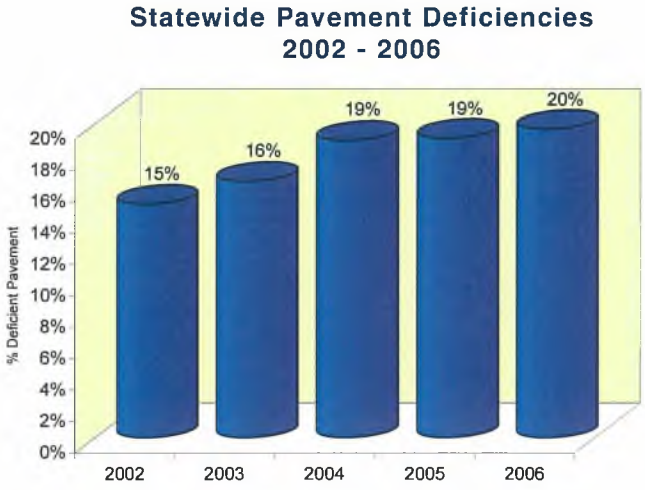


Figure 1.

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 summarizes current statewide needs by functional class. The estimated repair costs on the state highway system alone are more than $700 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.

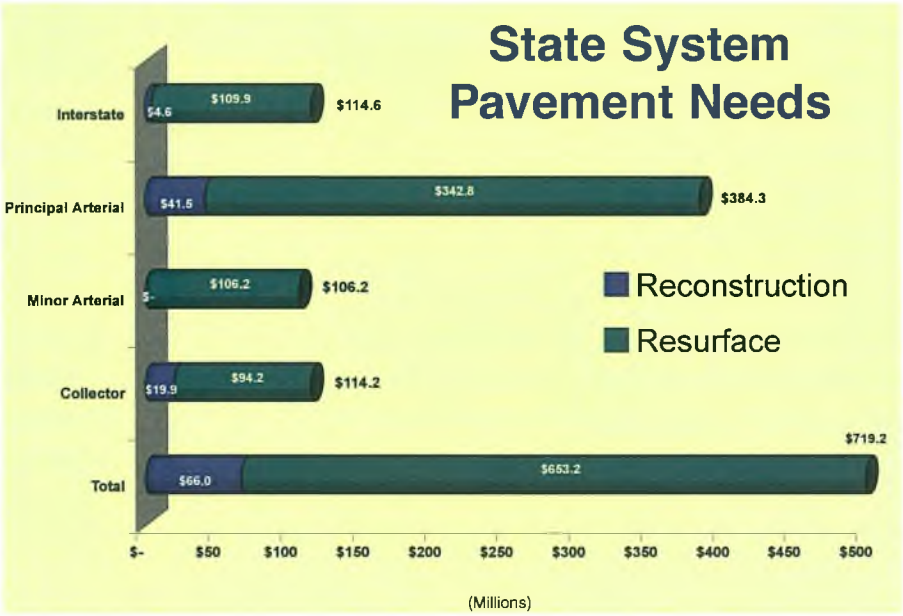


Figure 2.

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 both ITD and consultant contract. 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.

Idaho'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 pave-

ment management. Deflection data for project-level pavement management is collected, analyzed, and reported by the Materials section.

PAVEMENT-CONDITION TESTING

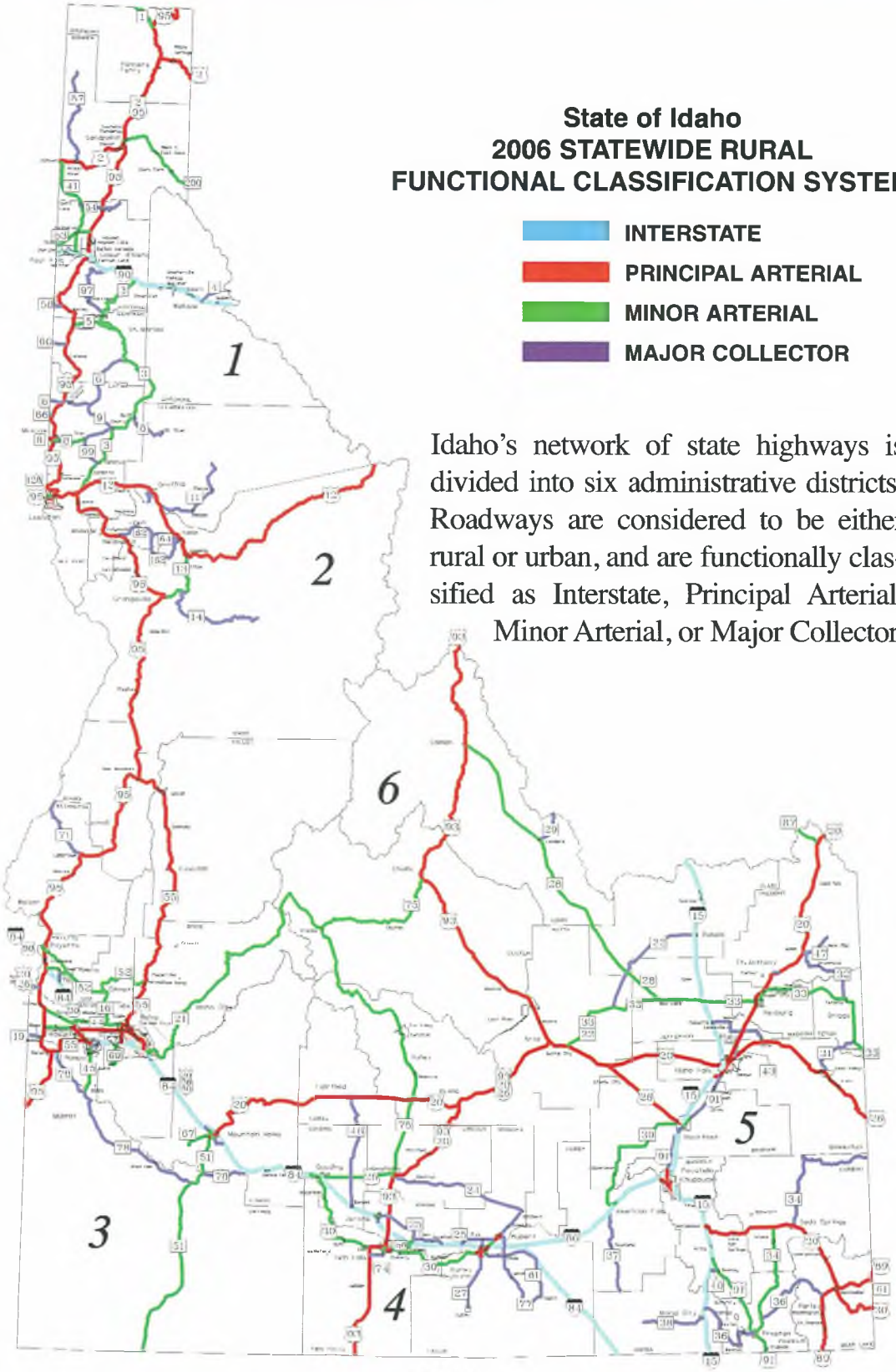
Pavement-condition data is an important component of Idaho's PMS. Two-lane roads are tested in one direction while interstates and divided arterials are tested in both ascending and descending directions. Pavement-condition data elements are collected as follows:

- **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 digital images of pavement on the entire State Highway System each year. The Pavement Management Engineer then uses the digital images to determine the type, extent, and severity of cracking within each PMS section. Based on this input a Cracking Index (CI) is calculated 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.



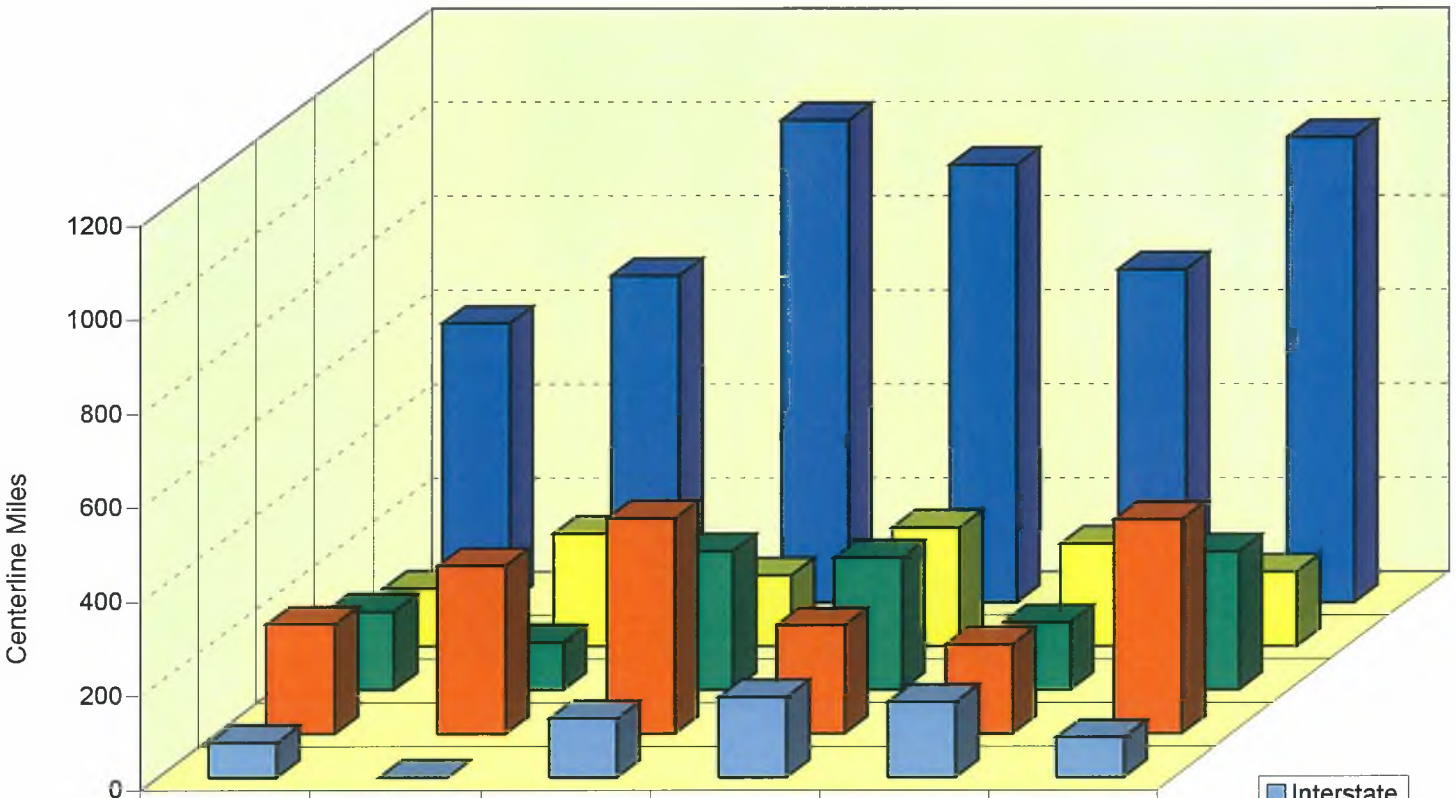
State of Idaho
2006 STATEWIDE RURAL
FUNCTIONAL CLASSIFICATION SYSTEM

- 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

2006 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	232	356	456	230	189	454
Minor Art	166	101	295	280	143	294
Collector	123	239	150	252	217	158
TOTAL	595	695	1026	931	709	990

Figure 3.

Centerline mileage, by district and functional class, is shown in Figures 3, 4, and 5. There are 4,946 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 595 centerline miles (12% of total mileage).

2006 Statewide Centerline Miles

(By Functional Class)

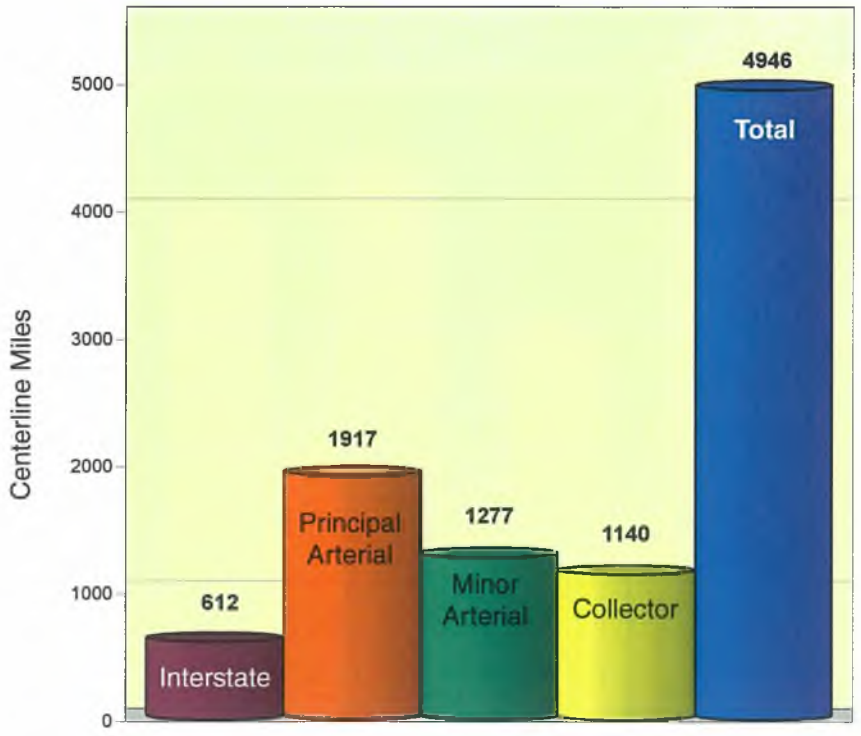


Figure 4.

