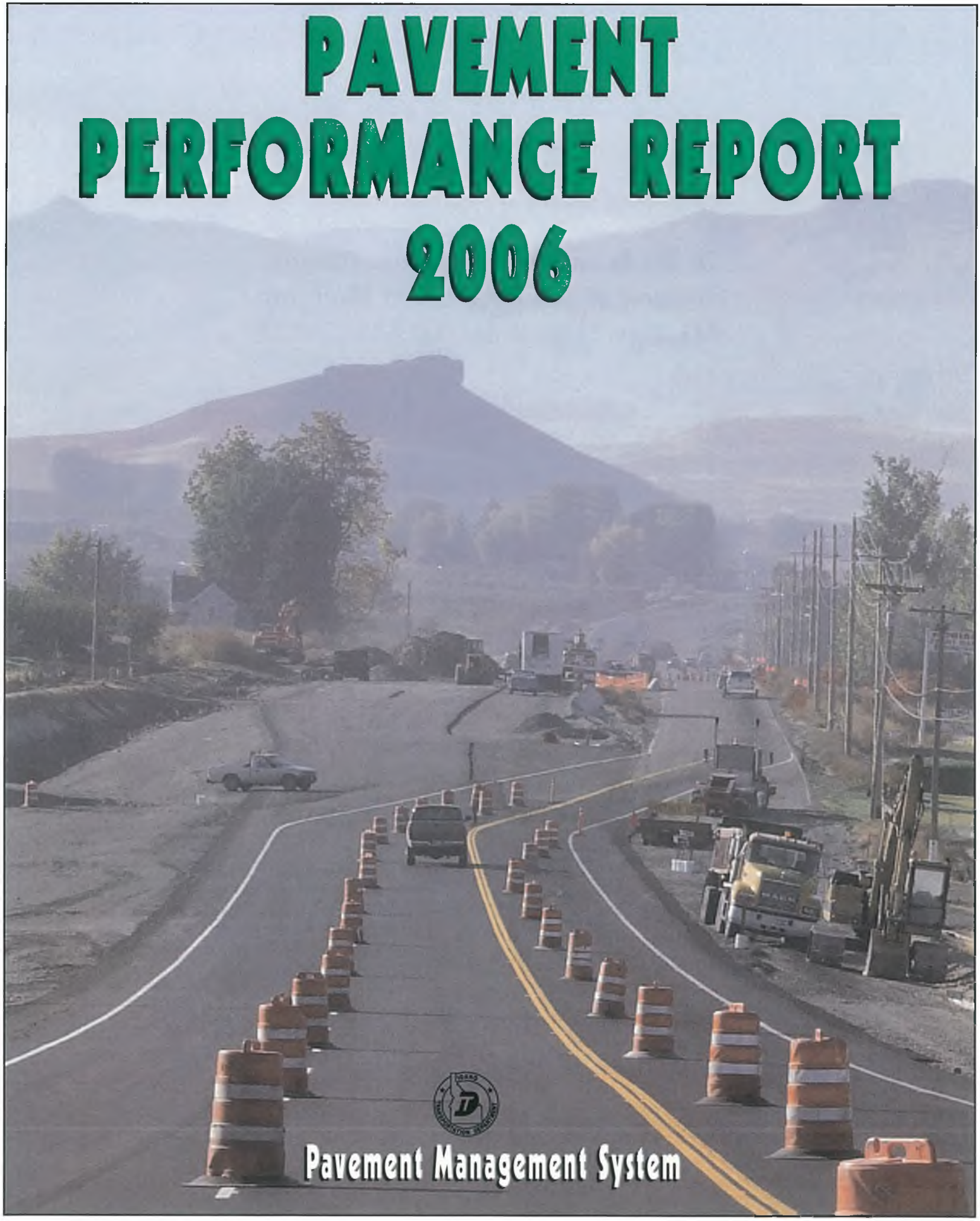
PAVEMENT PERFORMANCE REPORT 2006



Pavement Management System

This report was produced by the

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Division of Transportation Planning
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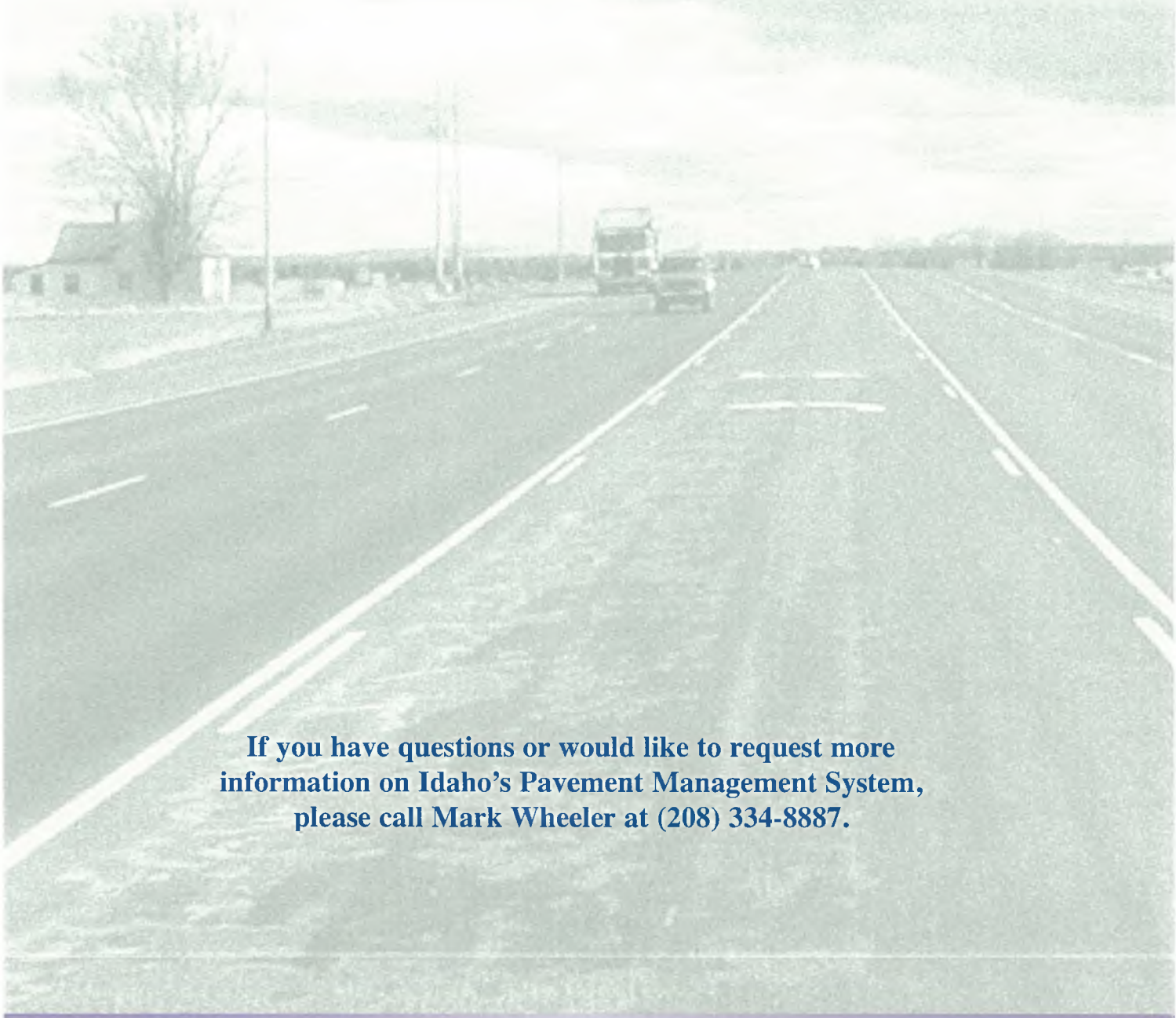

If you have questions or would like to request more information on Idaho's Pavement Management System, please call Mark Wheeler at (208) 334-8887.

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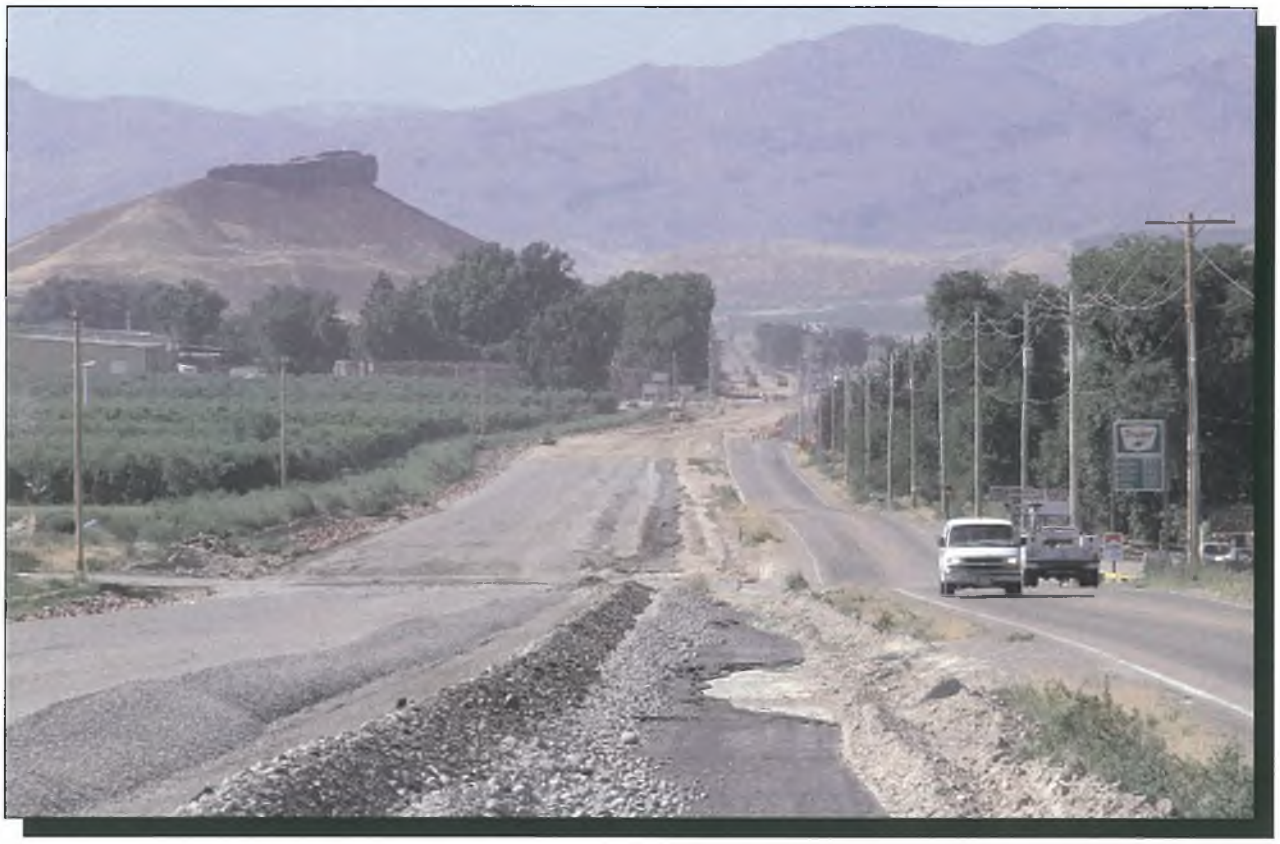


PURPOSE

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 19% by the end of calendar year 2005. 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

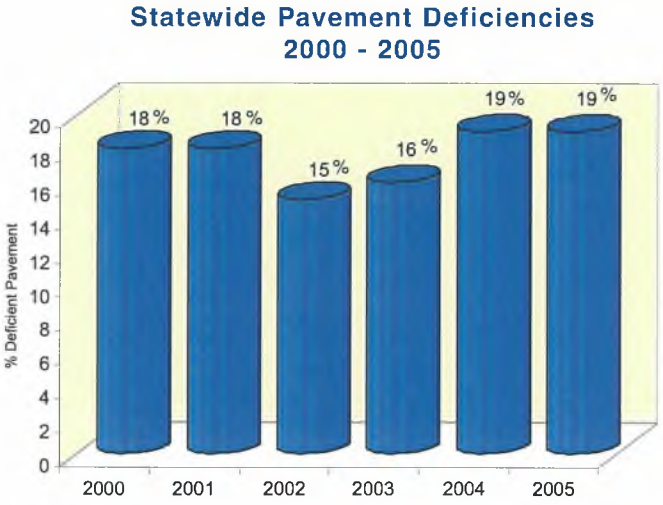


Figure 1.