2006 Centerline Miles by District

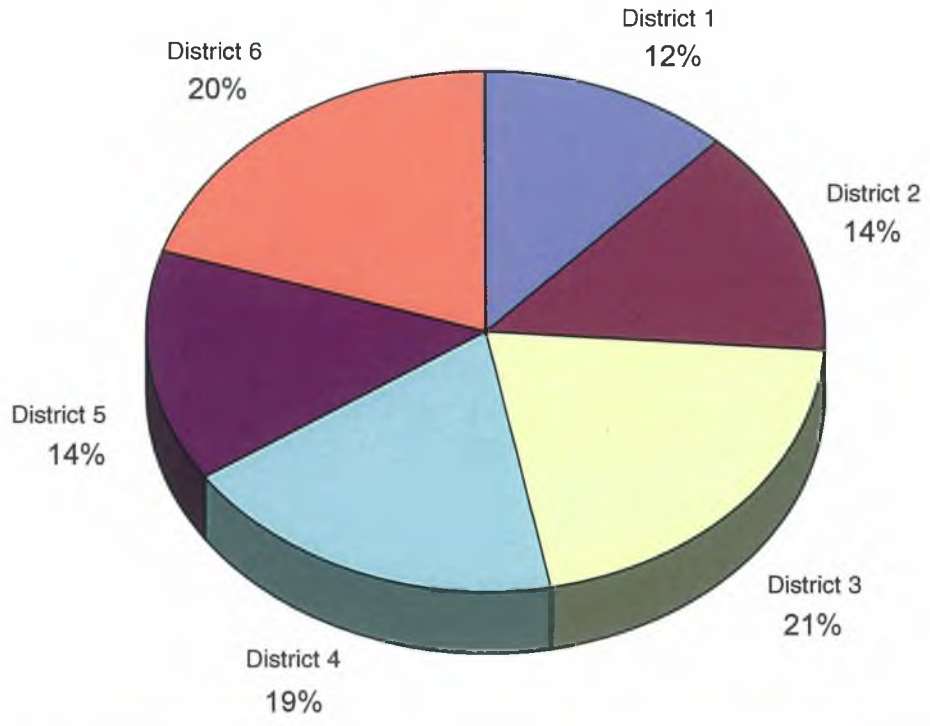
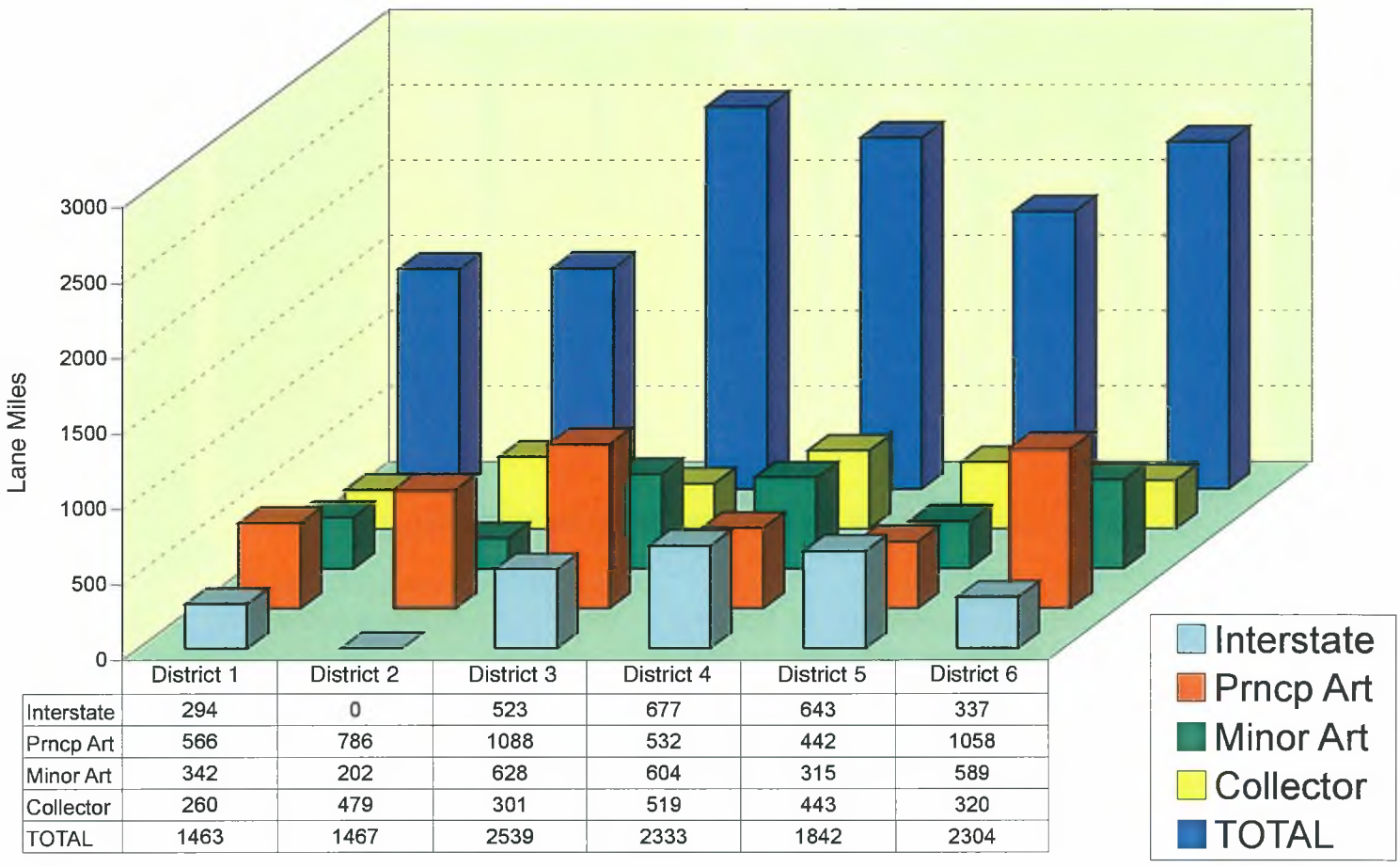


Figure 5.

2006 Lane Miles by District



	District 1	District 2	District 3	District 4	District 5	District 6
Interstate	294	0	523	677	643	337
Prncp Art	566	786	1088	532	442	1058
Minor Art	342	202	628	604	315	589
Collector	260	479	301	519	443	320
TOTAL	1463	1467	2539	2333	1842	2304

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 11,948 lane miles.

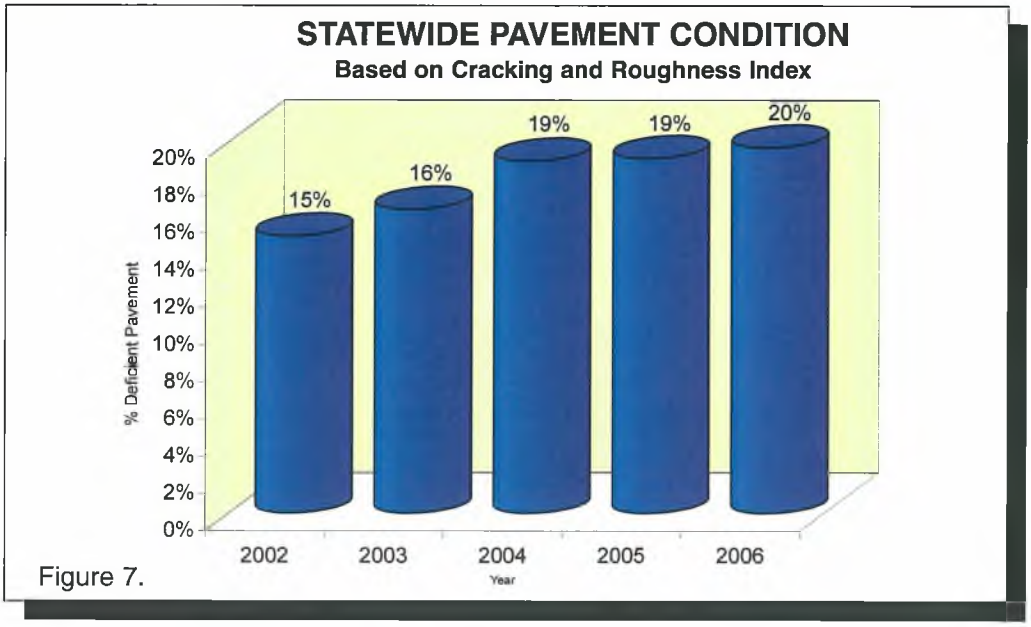


Figure 7.

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

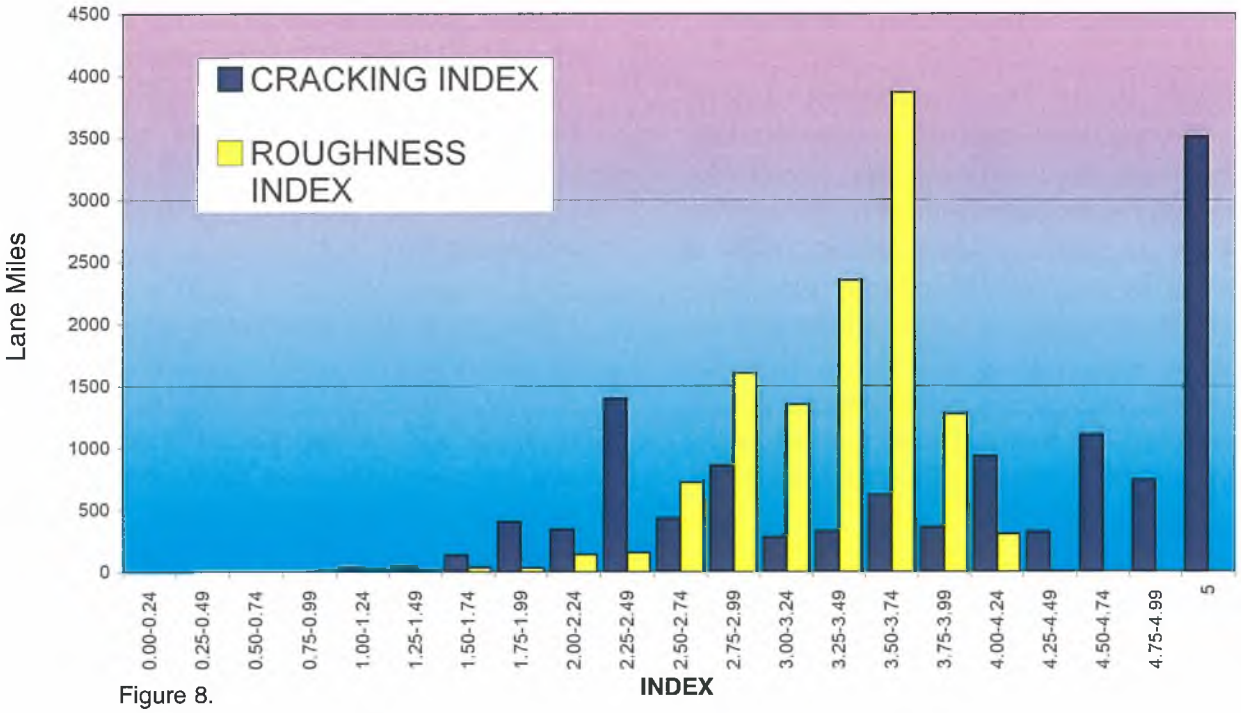


Figure 8.

Distribution of Lowest Index (Cracking or Roughness)

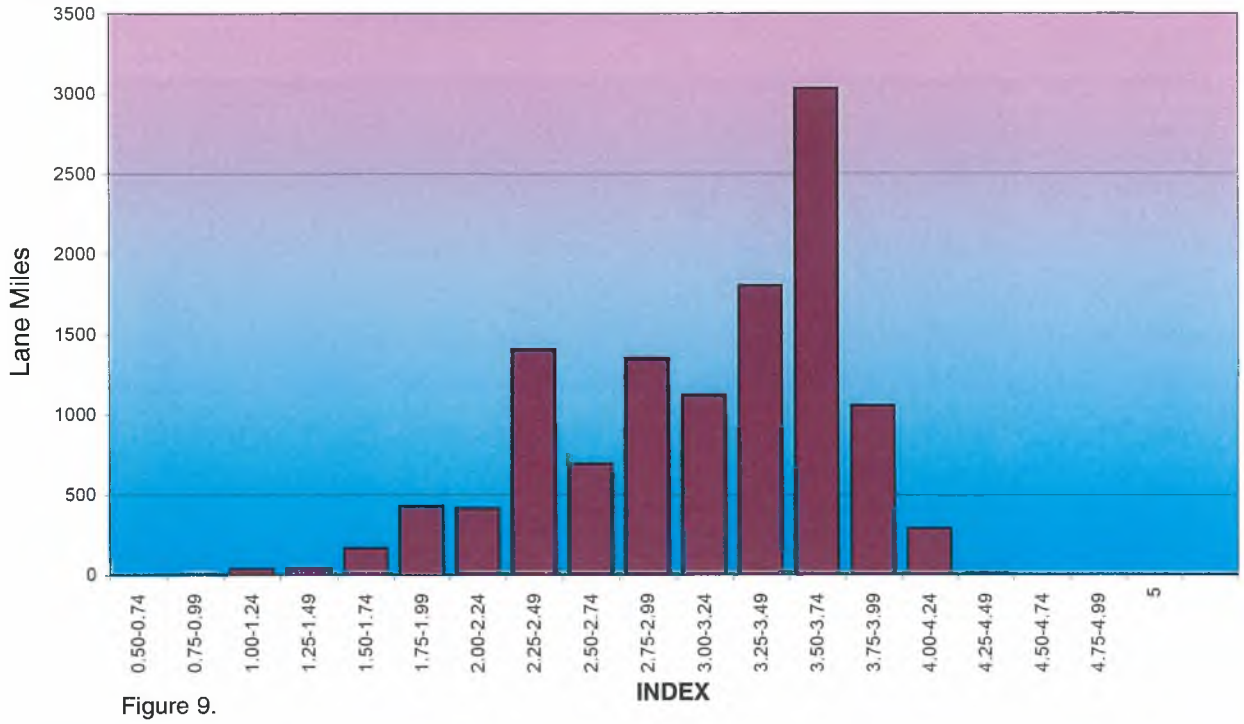


Figure 9.

PAVEMENT CONDITION (continued)

Figures 10 and 11 are summaries of pavement conditions from 2001 through 2005. The percentage of pavements considered good has risen from a statewide low of about 18.7% in 1994 to approximately 60% as shown for the end of calendar year 2006. Fair pavements have declined from approximately 44% in 1994 to 19% for 2006. The percentage of pavements considered poor or very poor has declined from a maximum of almost 38% in 1994 to 20% at the end of calendar year 2006.

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."

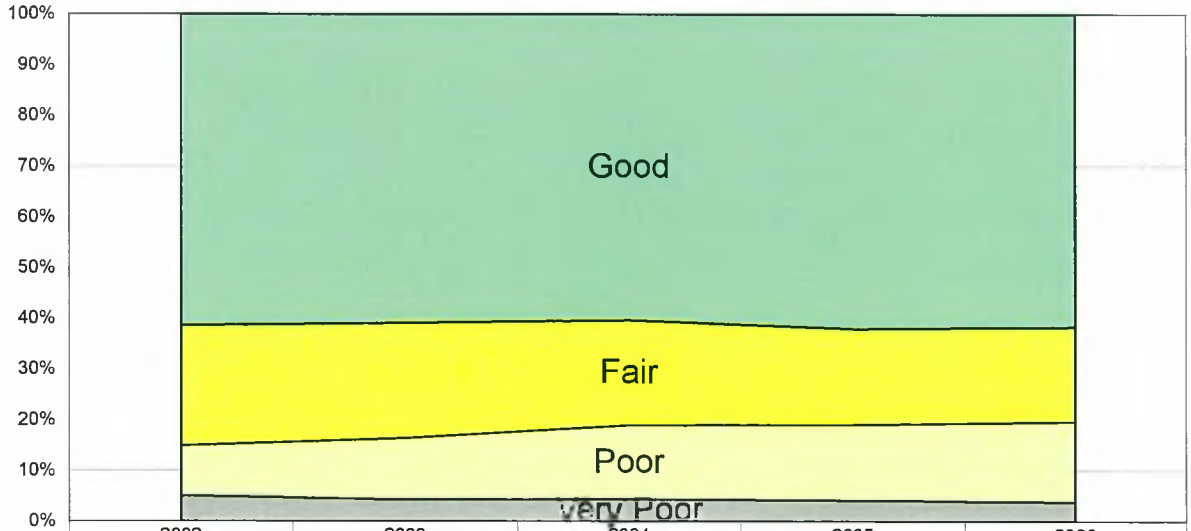
Current pavement condition by district is shown in Figure 13. The percentages in Figure 13 are based on statewide lane miles. For example, 14% of all pavements statewide considered good and 4% of all pavements considered very poor are located in District 1.

Figure 14 is also a summary of pavement condition based on total lane miles in each district, as opposed to statewide mileage. For example: 1% of District 1 roadways are considered very poor; and 60% of District 5 roadways are considered good.

STATEWIDE PAVEMENT CONDITION

By Lane Miles

Condition based on Cracking and Roughness Index



	2002	2003	2004	2005	2006
Good	7,267	7,196	7,154	7,364	7,318
Fair	2,801	2,691	2,453	2,244	2,223
Poor	1,170	1,435	1,735	1,772	1,879
Very Poor	593	497	510	494	457

Figure 10.

District Pavement Condition

by Lane Miles

Condition based on cracking and roughness indices

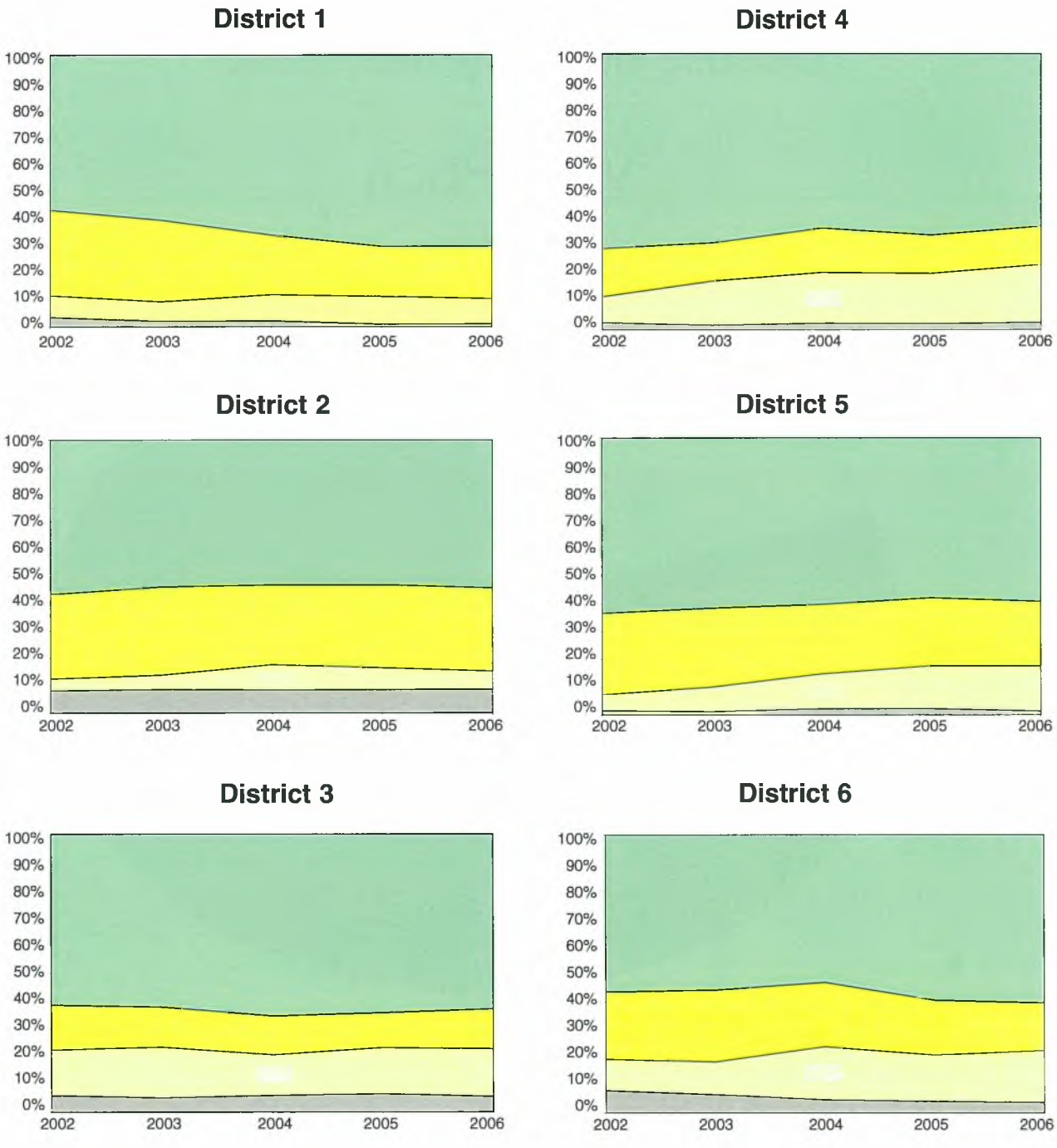


Figure 11.

2006 Statewide Pavement Condition

Condition Based on Cracking and Roughness Index

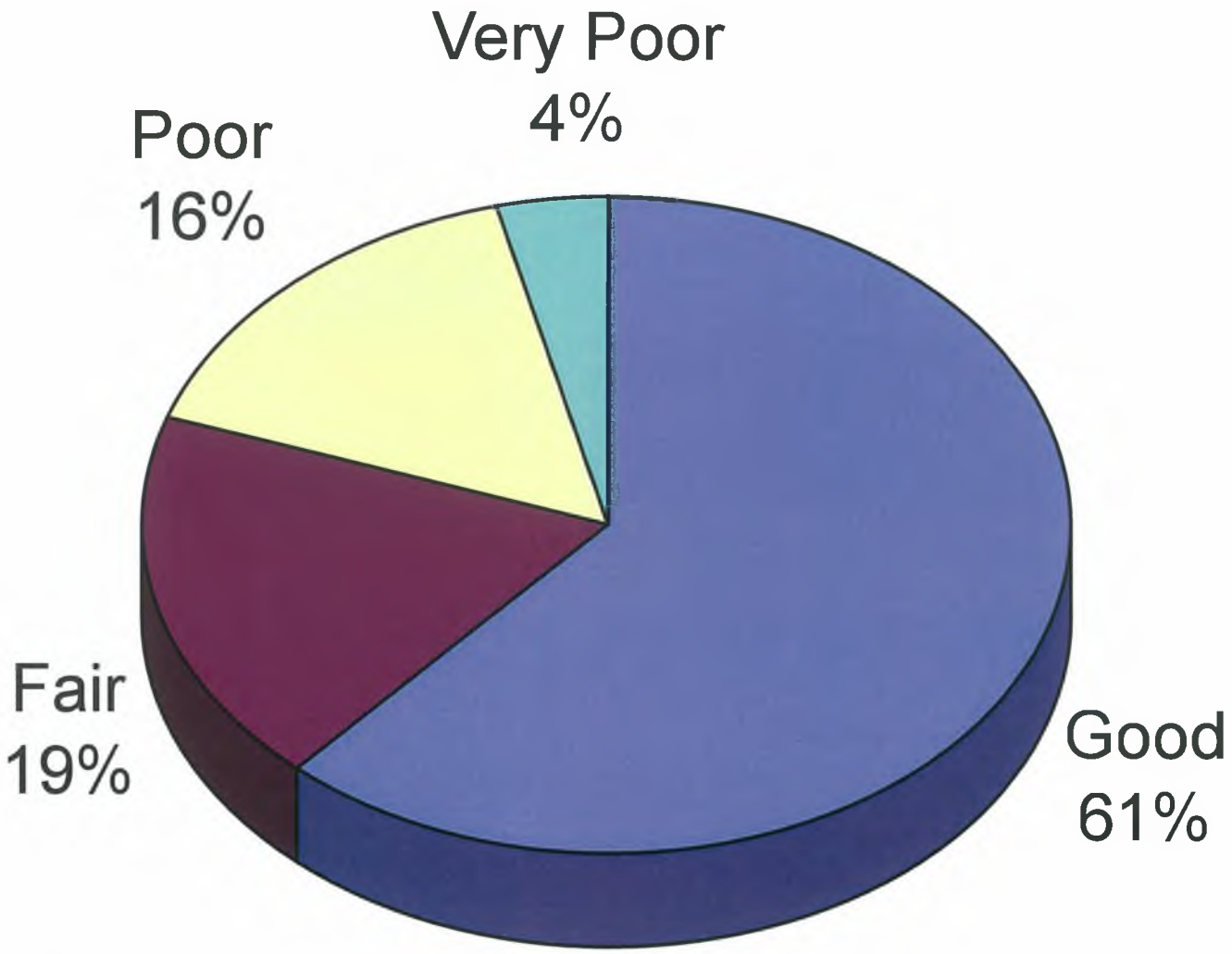


Figure 12.

2006 Pavement Condition
(District Percentage of Statewide Total)

Condition Based on Cracking and Roughness Indices

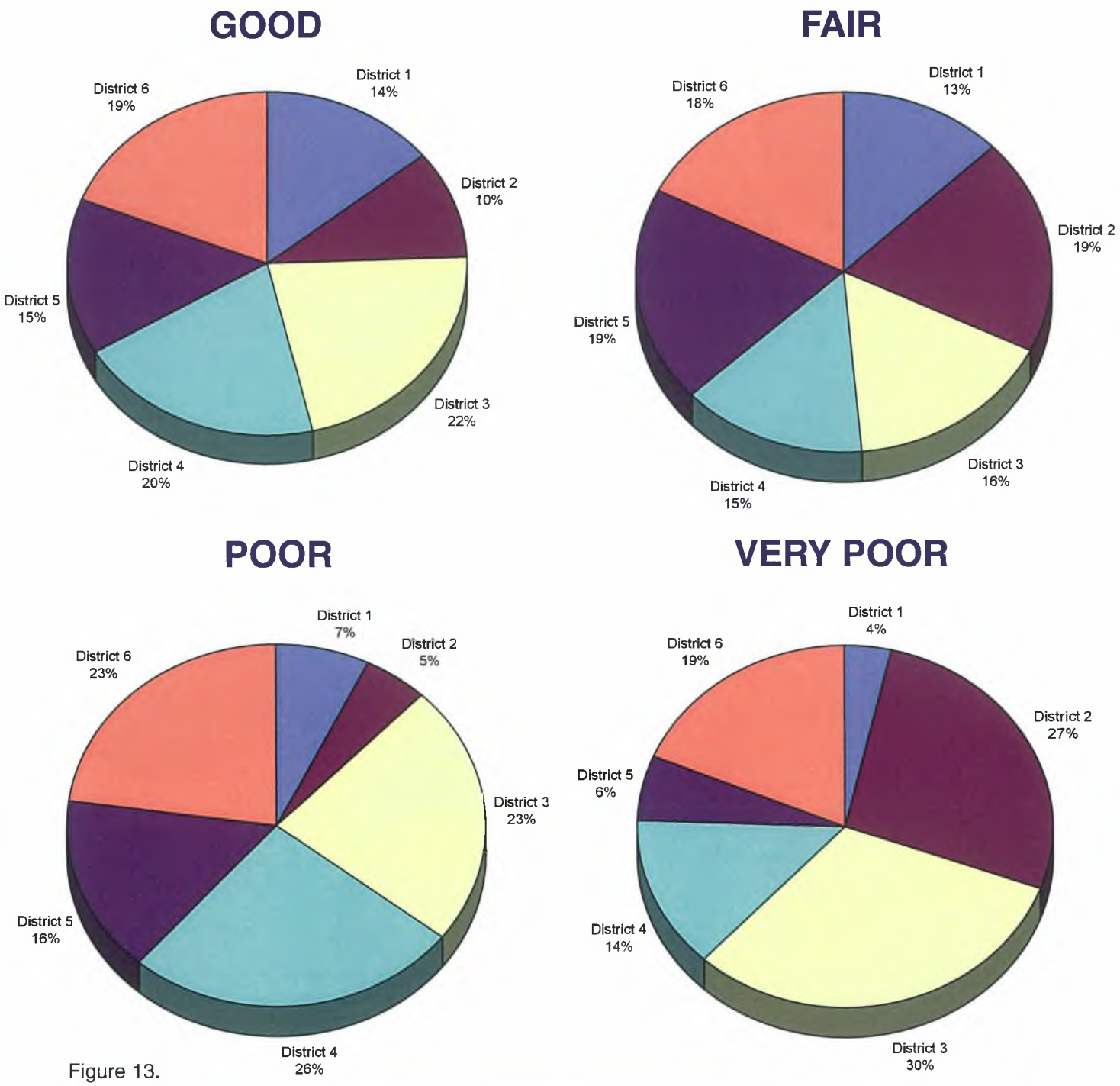


Figure 13.