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 is a summary of current statewide needs by functional class. The estimated repair costs on the state highway system alone total nearly $320 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.

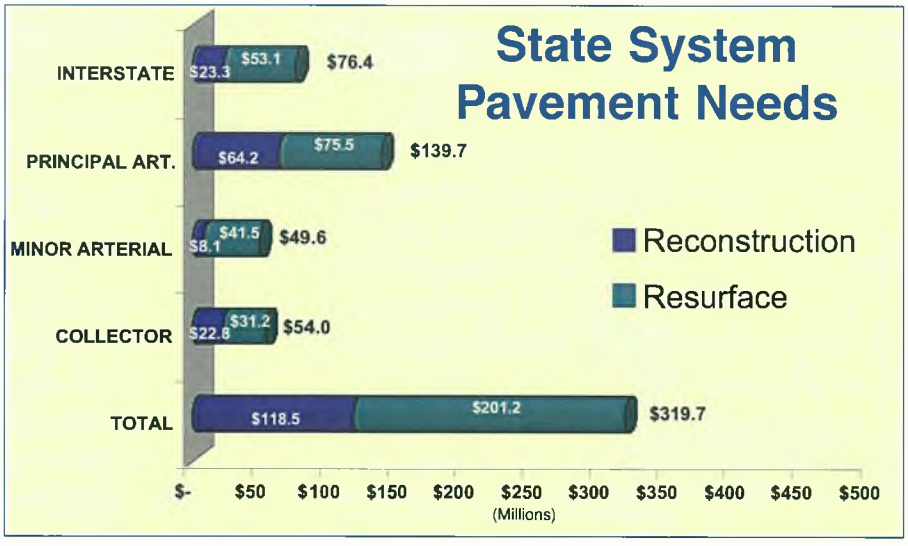


Figure 2.

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-

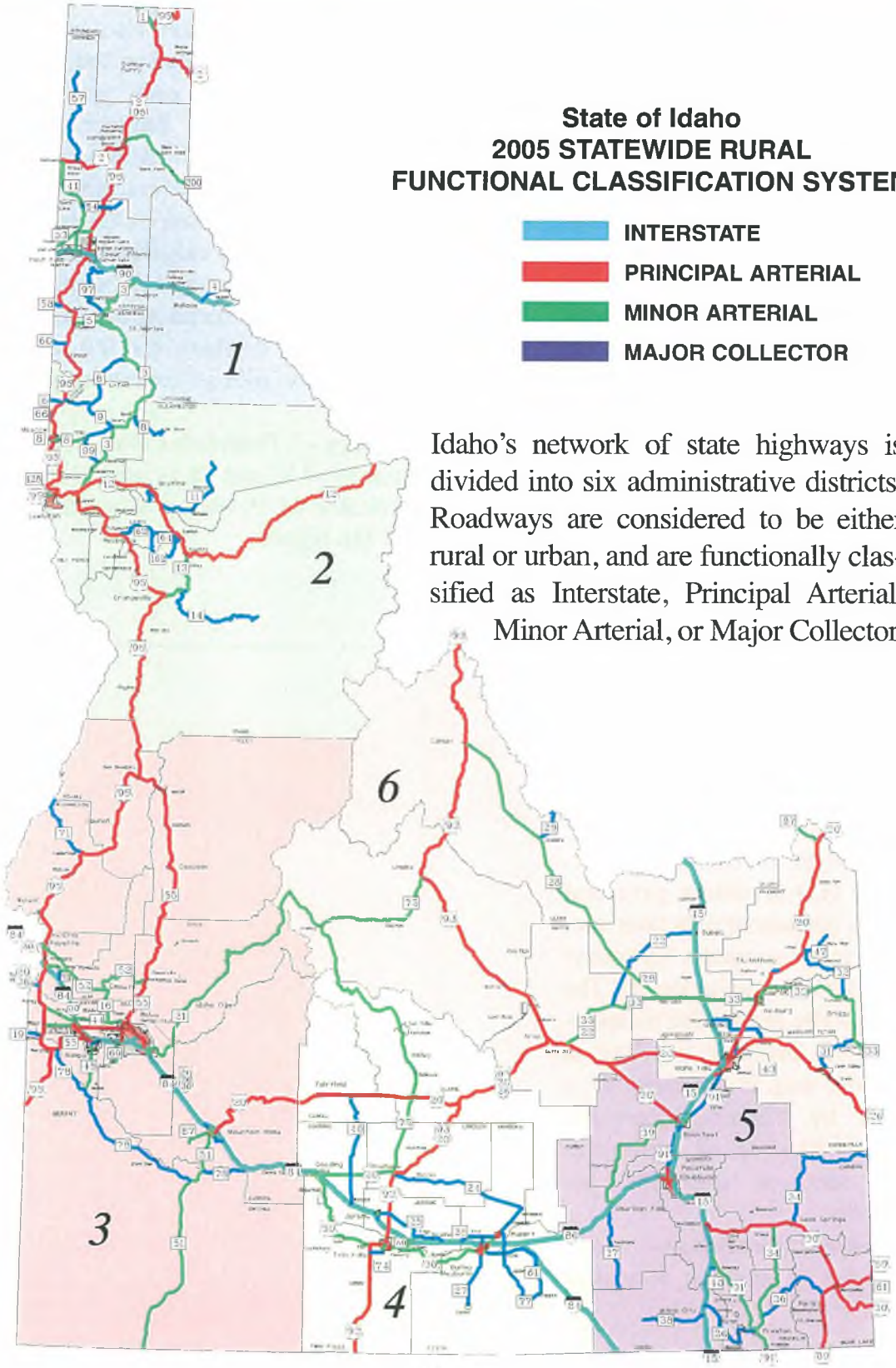
ment management. Deflection data for project-level pavement management is collected, analyzed, and reported by the Materials section.

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.



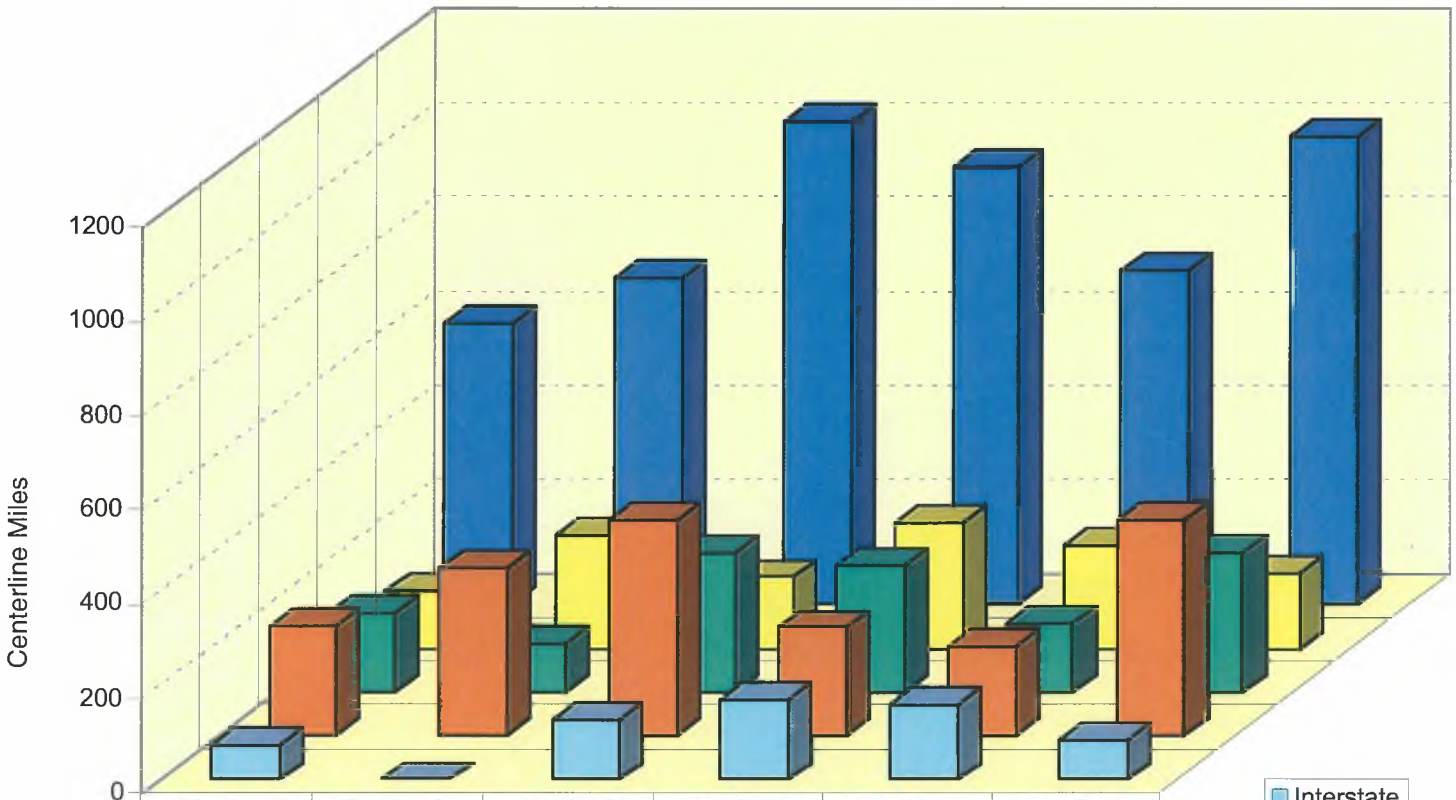
State of Idaho
2005 STATEWIDE RURAL
FUNCTIONAL CLASSIFICATION SYSTEM

- 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

2005 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	233	356	456	229	189	455
Minor Art	166	101	295	266	143	294
Collector	123	239	151	266	217	158
TOTAL	596	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 596 centerline miles (12% of total mileage).

2005 Statewide Centerline Miles

(By Functional Class)

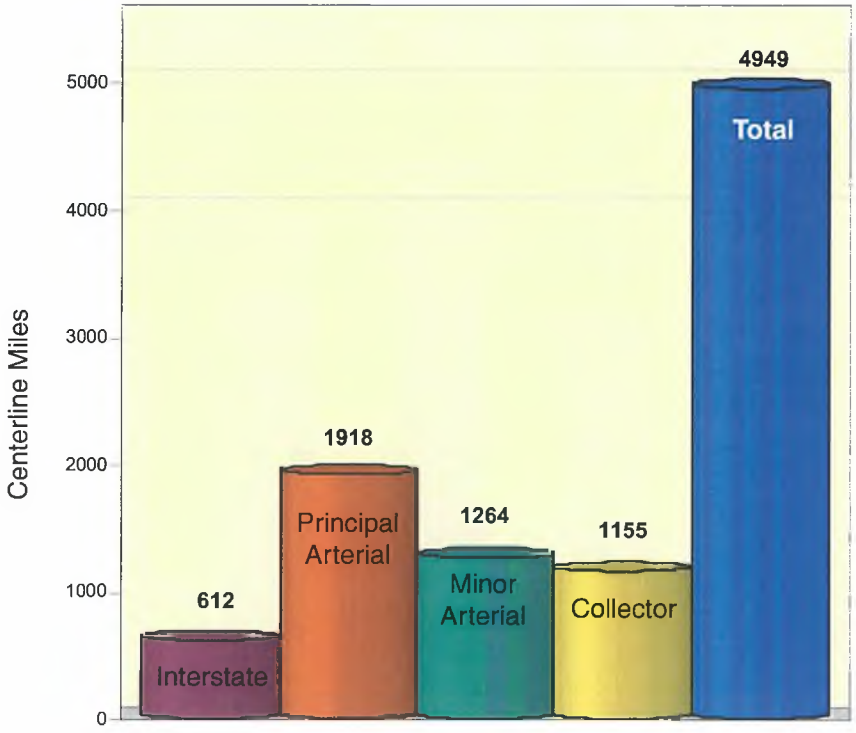


Figure 4.

2005 Centerline Miles by District

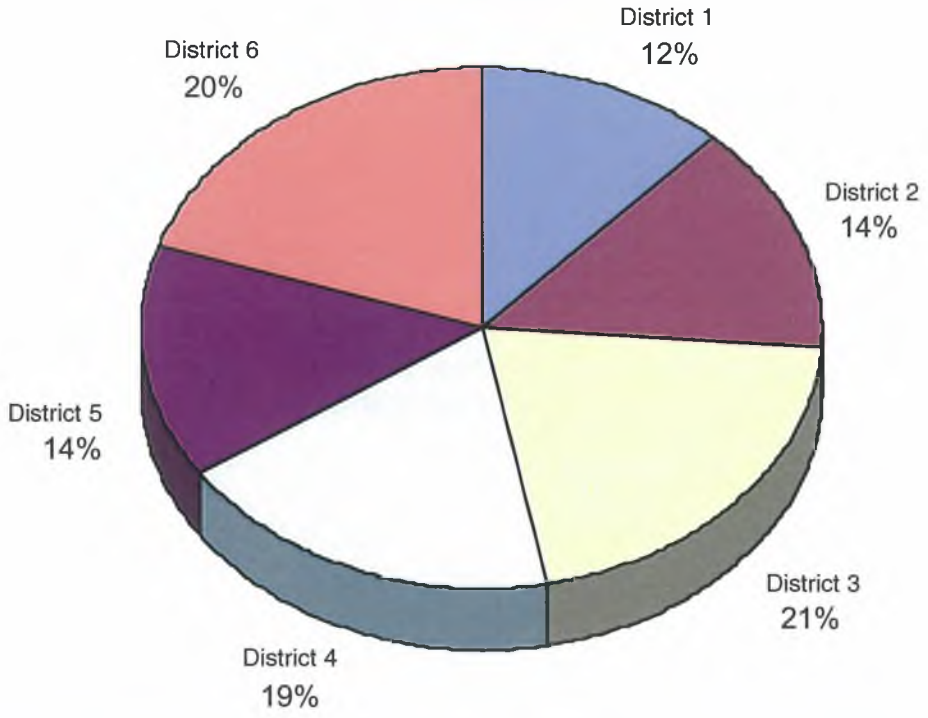
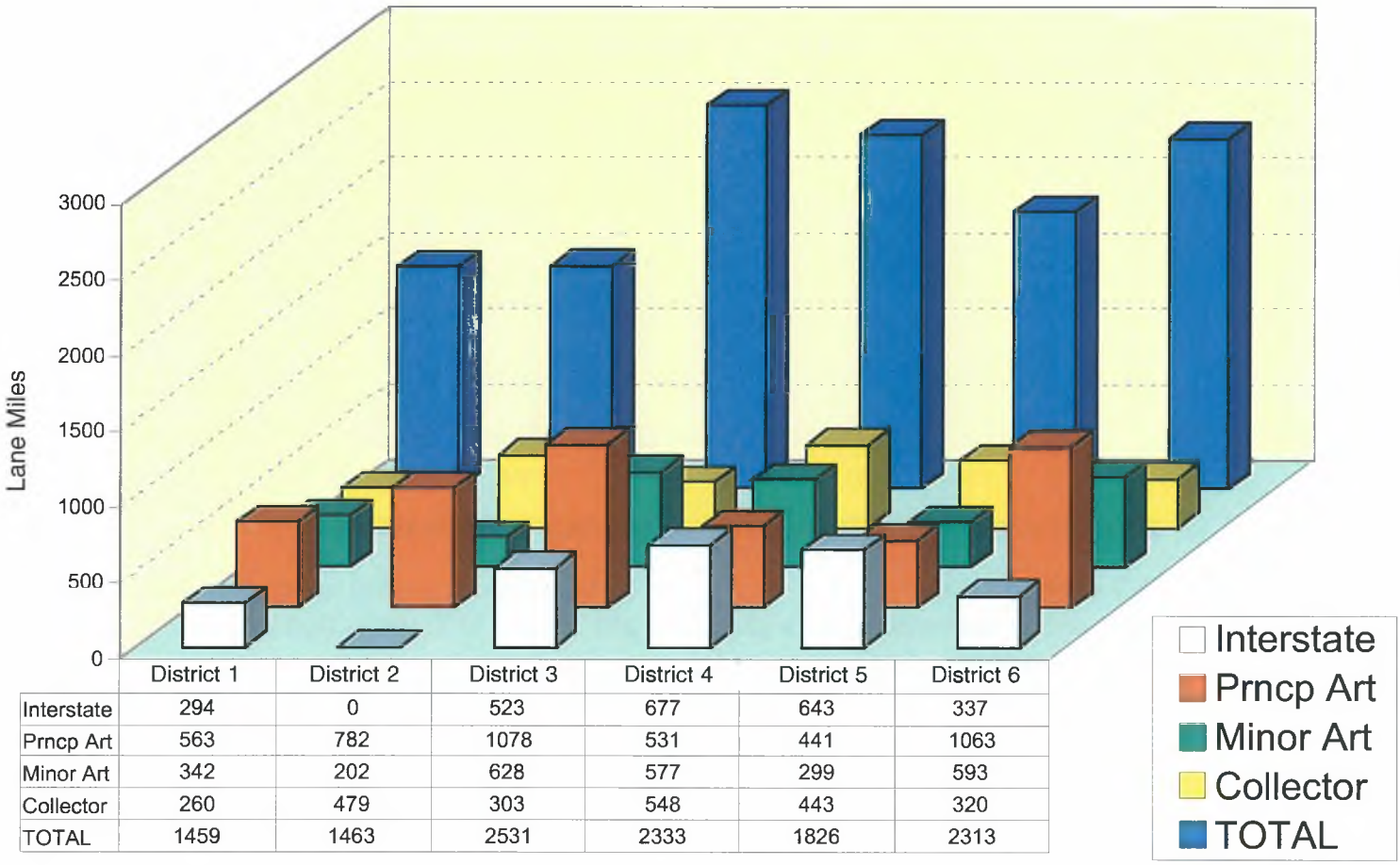


Figure 5.

2005 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	563	782	1078	531	441	1063
Minor Art	342	202	628	577	299	593
Collector	260	479	303	548	443	320
TOTAL	1459	1463	2531	2333	1826	2313

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 11,925 lane miles.

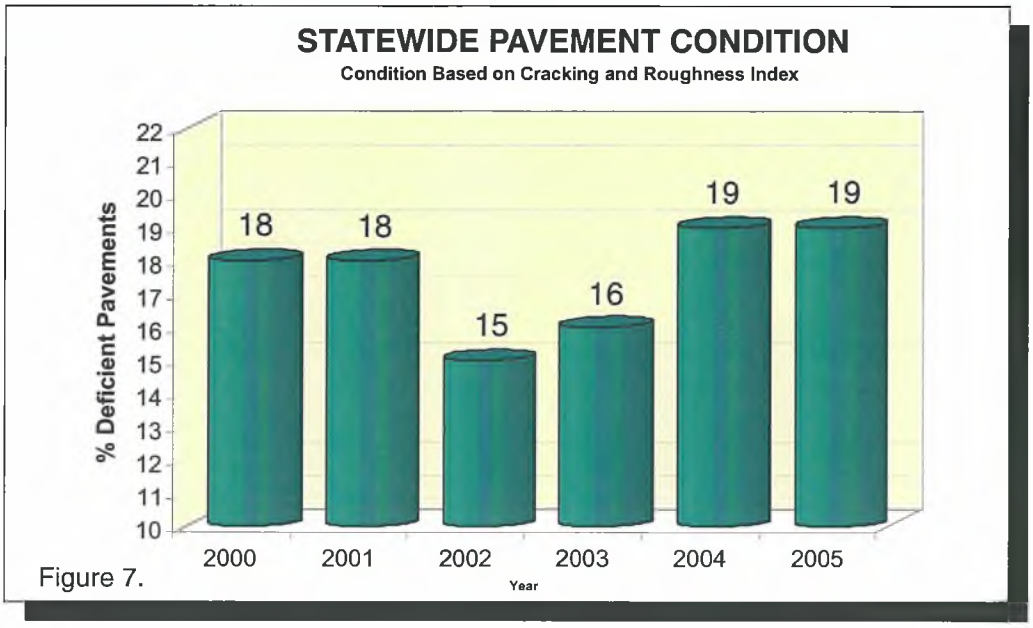


Figure 7.

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

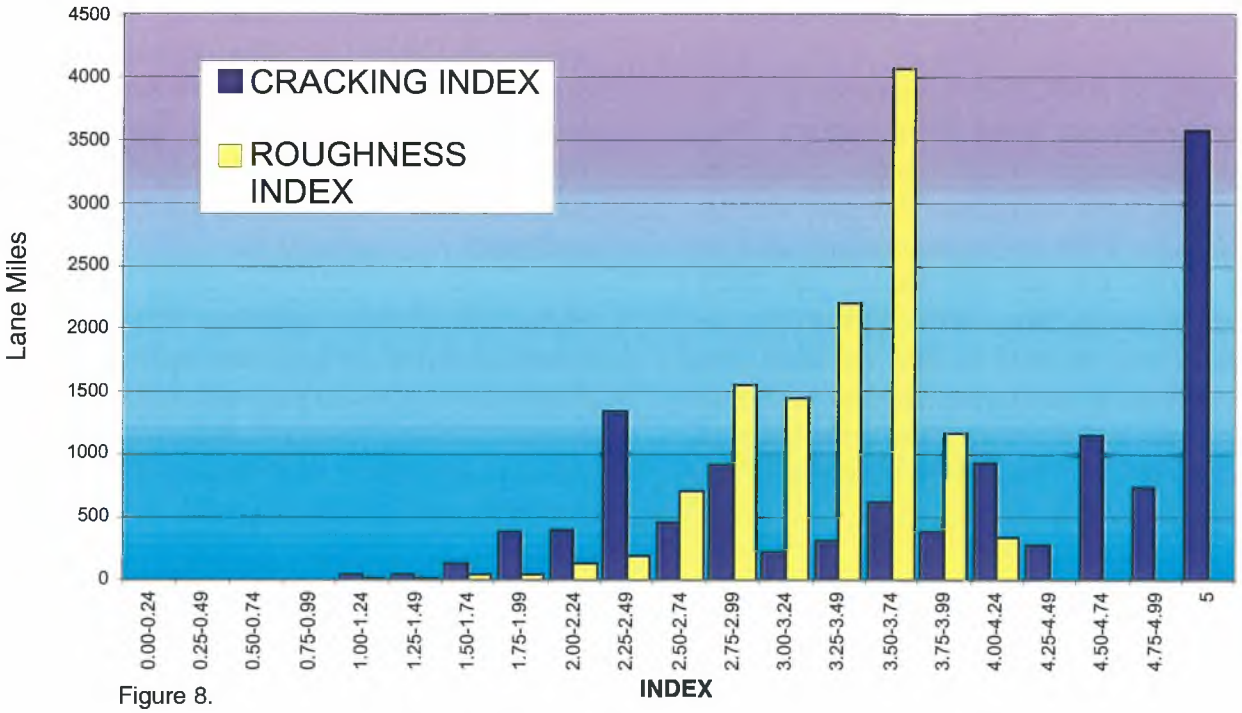


Figure 8.