2006
District Pavement Condition
Condition Based on Cracking and Roughness Indices

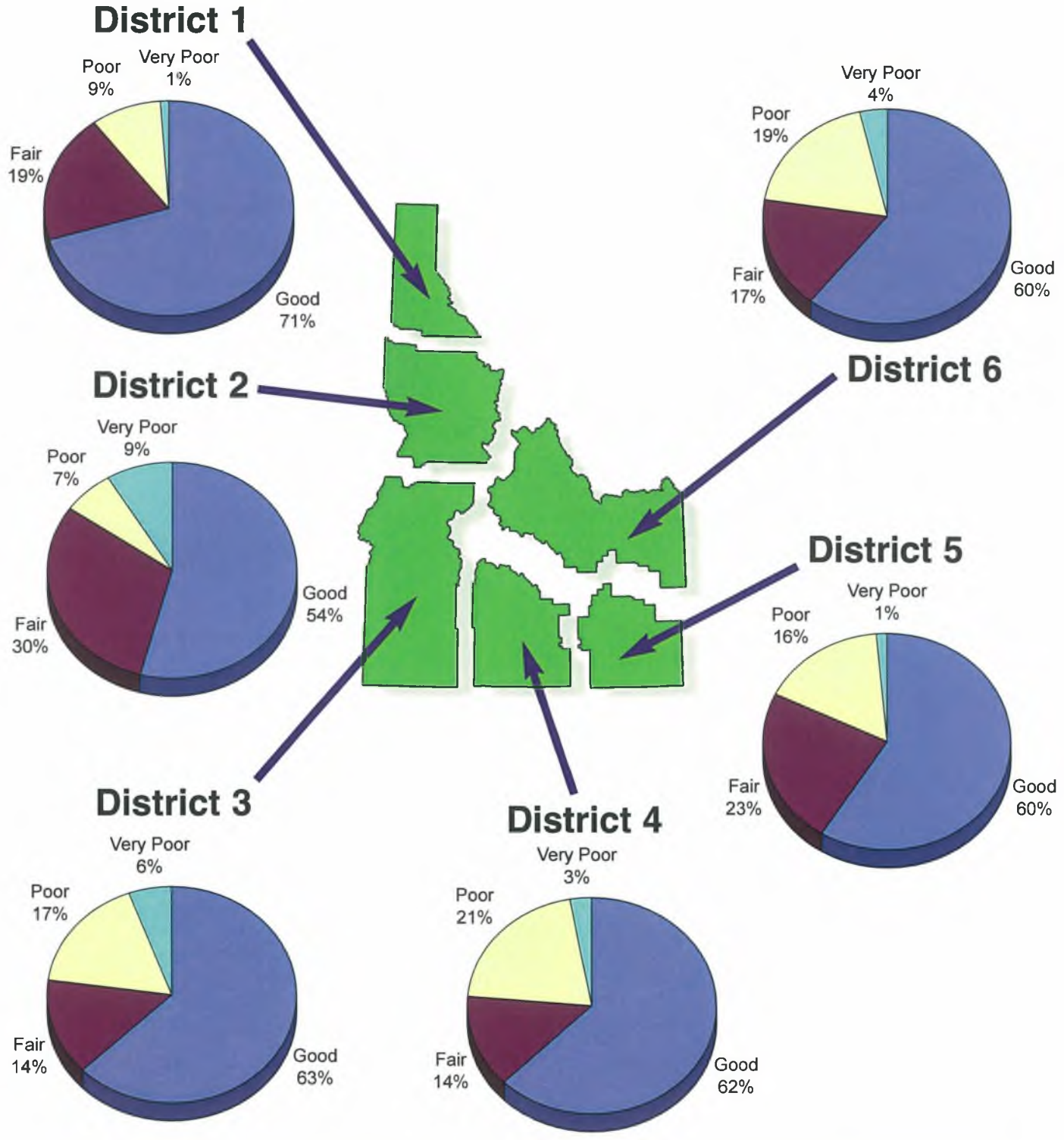
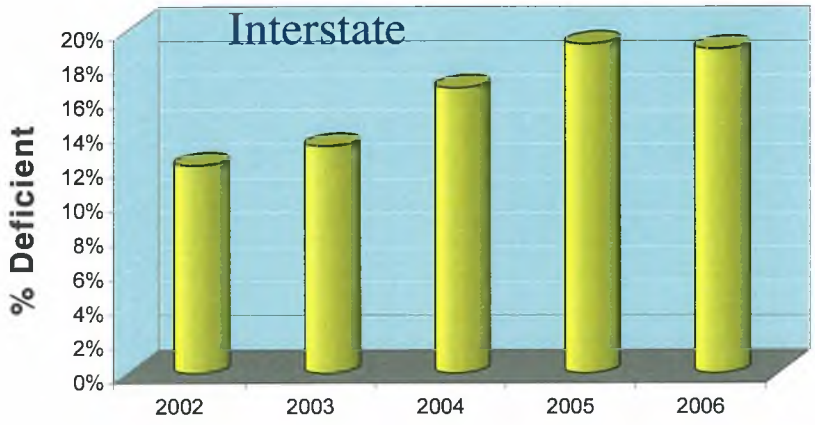


Figure 14.

PAVEMENT DEFICIENCIES BY SYSTEM

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



Interstate highways in Idaho have improved from 23% deficient in 1994 to 19% deficient in 2006, a reduction of 4%.

Figure 15.

The remaining (Non-Interstate) NHS routes have improved from 38 percent deficient in 1994 to approximately 20% deficient in 2006, a reduction of 18%.

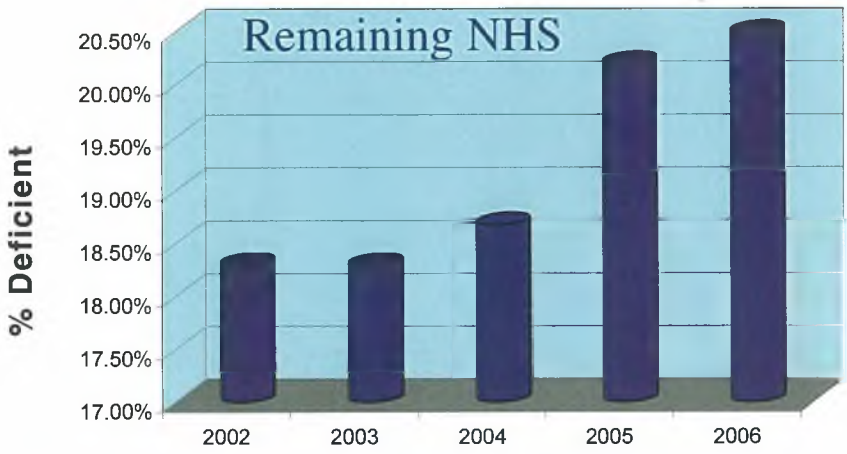
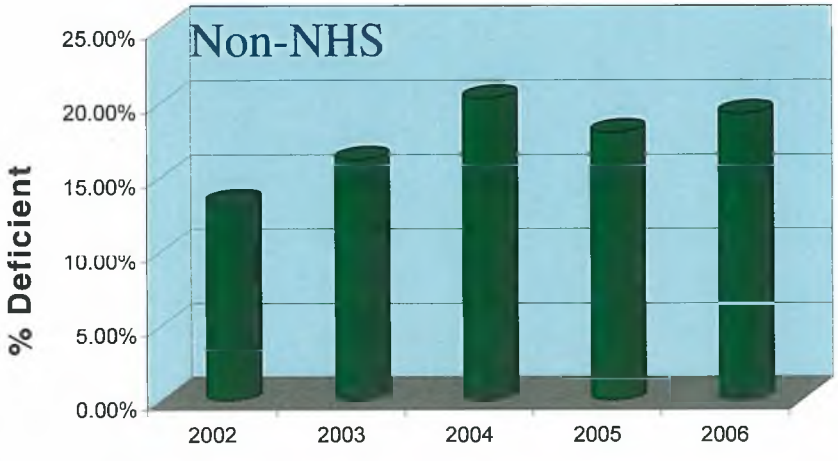


Figure 16.



Non-NHS route deficiencies have also been reduced from over 44% in 1994 to 19% in 2006, a reduction of 25%.

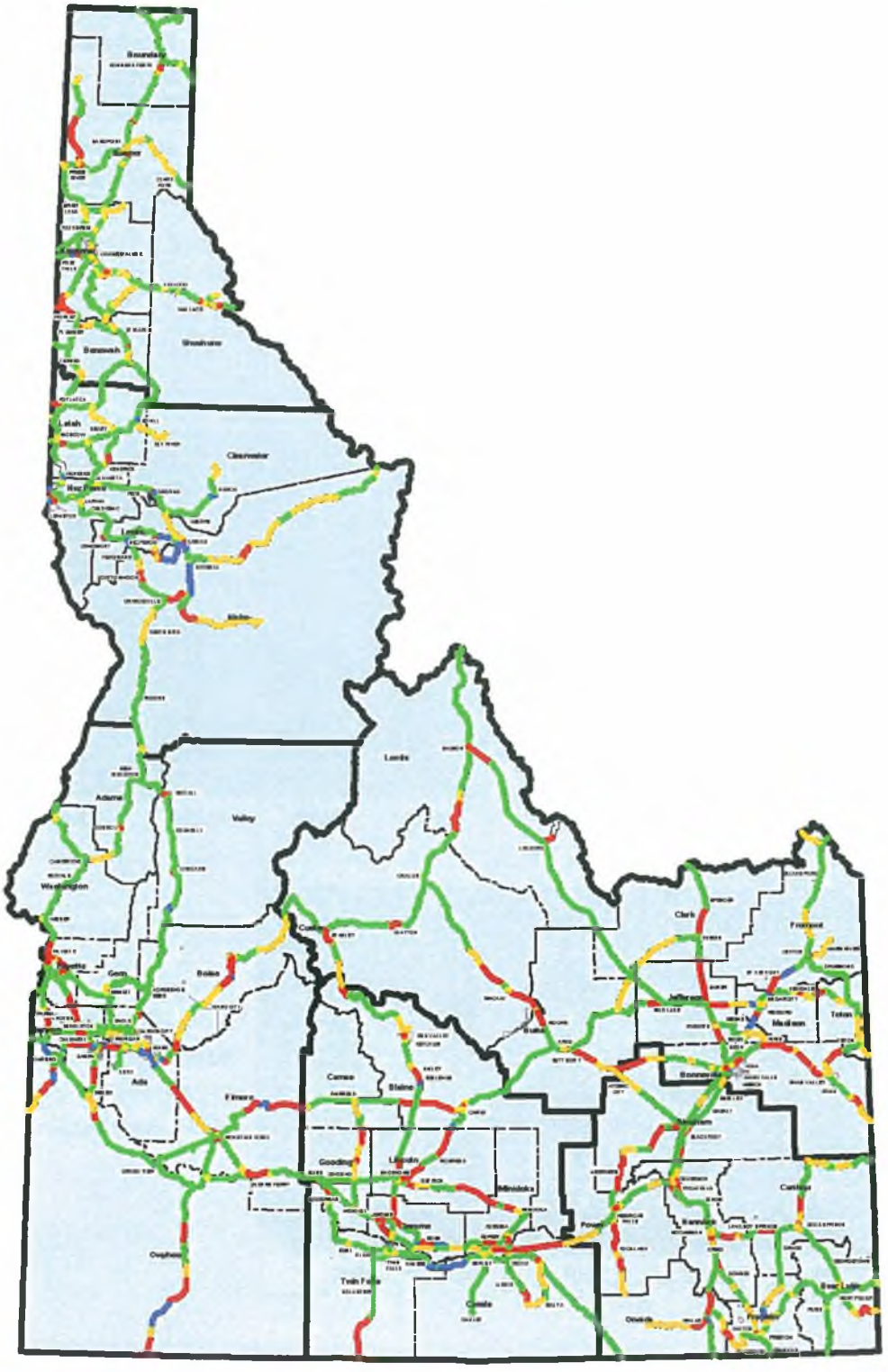
Figure 17.

State of Idaho

Pavement Condition Map

(11,877 Paved Lane Miles)

Good	Fair	Poor	Very Poor
(7,318 Lane Miles)	(2,223 Lane Miles)	(1,879 Lane Miles)	(457 Lane Miles)



Map 2.

District 1

Pavement Condition Map

(1,467 Paved Lane Miles)

Good	Fair	Poor	Very Poor
(1,031 Lane Miles)	(283 Lane Miles)	(135 Lane Miles)	(17 Lane Miles)

Map 3.

District 2

Pavement Condition Map

(1,416 Paved Lane Miles)

Good	Fair	Poor	Very Poor
(767 Lane Miles)	(431 Lane Miles)	(94 Lane Miles)	(123 Lane Miles)

Map 4.