Distribution of Lowest Index (Cracking or Roughness)

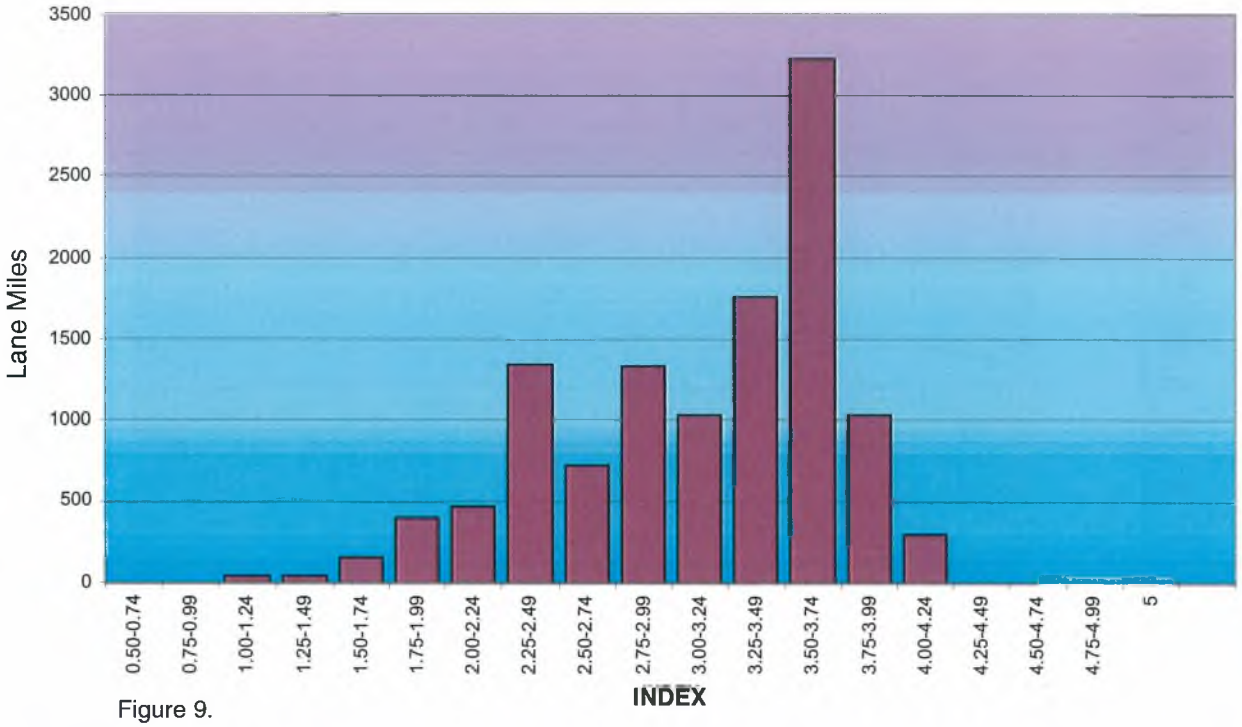


Figure 9.

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 62% as shown for the end of calendar year 2005. Fair pavements have declined from approximately 44% in 1994 to 19% for 2005. The percentage of pavements considered poor or very poor has declined from a maximum of almost 38% in 1994 to 19% at the end of calendar year 2005.

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."

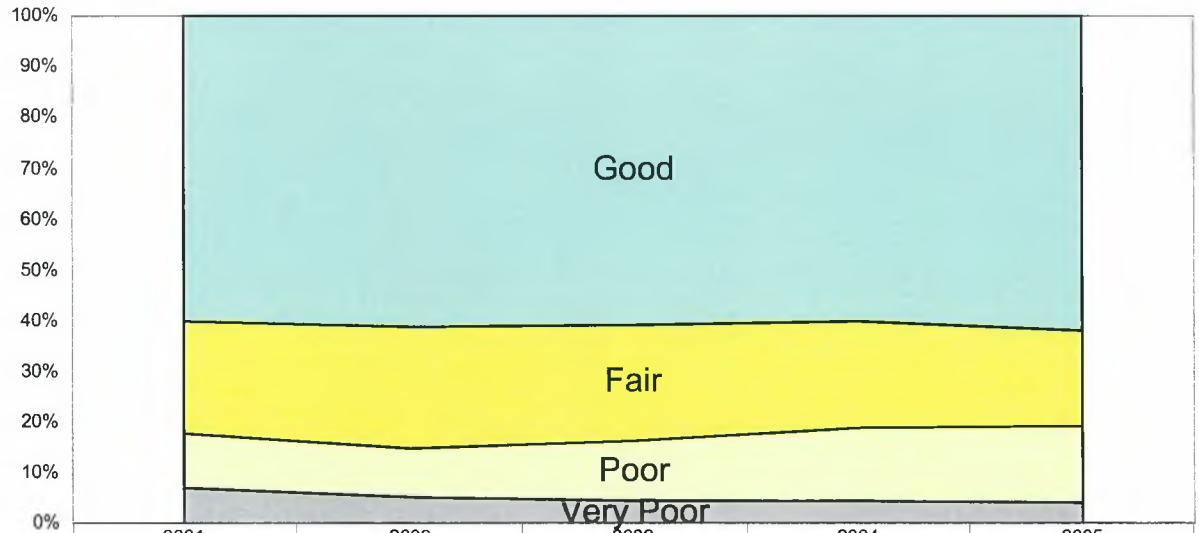
Current pavement condition by district is shown in Figure 13. The percentages in Figure 13 are based on statewide lane miles. For example, 13% of all pavements statewide considered good and 6% of all pavements considered very poor are located in District 1.

Figure 14 is also a summary of pavement condition based on total lane miles in each district, as opposed to statewide mileage. For example: 2% 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



	2001	2002	2003	2004	2005
Good	7,094	7,267	7,196	7,154	7,364
Fair	2,610	2,801	2,691	2,453	2,244
Poor	1,255	1,170	1,435	1,735	1,772
Very Poor	820	593	497	510	494

Figure 10.

District Pavement Condition

by Lane Miles

Condition based on cracking and roughness indices

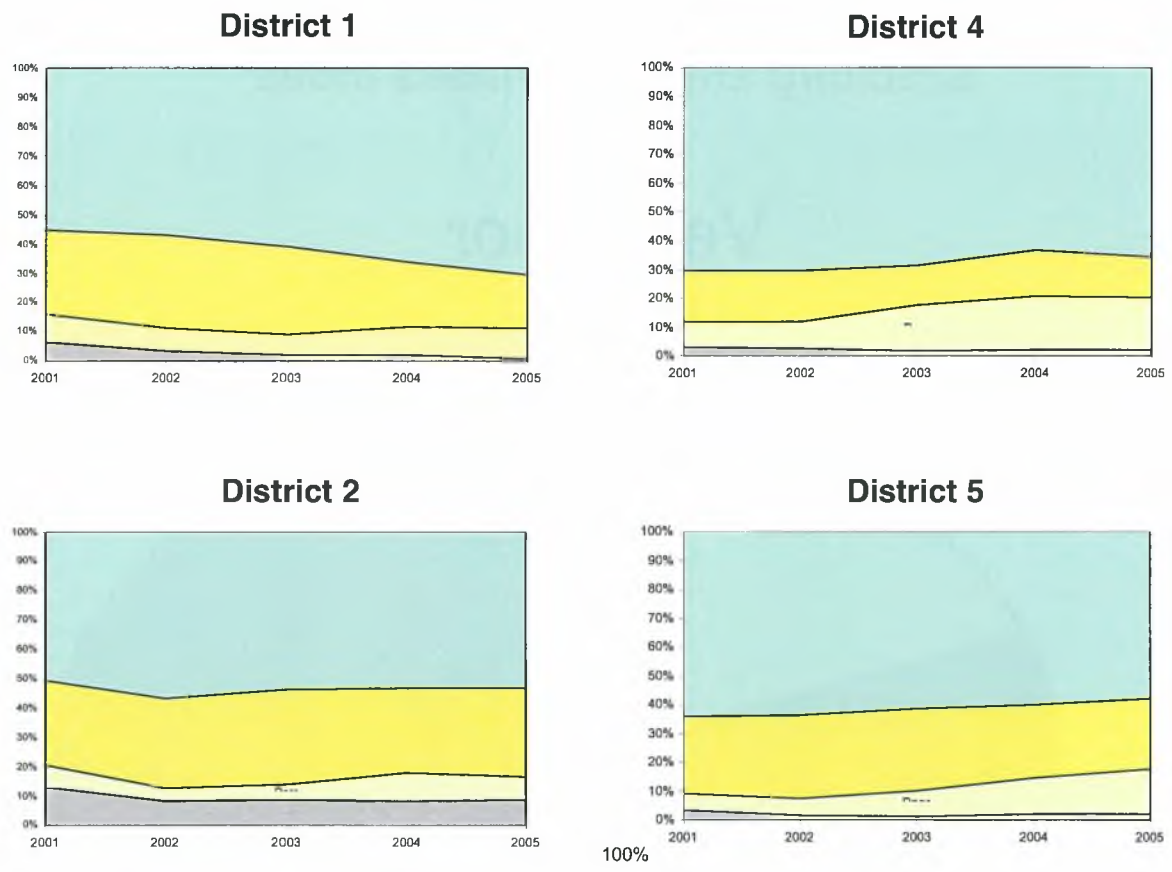


Figure 11.

2005 Statewide Pavement Condition

Condition Based on Cracking and Roughness Index

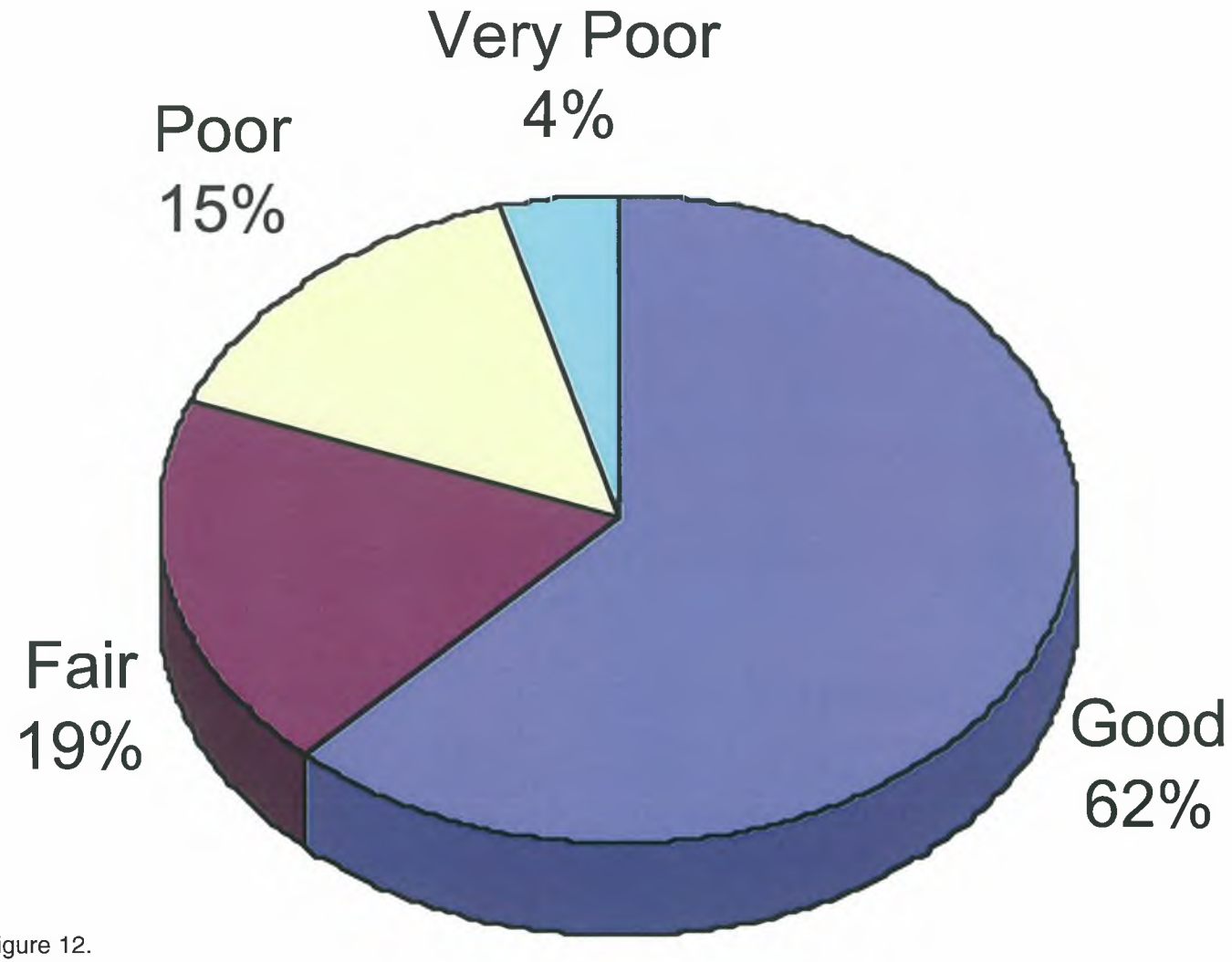


Figure 12.

2005 Pavement Condition
(District Percentage of Statewide Total)

Condition Based on Cracking and Roughness Indices

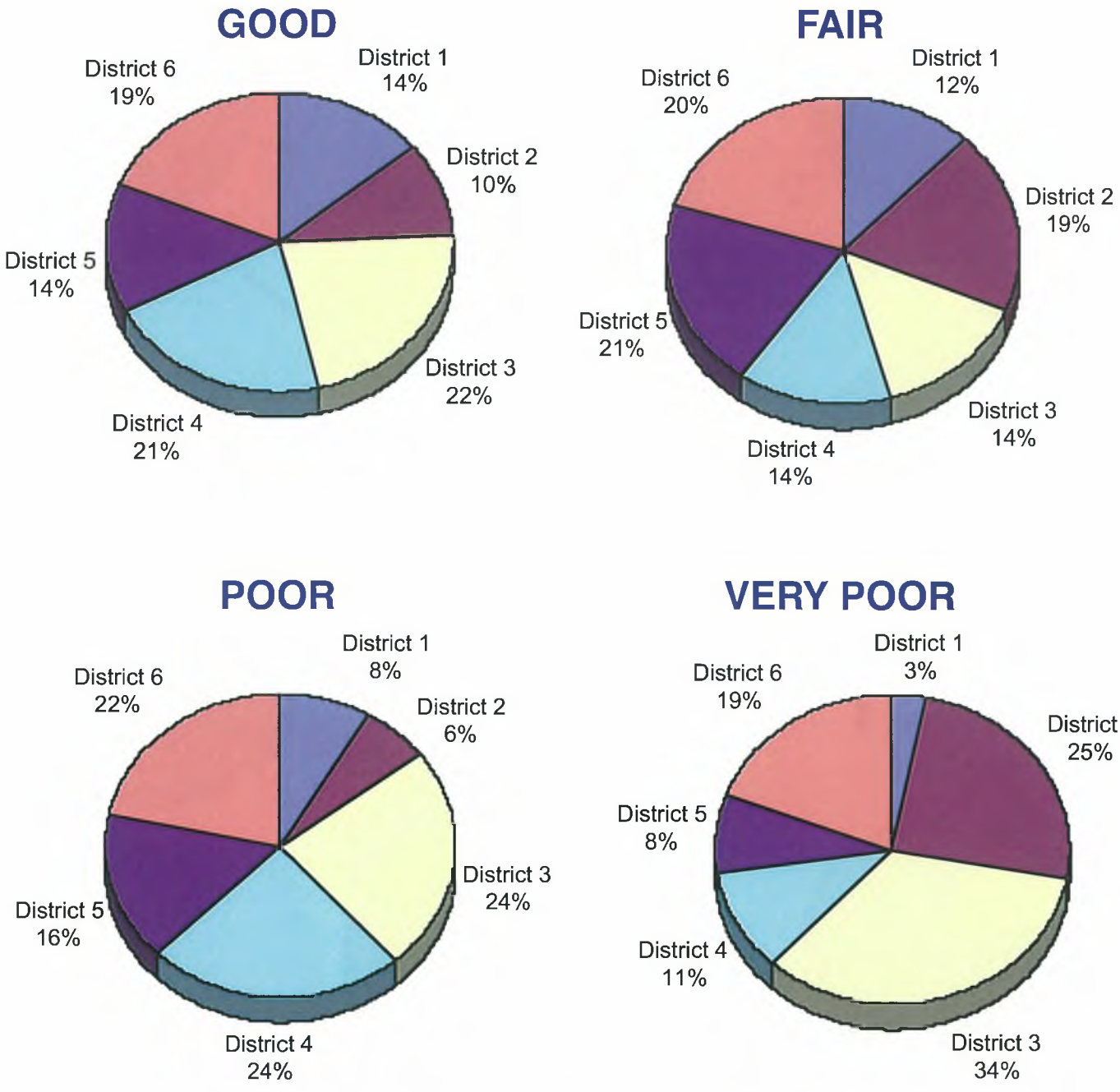


Figure 13.

2005
District Pavement Condition
Condition Based on Cracking and Roughness Indices

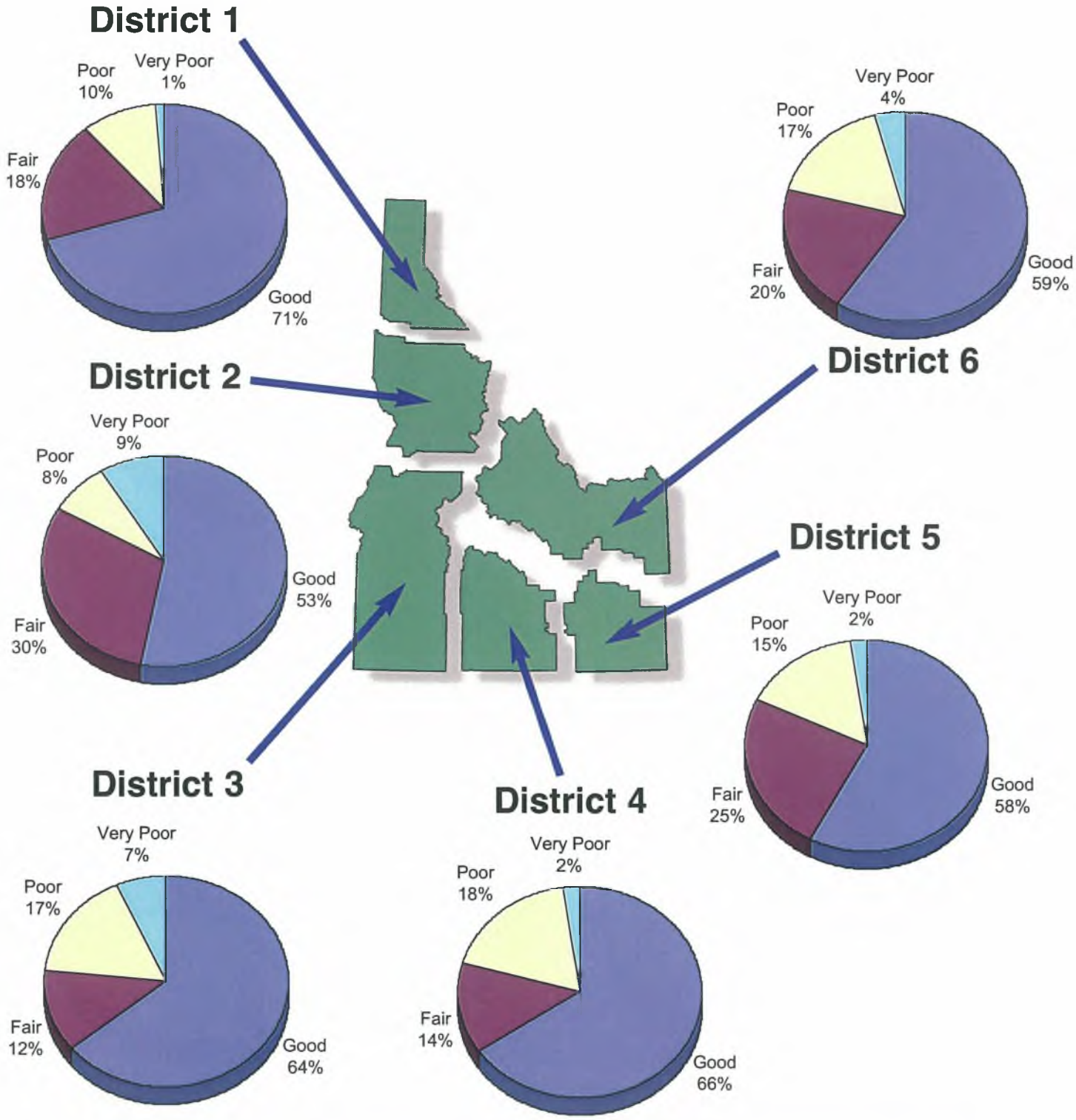


Figure 14.

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.

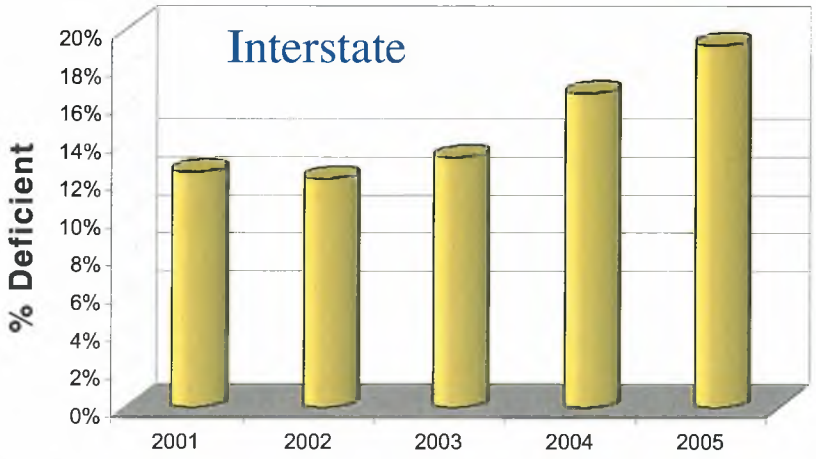


Figure 15.

Interstate highways in Idaho have improved from 23% deficient in 1994 to 18% deficient in 2005, a reduction of 5%.

The remaining (Non-Interstate) NHS routes have improved from 38 percent deficient in 1994 to approximately 20% deficient in 2005, a reduction of 18%.

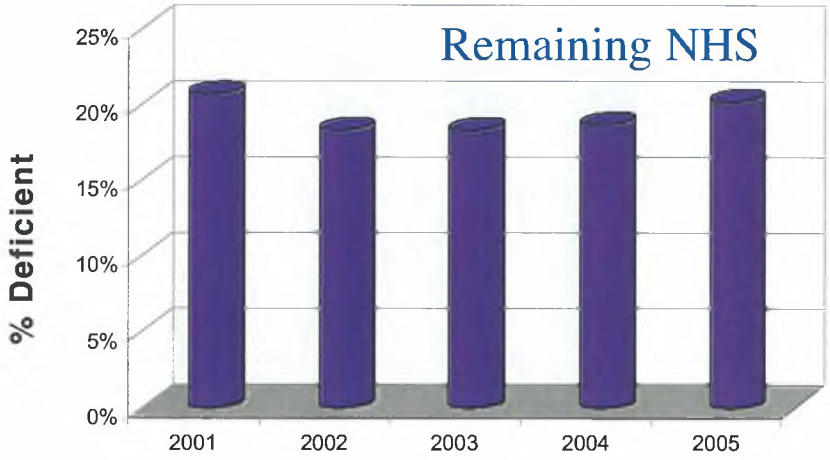


Figure 16.