District 3

Pavement Condition Map

(2,540 Paved Lane Miles)

Good	Fair	Poor	Very Poor
(1,597 Lane Miles)	(364 Lane Miles)	(436 Lane Miles)	(143 Lane Miles)

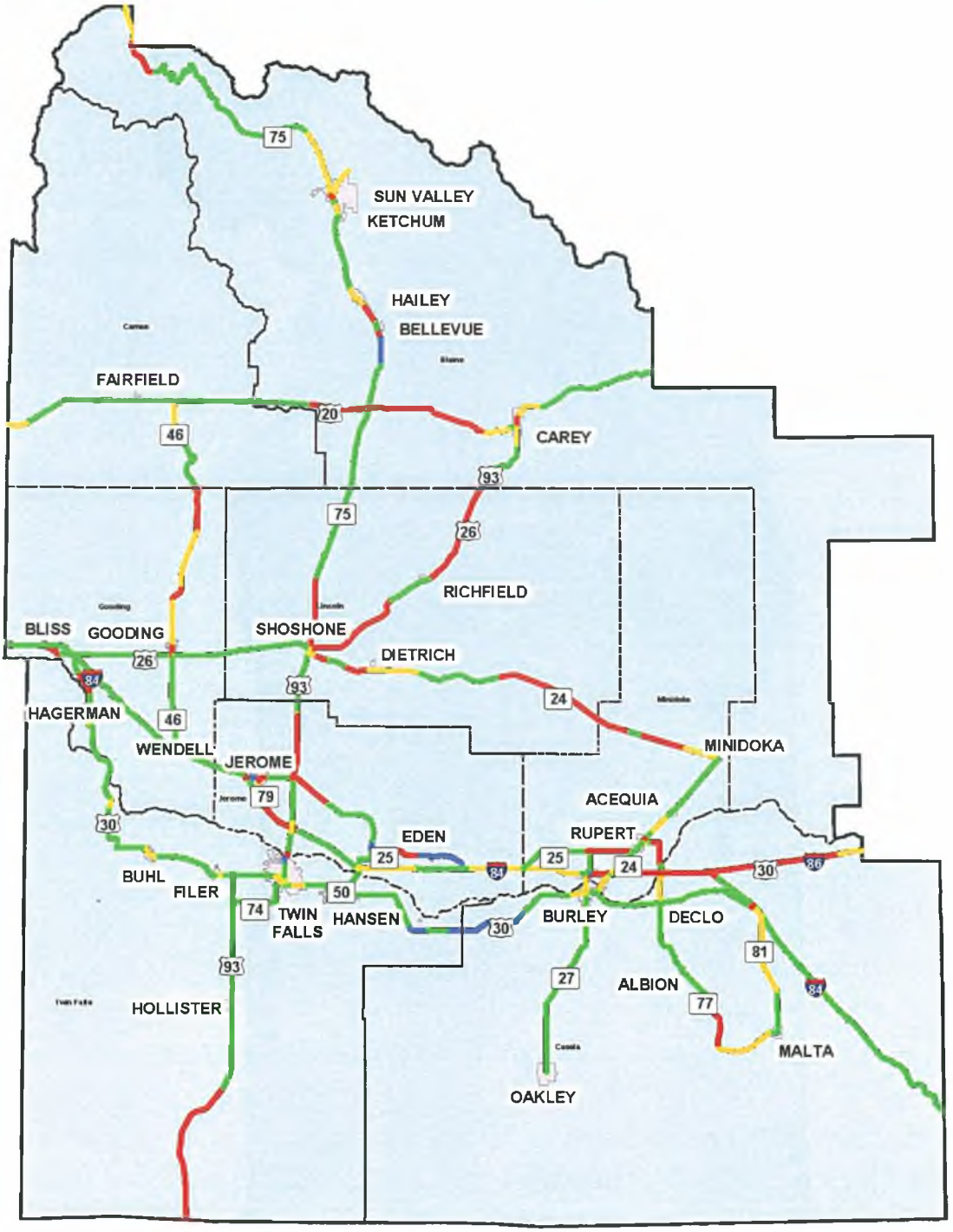
Map 5.

District 4

Pavement Condition Map

(2,333 Paved Lane Miles)

Good (1,457 Lane Miles) | Fair (325 Lane Miles) | Poor (489 Lane Miles) | Very Poor (63 Lane Miles)



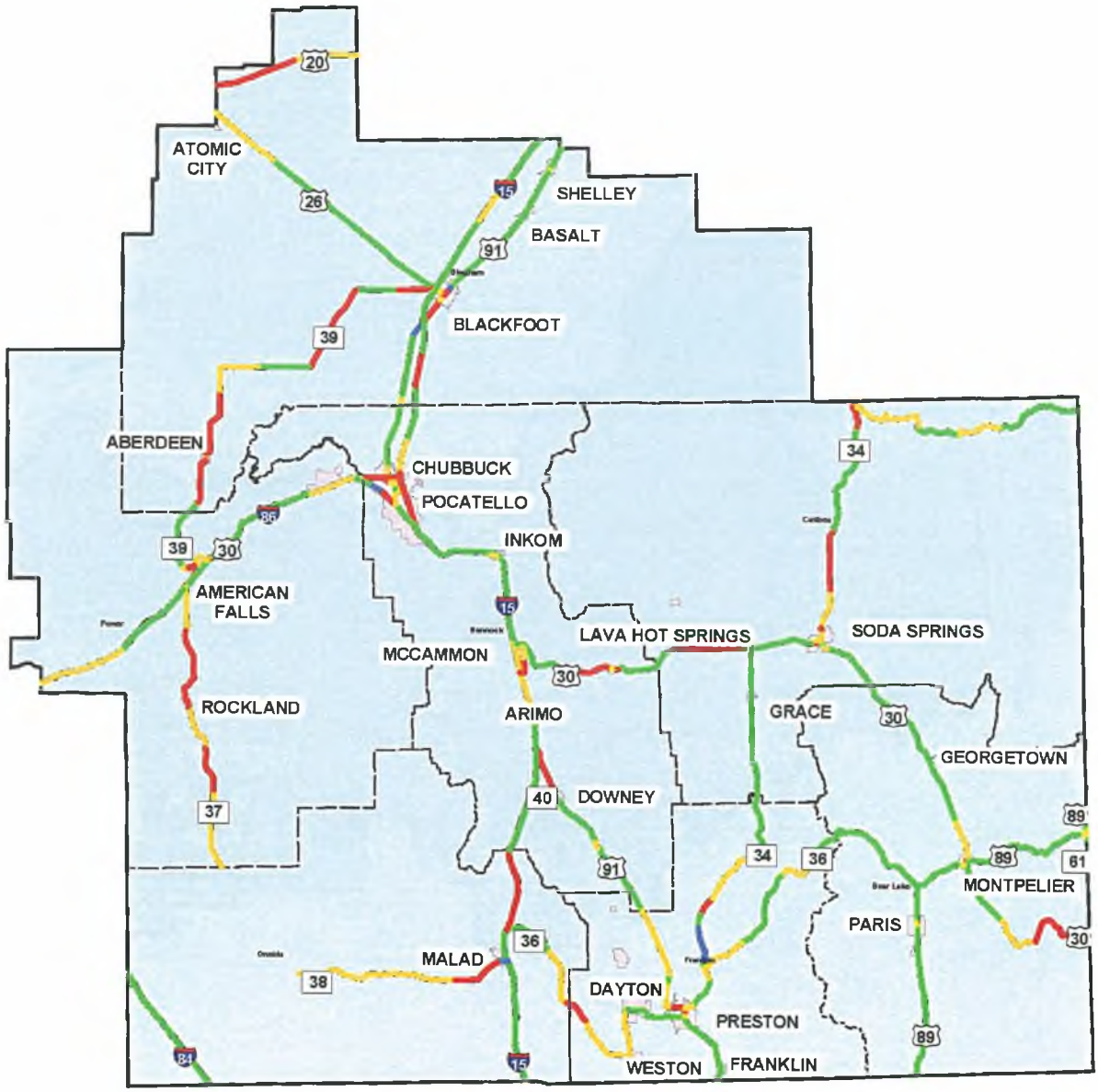
Map 6.

District 5

Pavement Condition Map

(1,842 Paved Lane Miles)

Good	Fair	Poor	Very Poor
(1,087 Lane Miles)	(429 Lane Miles)	(299 Lane Miles)	(27 Lane Miles)



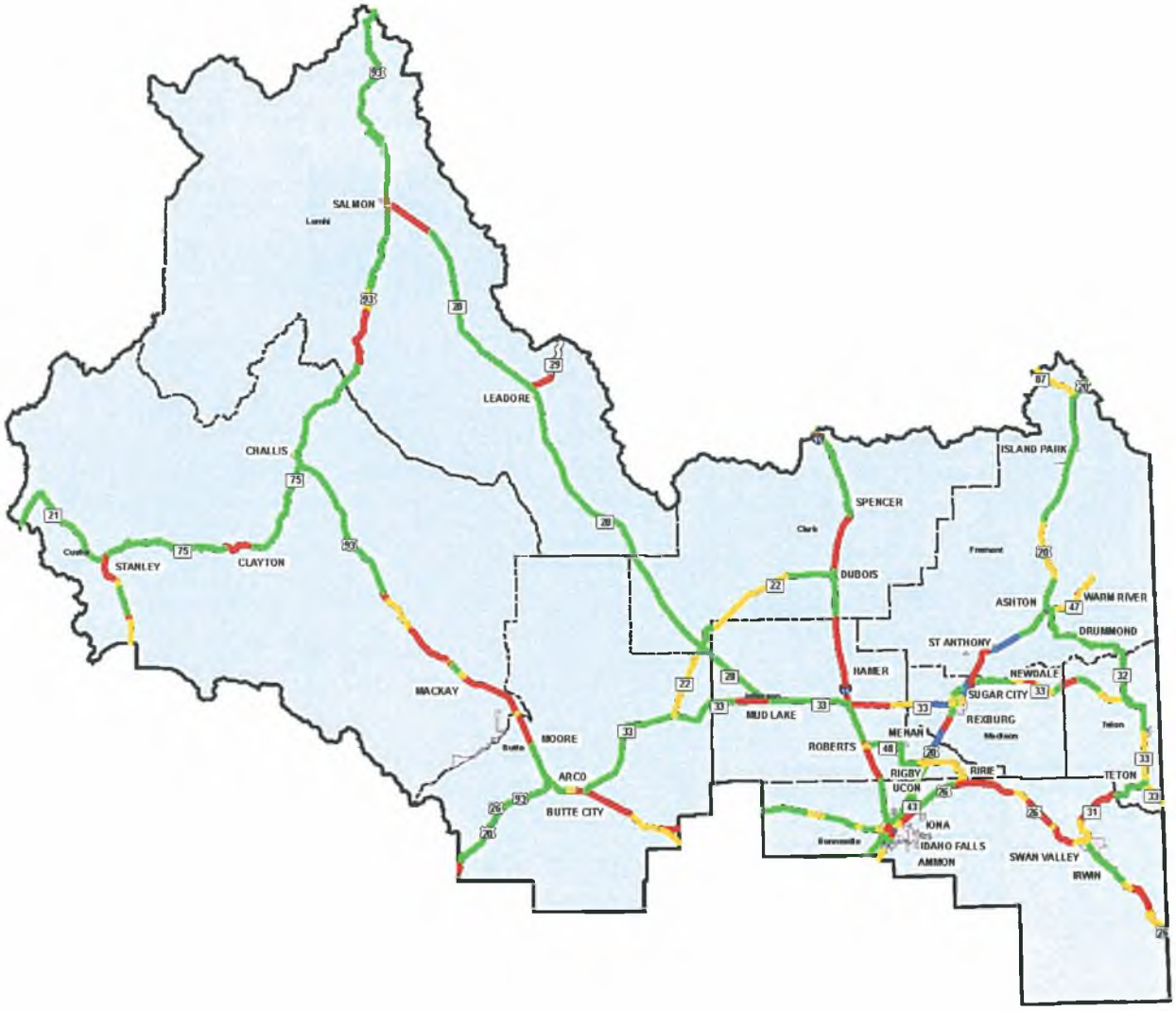
Map 7.

District 6

Pavement Condition Map

(2,280 Paved Lane Miles)

Good	Fair	Poor	Very Poor
(1,379 Lane Miles)	(391 Lane Miles)	(426 Lane Miles)	(85 Lane Miles)



Map 8.

Section 4
NEEDS ANALYSIS

PAVEMENT NEEDS

The pavement-condition needs identified on the following pages were obtained through the Highway Economics Requirements System - State Version (HERS-ST).

The HERS - ST 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. The HERS - ST 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 HERS - ST'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 HERS - ST analyzes data related to:

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

Among its reports, the program produces a 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.

Deterioration of pavements on the State Highway System is closely monitored. The pavement-management data acquired on every mile of roadway allows the department to effectively prioritize highway projects across the state.