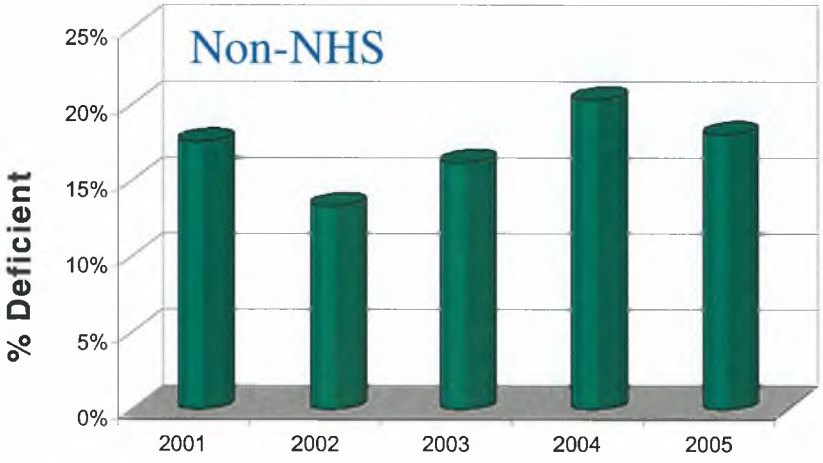


Figure 17.

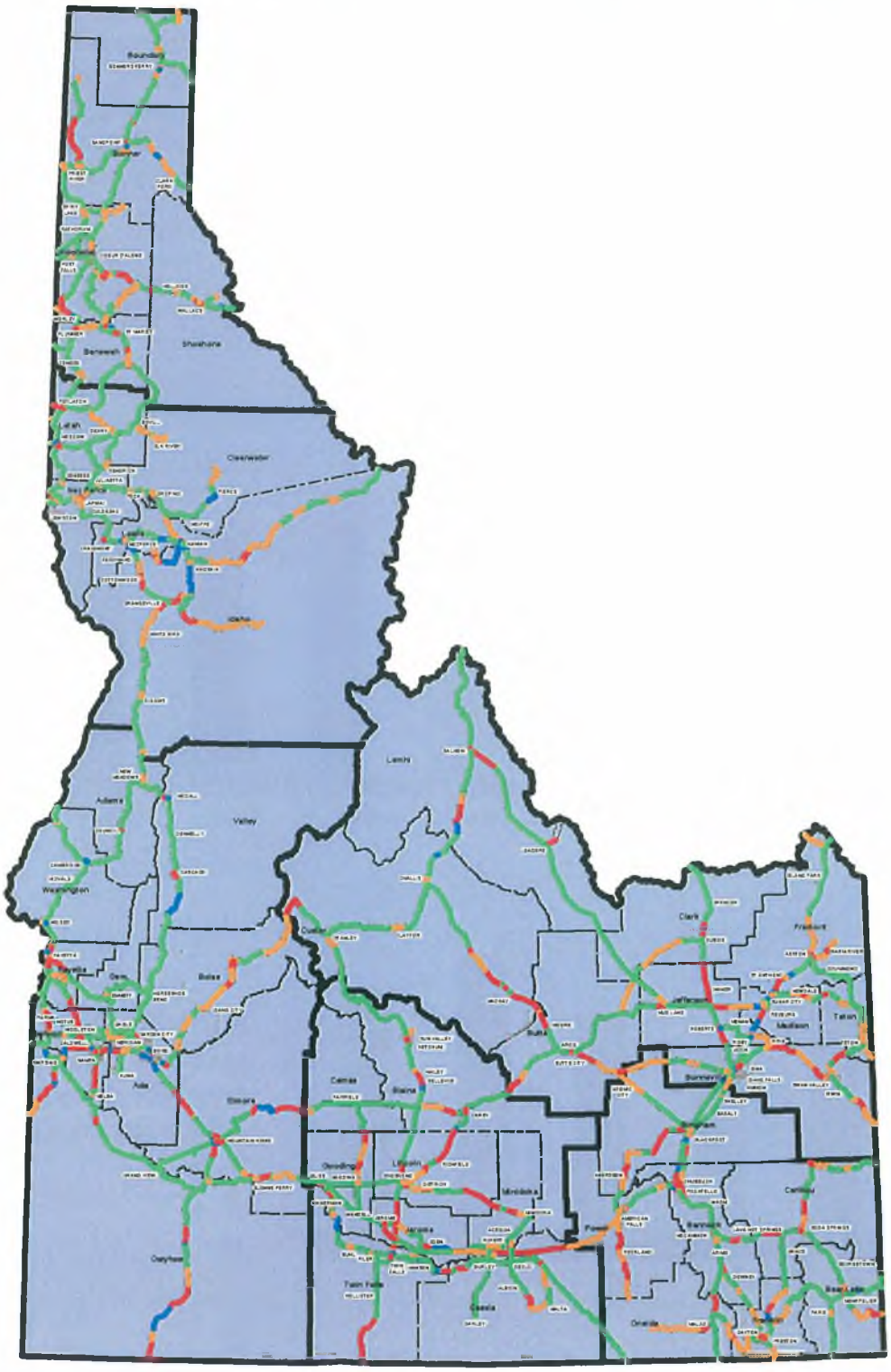
Non-NHS route deficiencies have also been reduced from over 44% in 1994 to 18% in 2005, a reduction of 26%.

State of Idaho

Pavement Condition Map

(11,874 Paved Lane Miles)

Good	Fair	Poor	Very Poor
(7,364 Lane Miles)	(2,44 Lane Miles)	(1,772 Lane Miles)	(494 Lane Miles)



Map 2.

District 1

Pavement Condition Map

(1,456 Paved Lane Miles)

Good	Fair	Poor	Very Poor
(1025 Lane Miles)	(268 Lane Miles)	(148 Lane Miles)	(15 Lane Miles)

Map 3.

District 2

Pavement Condition Map

(1,433 Paved Lane Miles)

Good	Fair	Poor	Very Poor
(761 Lane Miles)	(435 Lane Miles)	(114 Lane Miles)	(123 Lane Miles)

Map 4.

District 3

Pavement Condition Map

(2,532 Paved Lane Miles)

Good	Fair	Poor	Very Poor
(1,627 Lane Miles)	(316 Lane Miles)	(421 Lane Miles)	(168 Lane Miles)

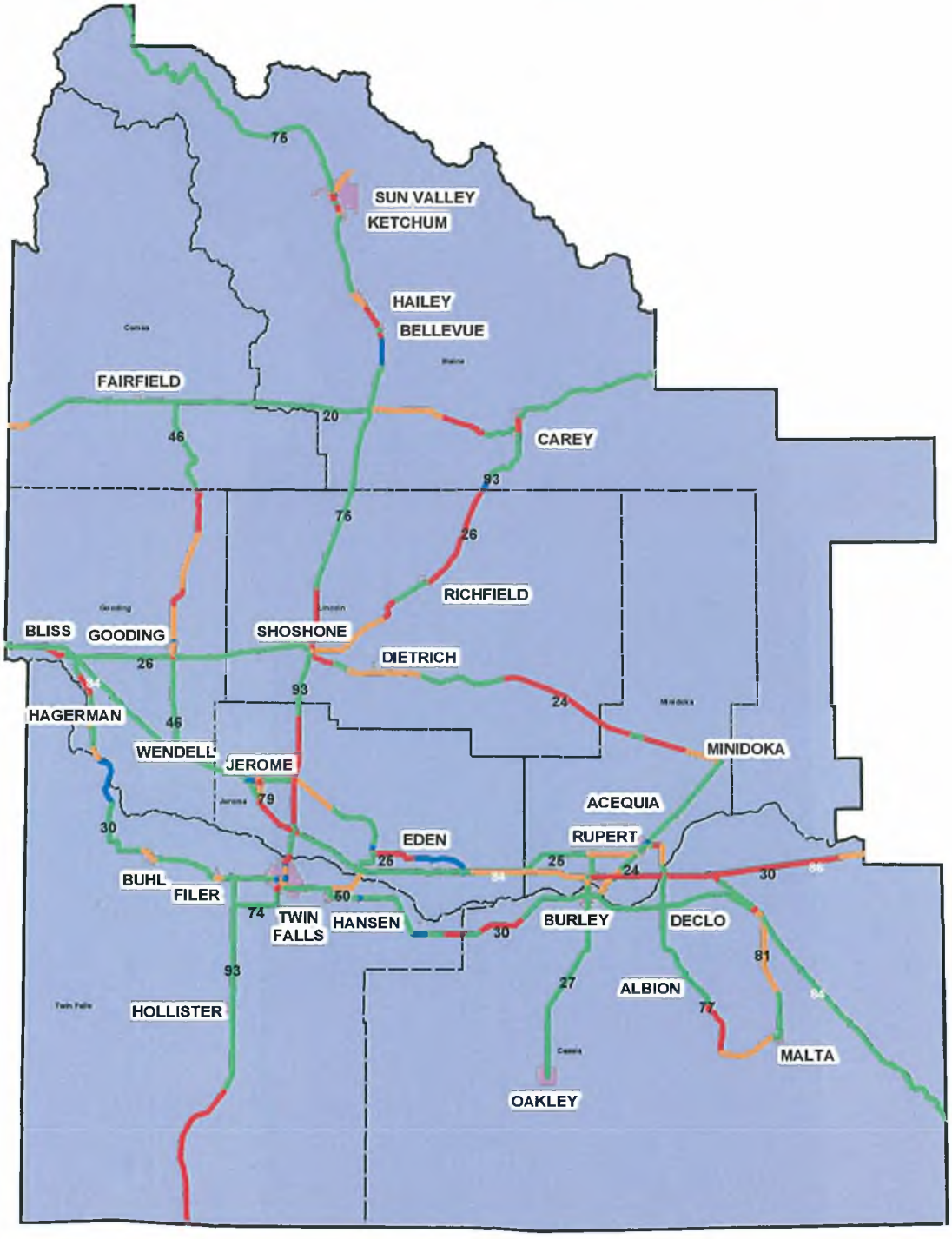
Map 5.

District 4

Pavement Condition Map

(2,333 Paved Lane Miles)

Good (1,532 Lane Miles) | Fair (324 Lane Miles) | Poor (426 Lane Miles) | Very Poor (62 Lane Miles)



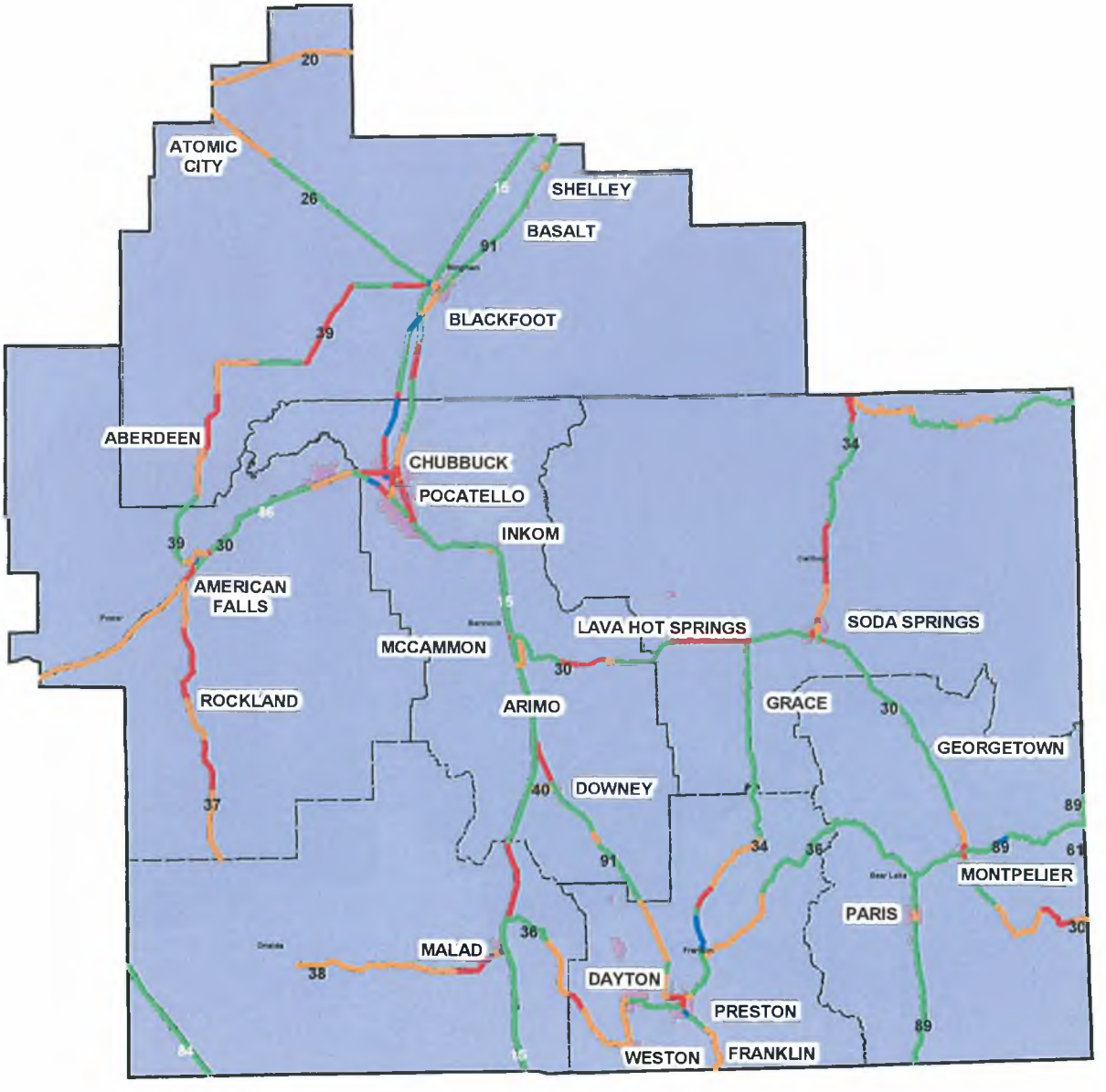
Map 6.