2006
Pavement Needs
(Lane Miles)

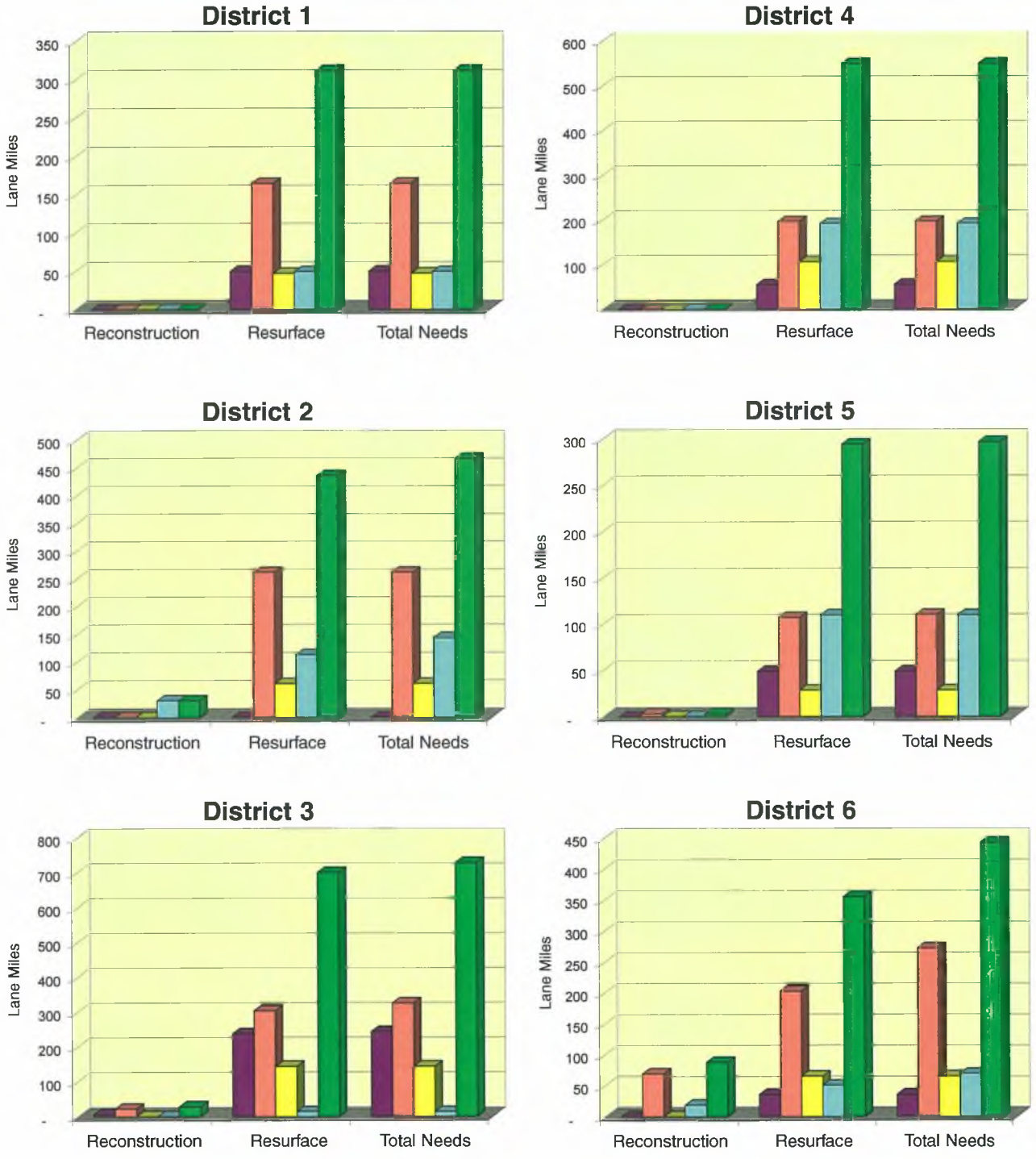


Figure 18.

INTERSTATE PRINCIPAL ART. MINOR ARTERIAL COLLECTOR TOTAL

2006 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	-	-	50	28,210	50	28,210
PRINCIPAL ART.	-	-	165	44,662	165	44,662
MINOR ARTERIAL	-	-	47	11,285	47	11,285
COLLECTOR	-	-	49	10,041	49	10,041
TOTAL	-	-	312	94,197	312	94,197

DISTRICT 2

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	-	-	-	-	-	-
PRINCIPAL ART.	-	-	261	73,323	261	73,323
MINOR ARTERIAL	-	-	61	14,799	61	14,799
COLLECTOR	30	12,272	113	26,429	144	38,701
TOTAL	30	12,272	436	114,551	466	126,823

DISTRICT 3

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	6	4,626	238	67,473	244	72,100
PRINCIPAL ART.	22	11,112	304	98,796	326	109,908
MINOR ARTERIAL	-	-	144	39,993	144	39,993
COLLECTOR	-	-	14	1,659	14	1,659
TOTAL	28	15,738	701	207,921	729	223,659

DISTRICT 4

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	-	-	56	5,328	56	5,328
PRINCIPAL ART.	-	-	196	51,875	196	51,875
MINOR ARTERIAL	-	-	106	22,202	106	22,202
COLLECTOR	-	-	191	32,773	191	32,773
TOTAL	-	-	549	112,178	549	112,178

DISTRICT 5

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	-	-	49	5,529	49	5,529
PRINCIPAL ART.	3	1,875	107	22,281	110	24,156
MINOR ARTERIAL	-	-	28	5,029	28	5,029
COLLECTOR	-	-	110	13,424	110	13,424
TOTAL	3	1,875	294	46,264	297	48,139

DISTRICT 6

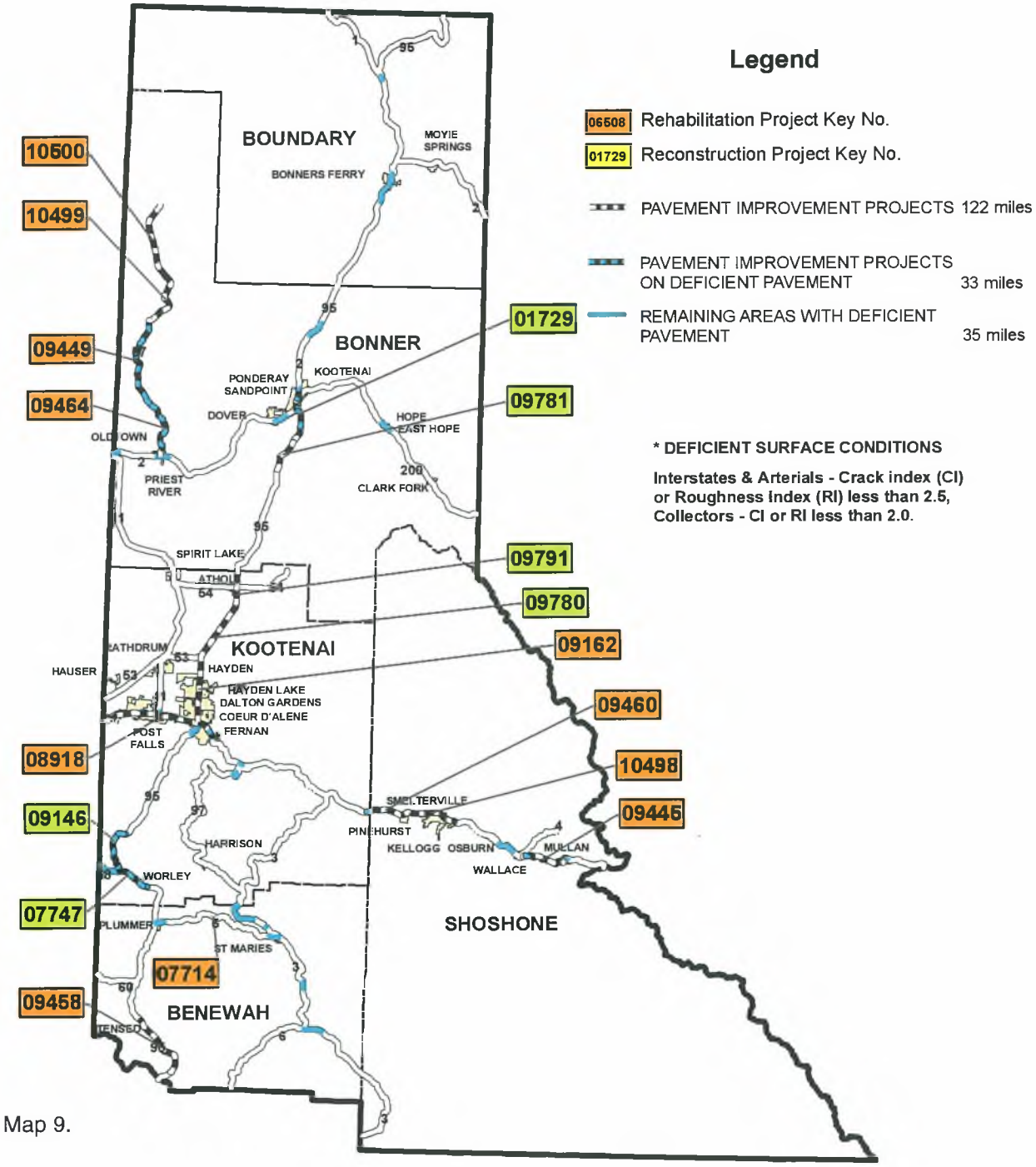
	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	-	-	36	3,397	36	3,397
PRINCIPAL ART.	69	28,486	203	51,853	272	80,339
MINOR ARTERIAL	-	-	66	12,898	66	12,898
COLLECTOR	19	7,676	51	9,892	69	17,568
TOTAL	88	36,162	355	78,040	443	114,203

GRAND TOTAL	150	66,047	2,646	653,152	2,796	719,199

District 1

Programmed Pavement Improvement Projects vs. Pavement Deficiencies

FY2007 — FY2011

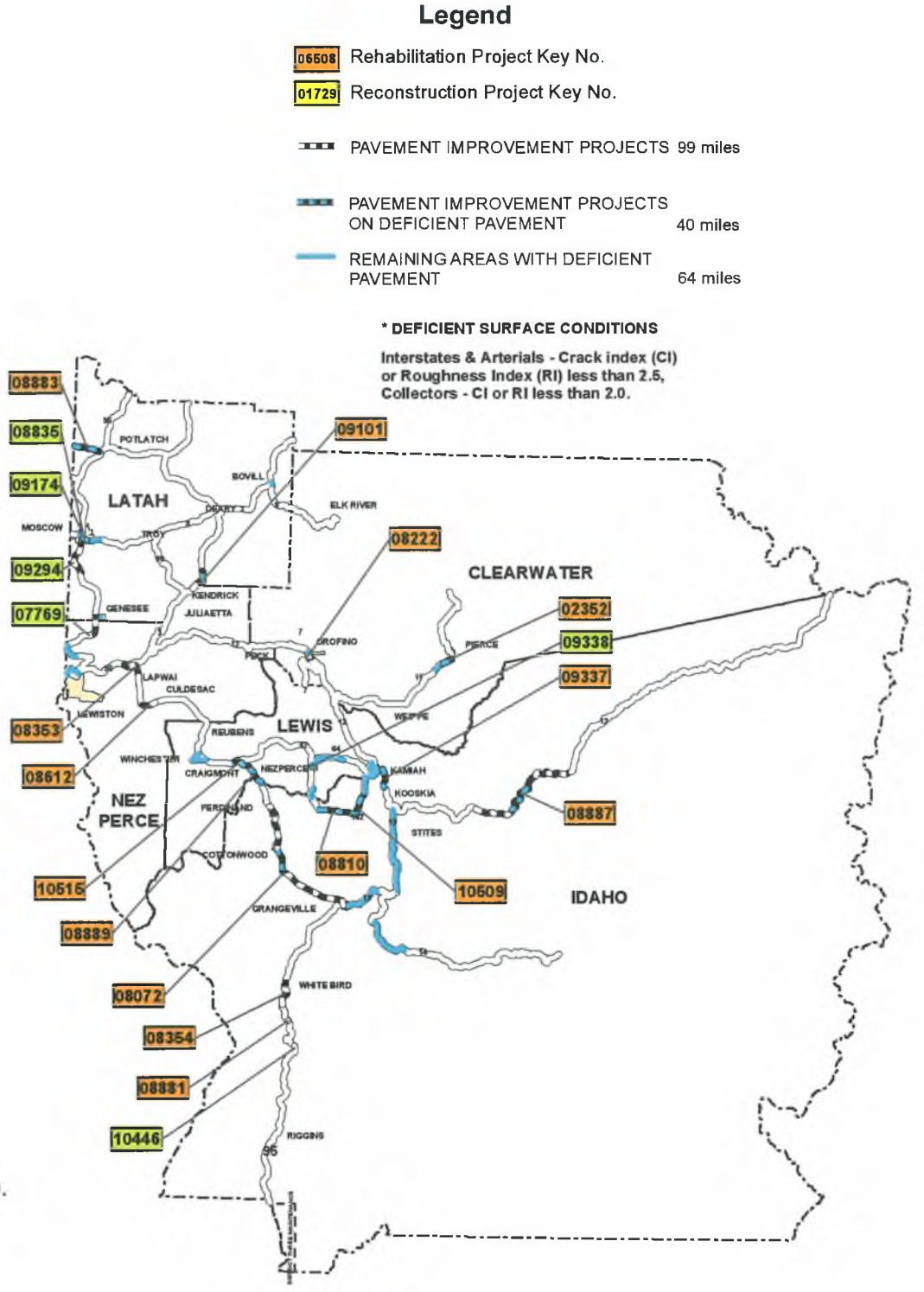


Map 9.

District 2

Programmed Pavement Improvement Projects vs. Pavement Deficiencies

FY2007 — FY2011

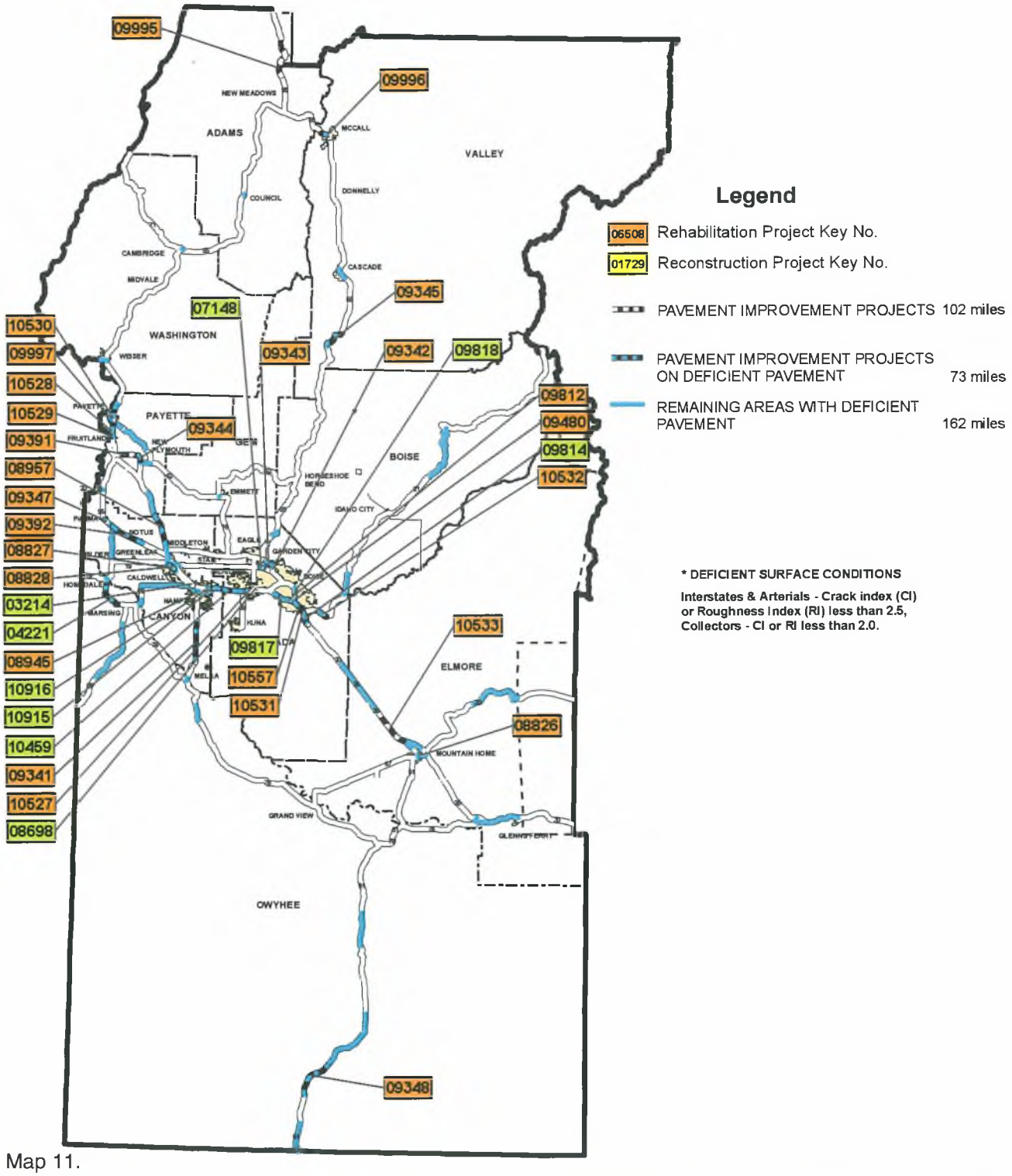


Map 10.