District 5

Pavement Condition Map

(1,826 Paved Lane Miles)

Good	Fair	Poor	Very Poor
(1,064 Lane Miles)	(449 Lane Miles)	(282 Lane Miles)	(41 Lane Miles)



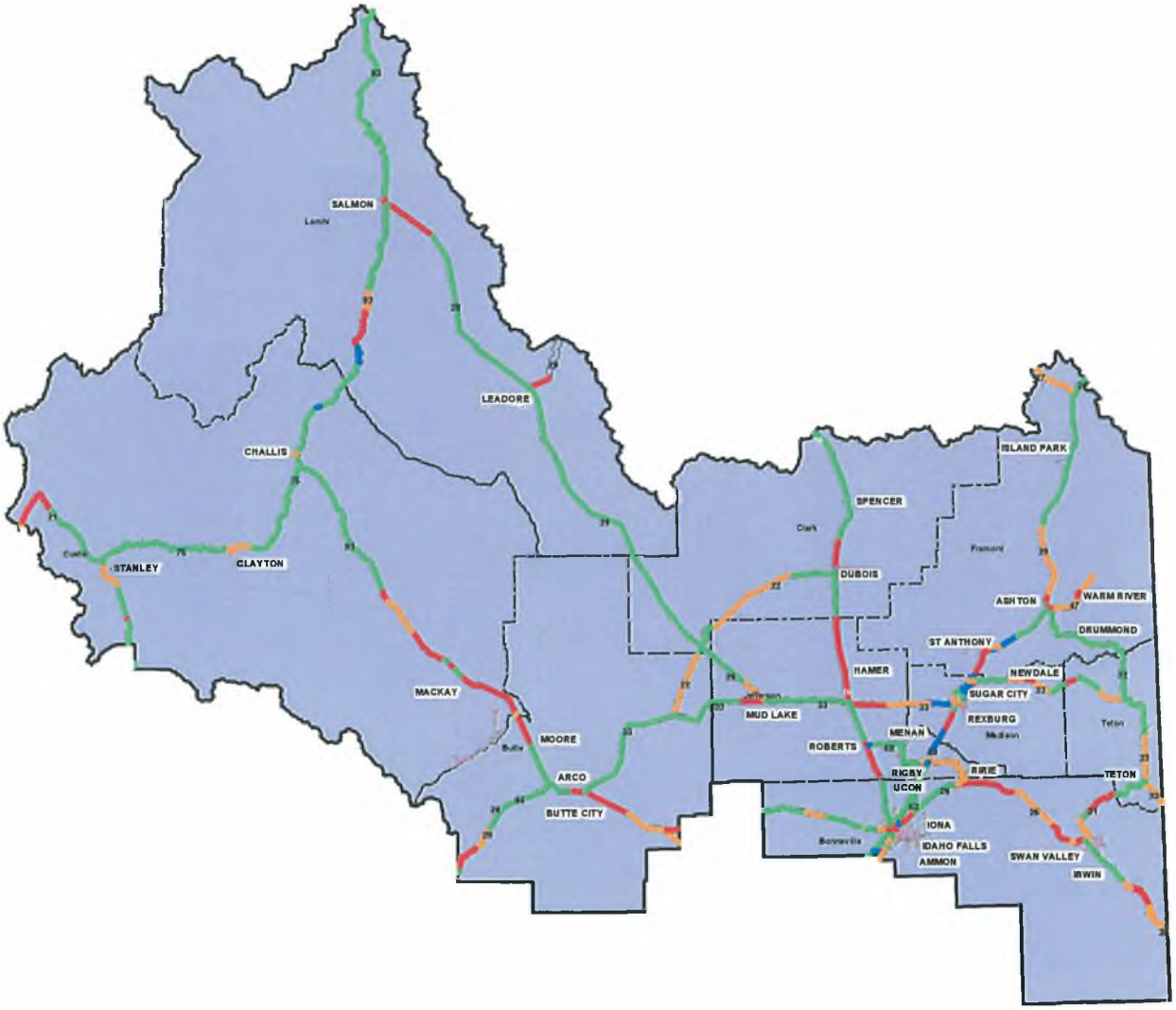
Map 7.

District 6

Pavement Condition Map

(2,293 Paved Lane Miles)

Good	Fair	Poor	Very Poor
(1,364 Lane Miles)	(452 Lane Miles)	(382 Lane Miles)	(95 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.

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.

2005
Pavement Needs
(Lane Miles)

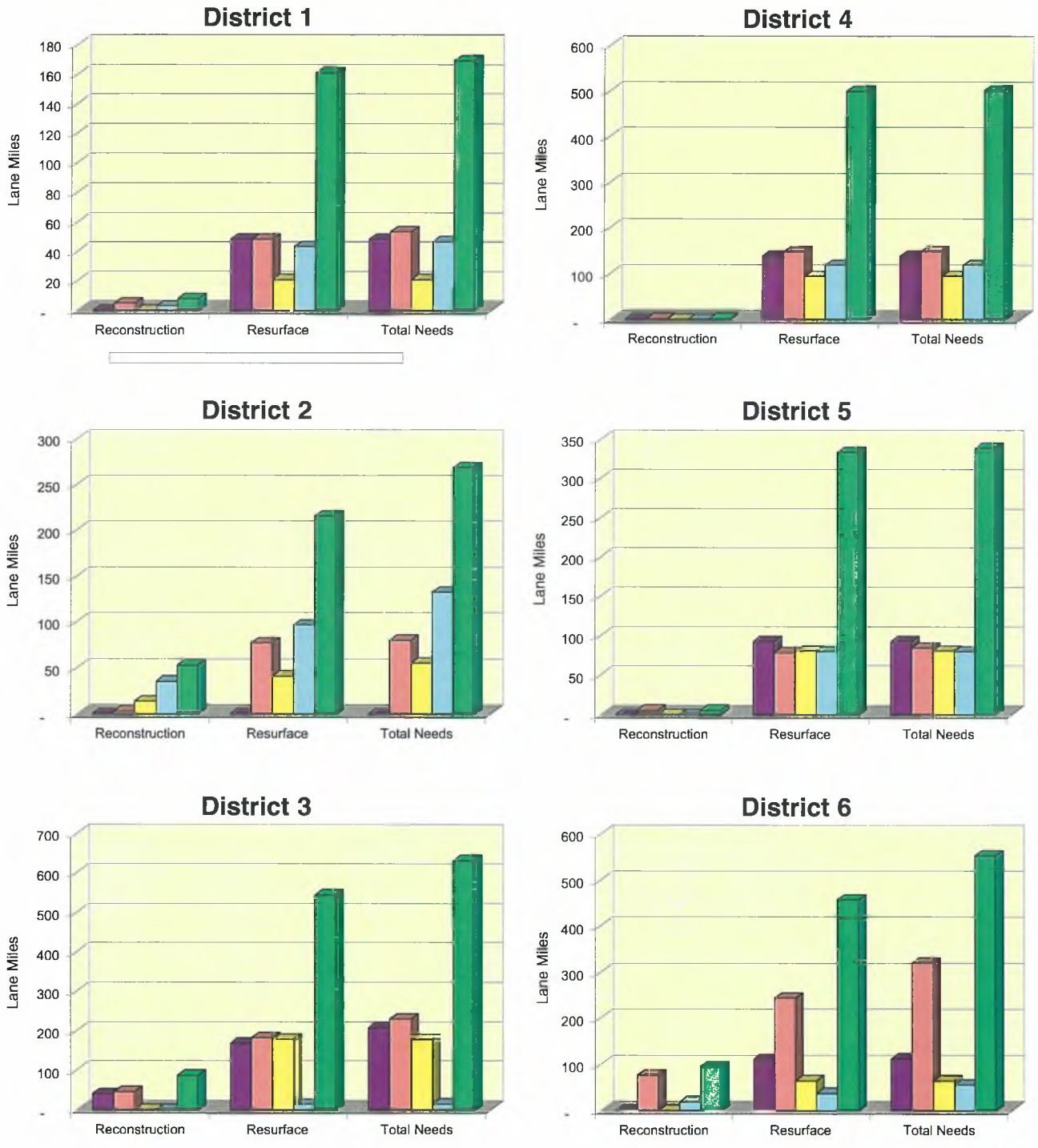


Figure 18.

INTERSTATE PRINCIPAL ART. MINOR ARTERIAL COLLECTOR TOTAL

2005 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	-	-	48	5,431	48	5,431
PRINCIPAL ART.	5	2,391	48	4,715	53	7,106
MINOR ARTERIAL	-	-	21	2,006	21	2,006
COLLECTOR	3	1,254	43	3,333	46	4,587
TOTAL	8	3,645	161	15,485	169	19,130

DISTRICT 2

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	-	-	-	-	-	-
PRINCIPAL ART.	3	1,893	77	8,220	80	10,113
MINOR ARTERIAL	14	8,099	41	4,335	55	12,434
COLLECTOR	36	13,824	97	9,252	133	23,076
TOTAL	53	23,816	216	21,807	269	45,623

DISTRICT 3

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	40	23,346	168	15,614	209	38,960
PRINCIPAL ART.	46	23,528	183	20,102	229	43,630
MINOR ARTERIAL	-	-	178	15,253	178	15,253
COLLECTOR	1	223	14	988	15	1,211
TOTAL	87	47,097	544	51,957	631	99,054

DISTRICT 4

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	-	-	139	12,941	139	12,941
PRINCIPAL ART.	1	789	148	12,398	149	13,187
MINOR ARTERIAL	-	-	94	8,478	94	8,478
COLLECTOR	-	-	119	8,045	119	8,045
TOTAL	1	789	500	41,862	501	42,651

DISTRICT 5

	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	-	-	93	9,028	93	9,028
PRINCIPAL ART.	5	3,058	79	8,011	84	11,069
MINOR ARTERIAL	-	-	81	6,567	81	6,567
COLLECTOR	-	-	80	5,702	80	5,702
TOTAL	5	3,058	333	29,308	338	32,366