District 3

Programmed Pavement Improvement Projects vs. Pavement Deficiencies

FY2007 — FY2011



Legend

06508 Rehabilitation Project Key No.

01729 Reconstruction Project Key No.

PAVEMENT IMPROVEMENT PROJECTS 102 miles

PAVEMENT IMPROVEMENT PROJECTS ON DEFICIENT PAVEMENT 73 miles

REMAINING AREAS WITH DEFICIENT PAVEMENT 162 miles

*** DEFICIENT SURFACE CONDITIONS**

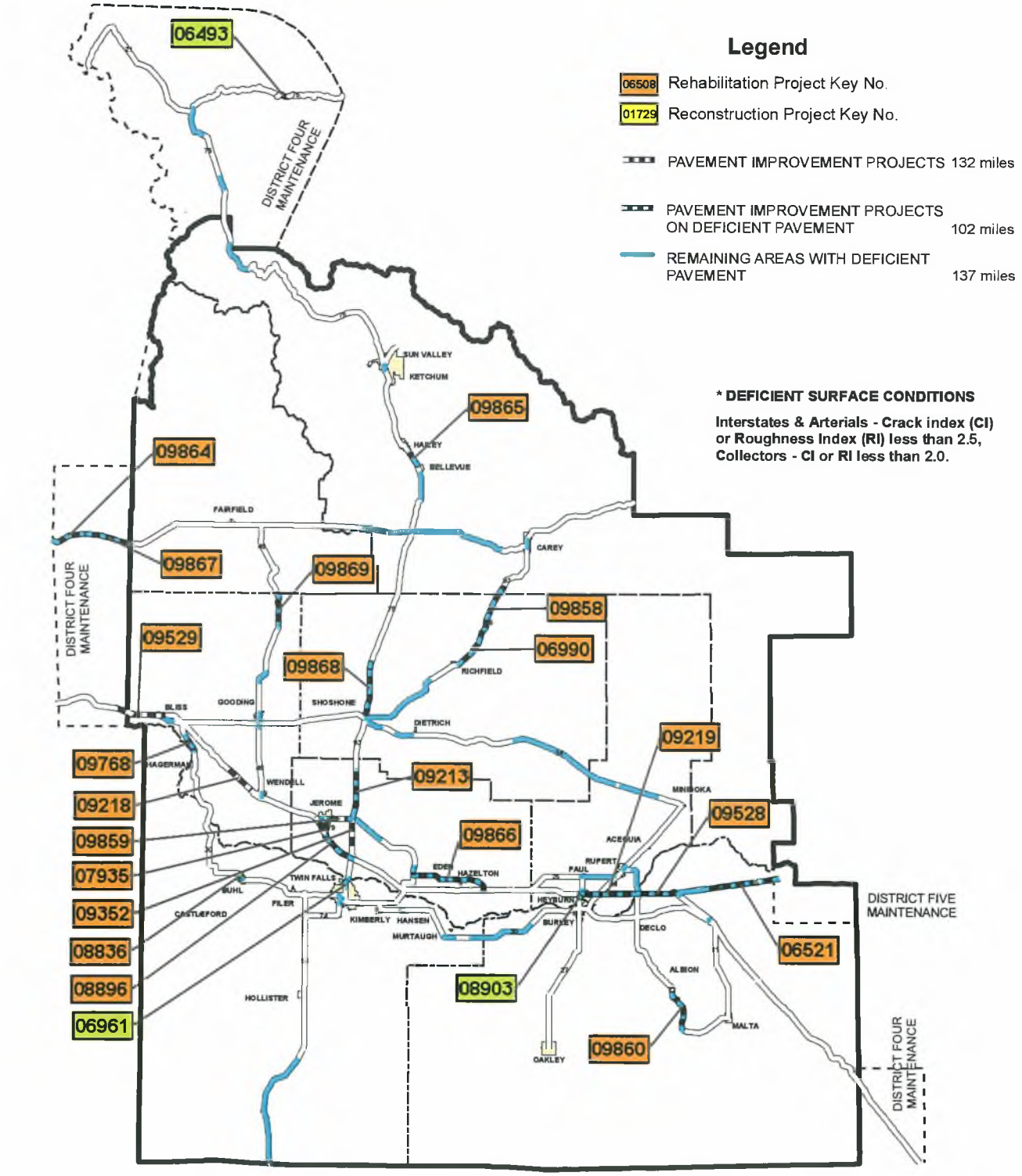
Interstates & Arterials - Crack index (CI) or Roughness Index (RI) less than 2.5, Collectors - CI or RI less than 2.0.

Map 11.

District 4

Programmed Pavement Improvement Projects vs. Pavement Deficiencies

FY2007 — FY2011

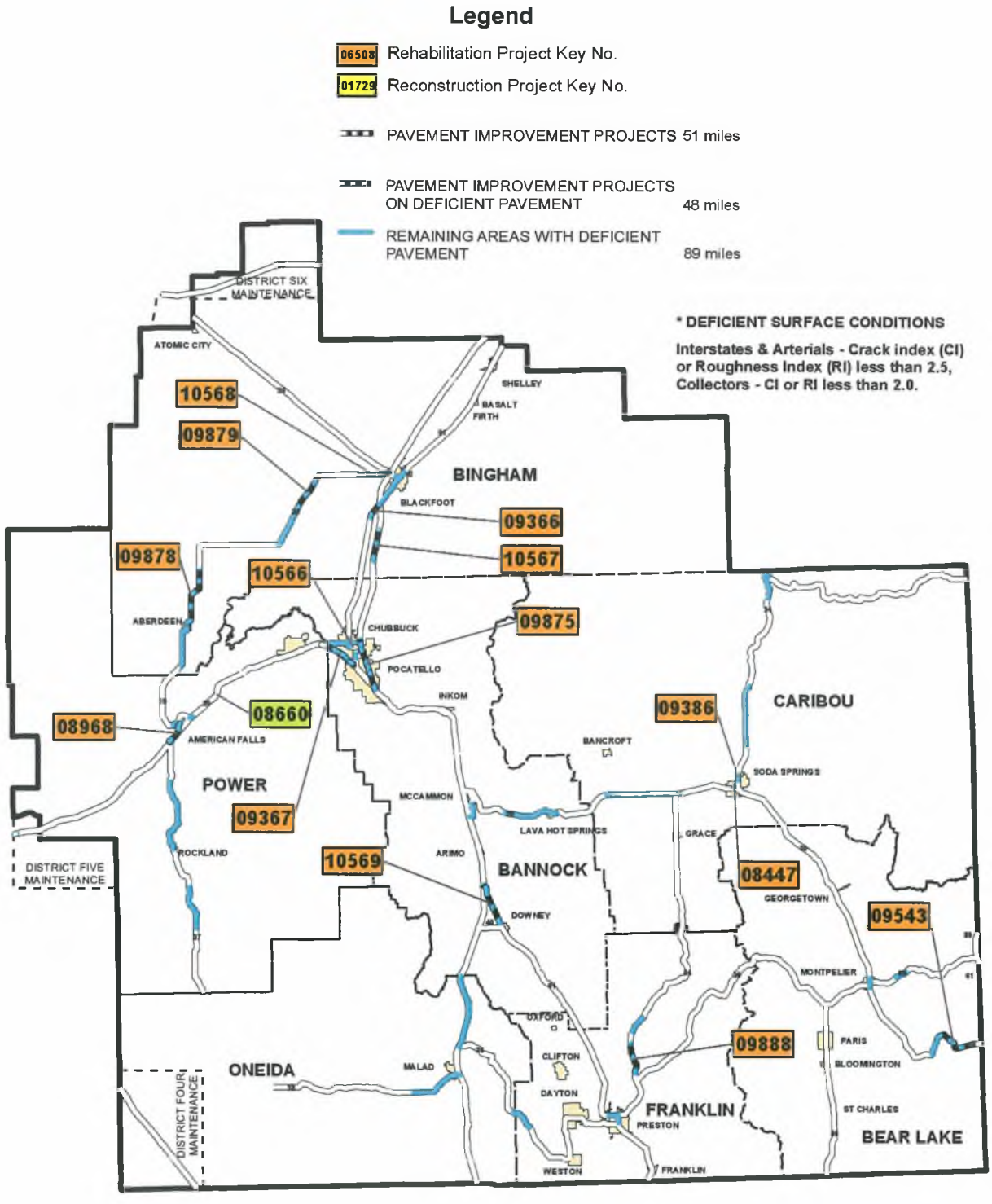


Map 12.

District 5

Programmed Pavement Improvement Projects vs. Pavement Deficiencies

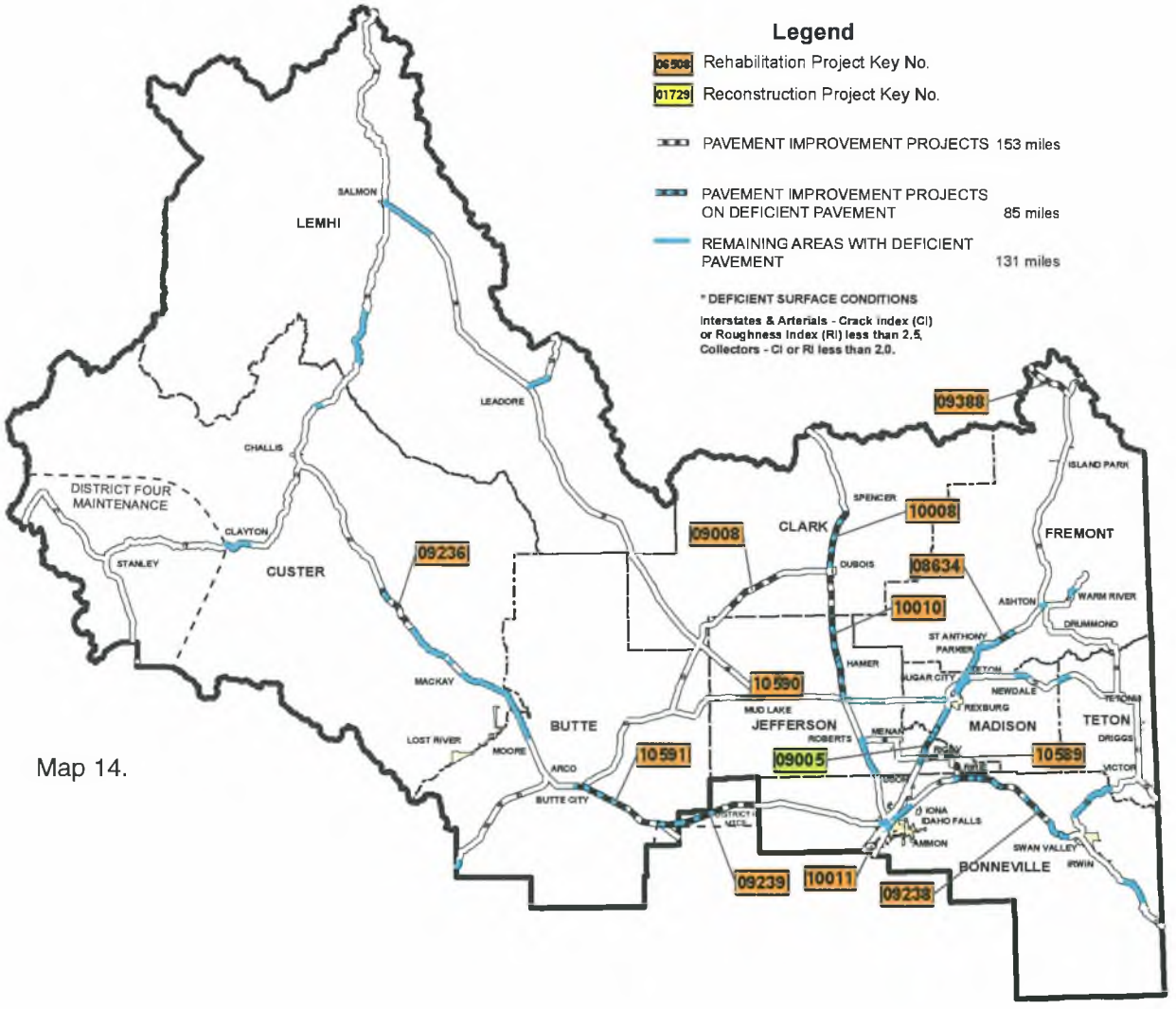
FY2007 — FY2011



District 6

Programmed Pavement Improvement Projects vs. Pavement Deficiencies

FY2007 — FY2011



Map 14.

Section 5
SEALCOATS

Sealcoats projects apply a cover coat of gravel chips over hot liquid asphalt to seal cracks in the original pavement. This prolongs the life of the road and improves skid resistance.

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 2002 through 2006.

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

District 5 has the highest "percentage" of lane miles sealcoated annually (12.6% or 217 lane miles).

Figures 22 through 27 show the miles sealcoated from 2002 to 2006 in each of ITD's six districts.

STATEWIDE FIVE-YEAR SEALCOAT HISTORY

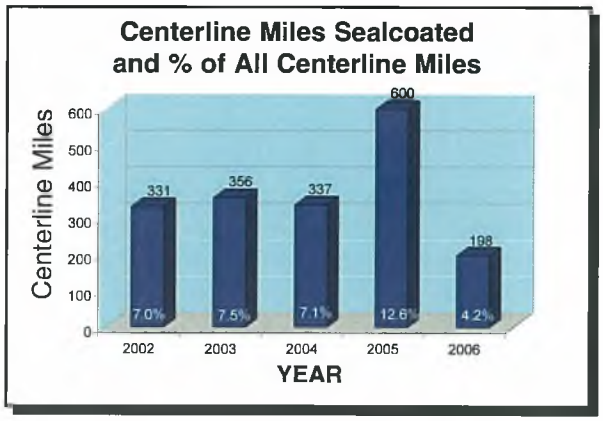


Figure 19

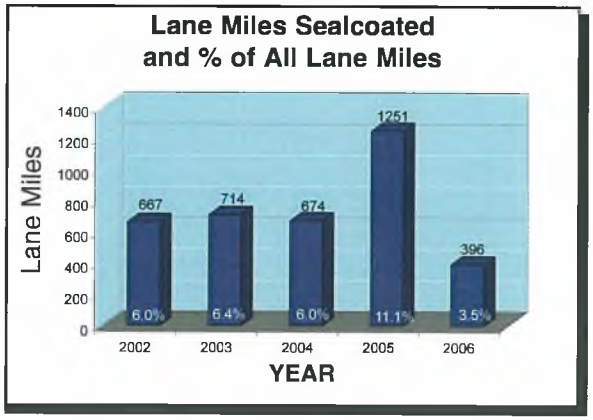


Figure 20

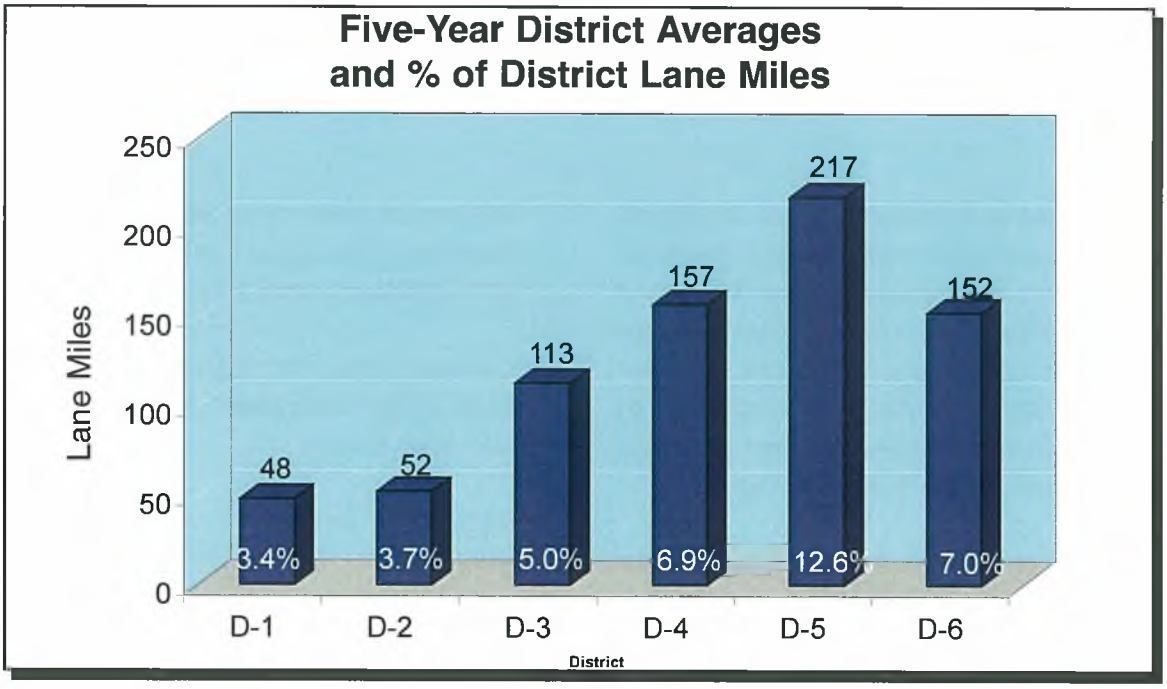
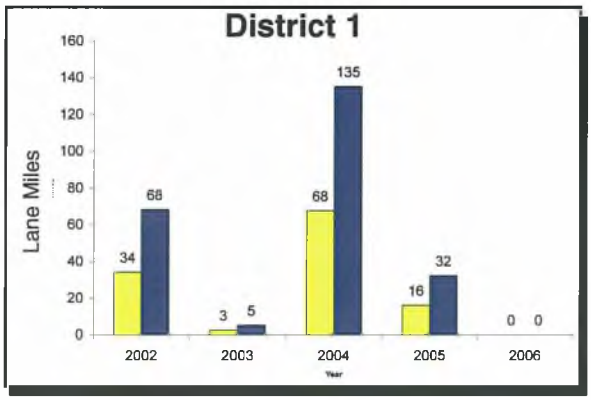
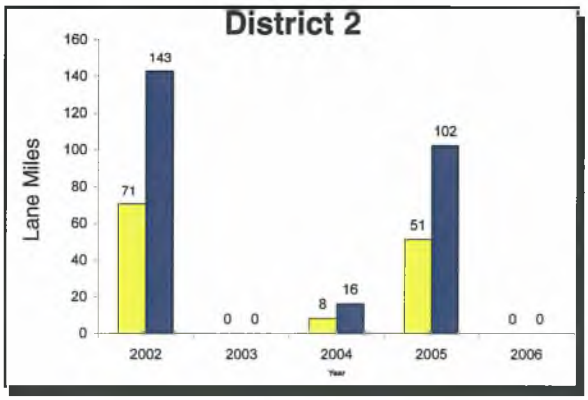


Figure 21

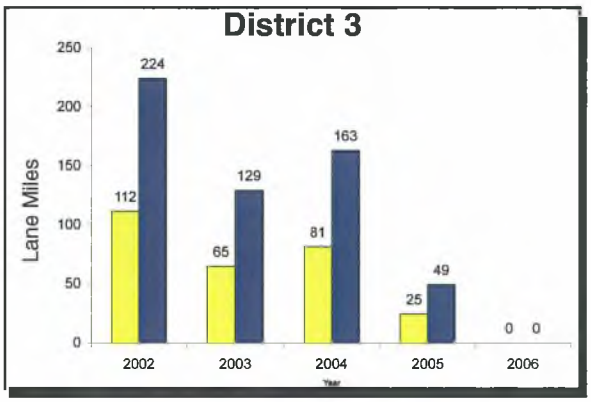
STATEWIDE FIVE-YEAR SEALCOAT HISTORY BY DISTRICT



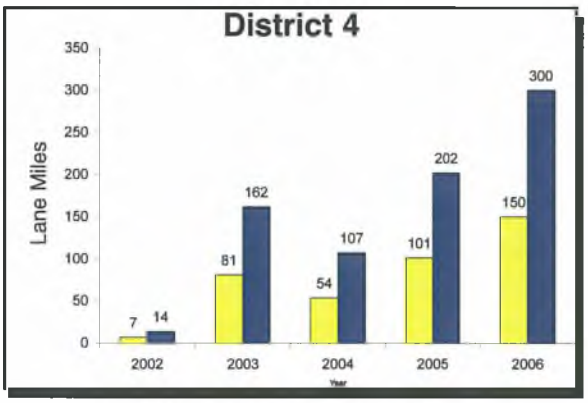
5-Year Lane Mile Average = 48



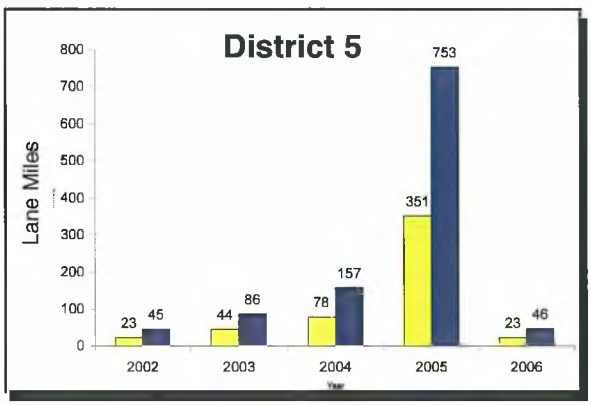
5-Year Lane Mile Average = 52



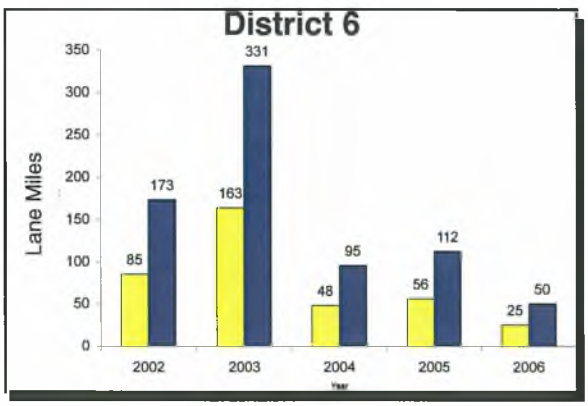
5-Year Lane Mile Average = 113



5-Year Lane Mile Average = 157



5-Year Lane Mile Average = 217



5-Year Lane Mile Average = 152

Centerline Miles Lane 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 20% by calendar year 2006.

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.

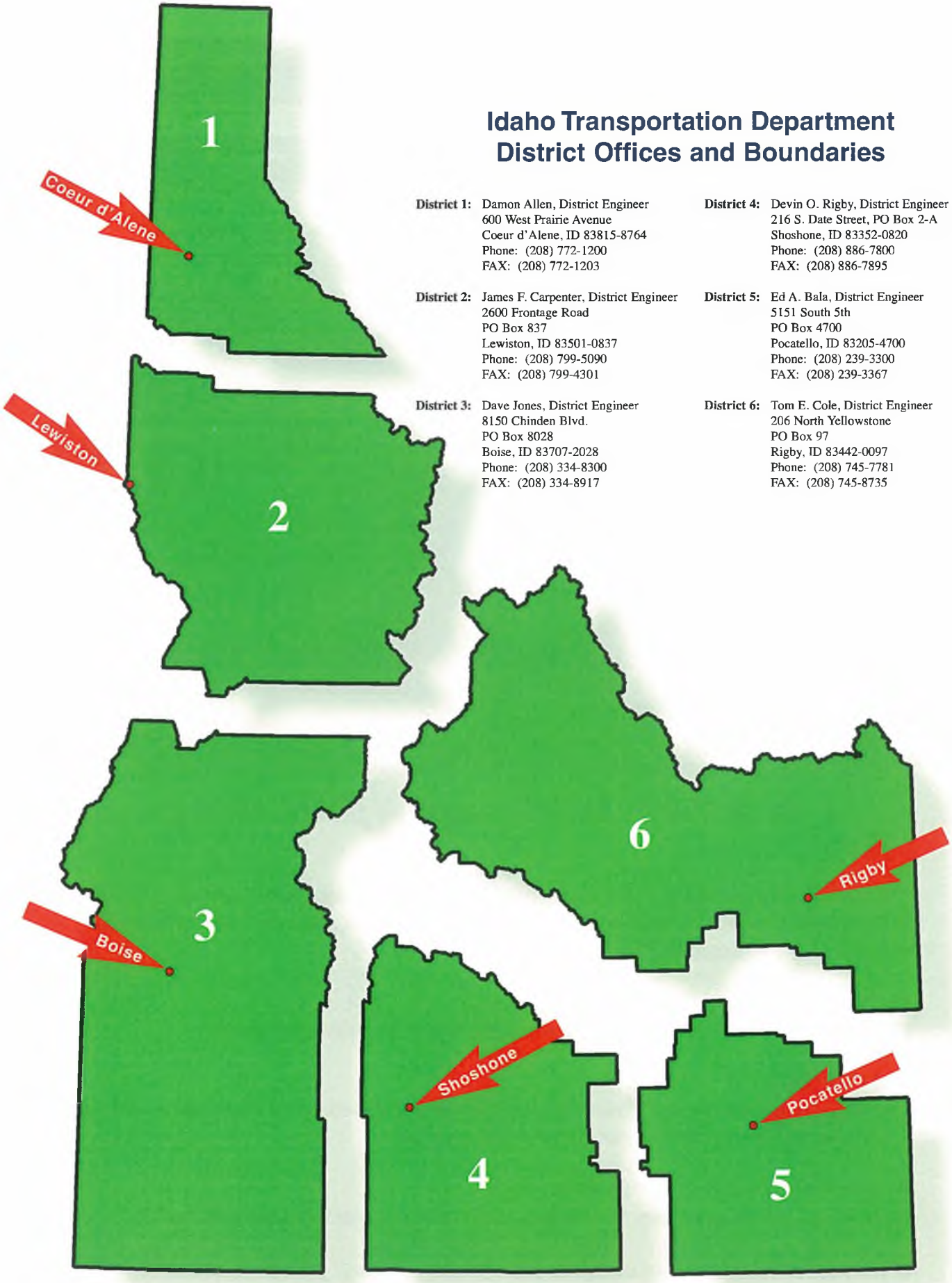
- **Reconstruction:** When pavements have reached the end of their service life an effective reconstruction program is necessary.

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: Damon Allen, District Engineer
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Coeur d'Alene, ID 83815-8764
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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: Dave Jones, 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
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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.itd.idaho.gov/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 transportation in Idaho, our site is just a click away!

Notes

Pavement Management System

– 2007 –