DISTRICT 6

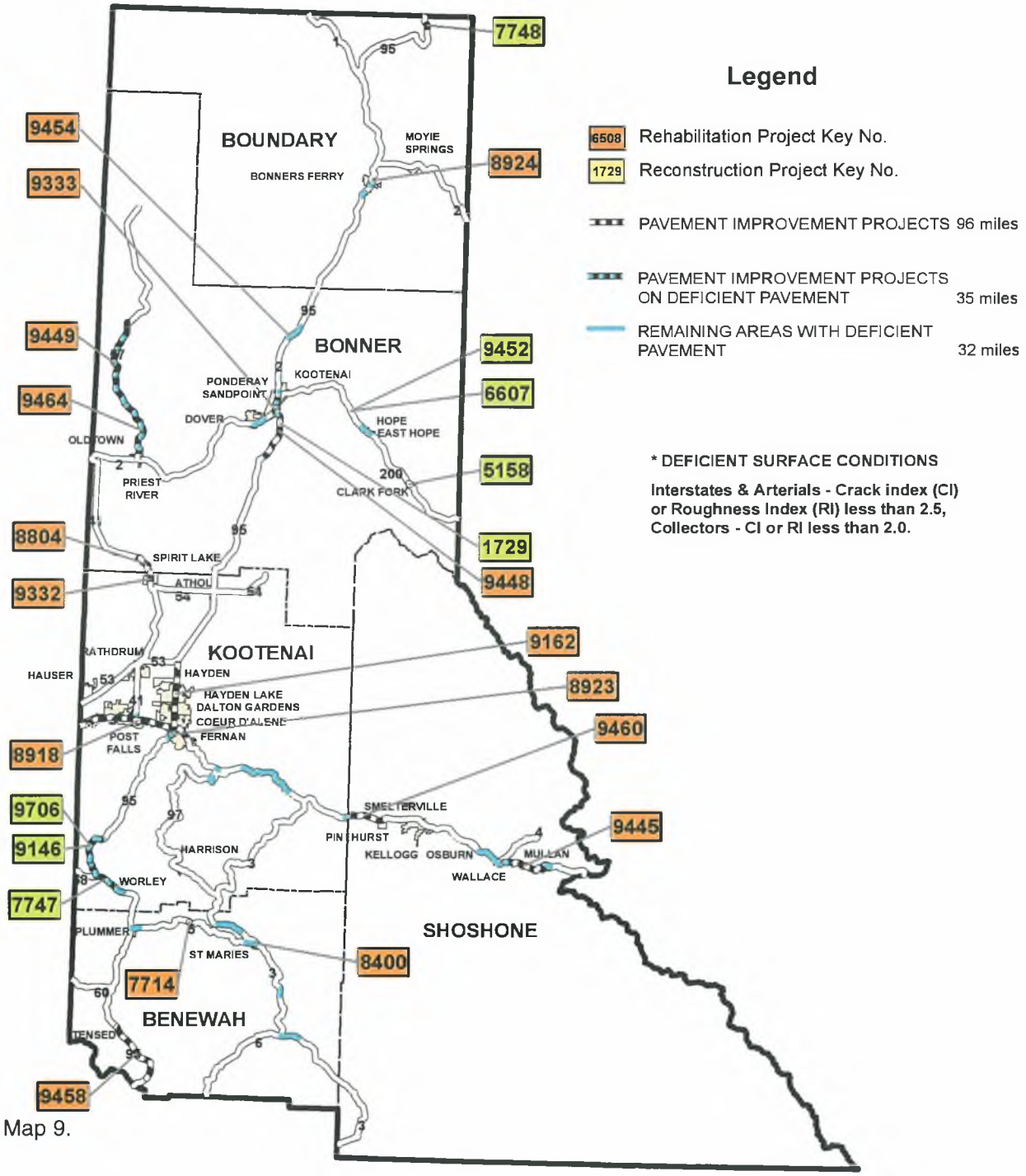
	RECONSTRUCTION		RESURFACE			
	DEFICIENT LANE MILES	COST ($000)	DEFICIENT LANE MILES	COST ($000)	TOTAL LANE MILES	TOTAL COST ($000)
INTERSTATE	-	-	112	10,045	112	10,045
PRINCIPAL ART.	77	32,579	244	22,021	321	54,600
MINOR ARTERIAL	-	-	65	4,845	65	4,845
COLLECTOR	19	7,485	37	3,885	56	11,370
TOTAL	96	40,064	458	40,796	553	80,860

GRAND TOTAL	250	118,469	2,211	201,215	2,462	319,684

District 1

Programmed Pavement Improvement Projects vs. Pavement Deficiencies

FY2006 — FY2010

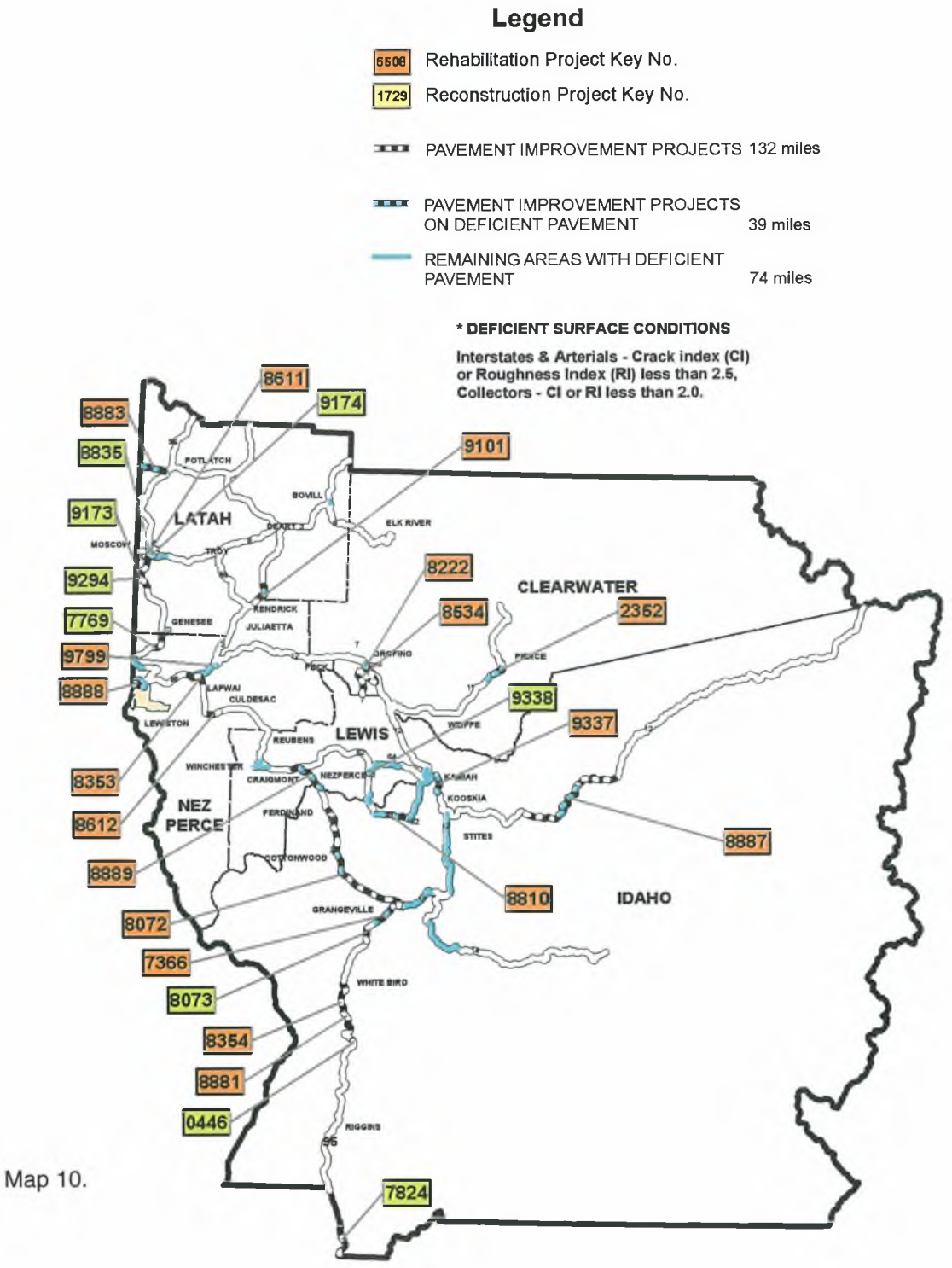


Map 9.

District 2

Programmed Pavement Improvement Projects vs. Pavement Deficiencies

FY2006 — FY2010

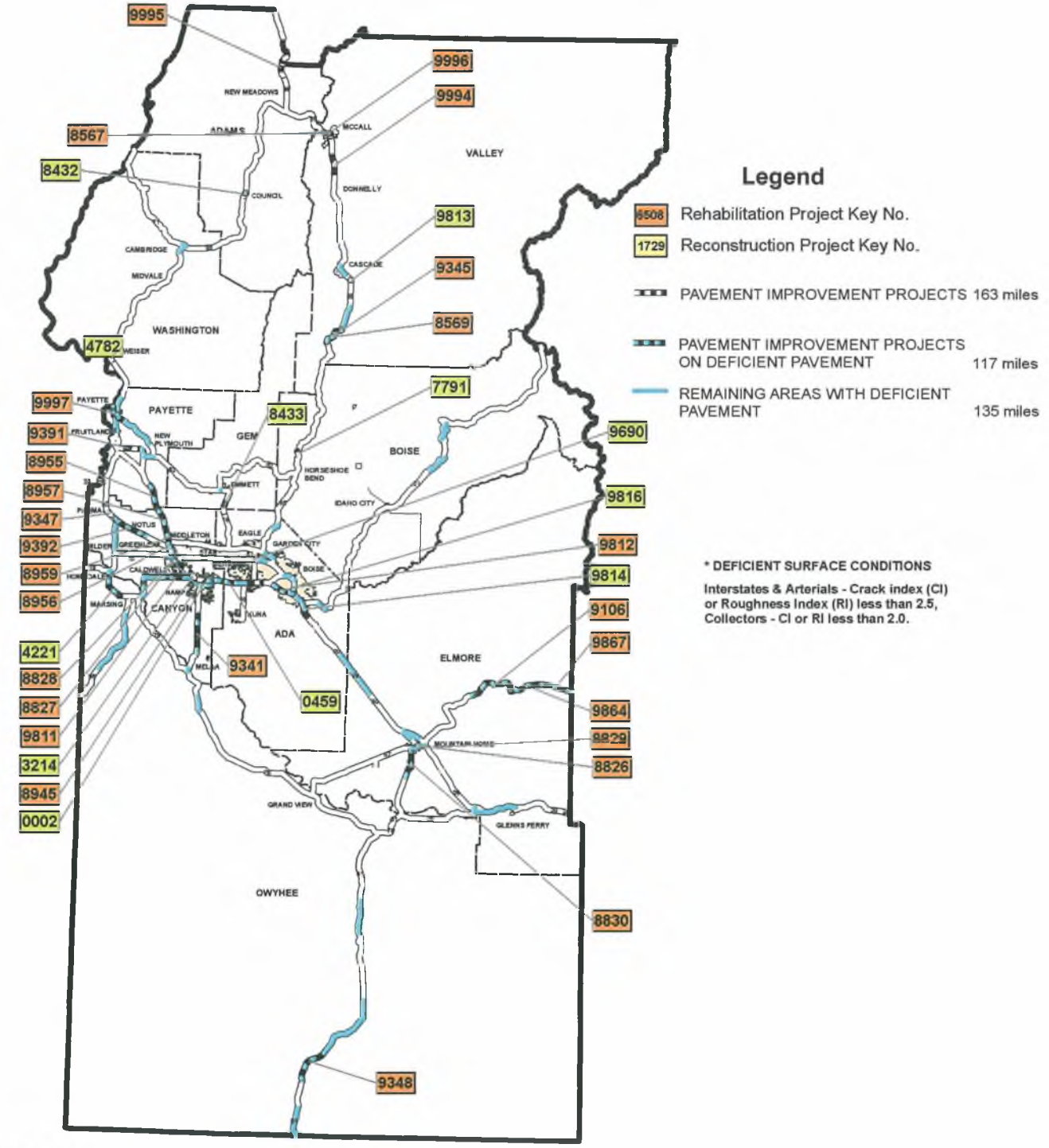


Map 10.

District 3

Programmed Pavement Improvement Projects vs. Pavement Deficiencies

FY2006 — FY2010

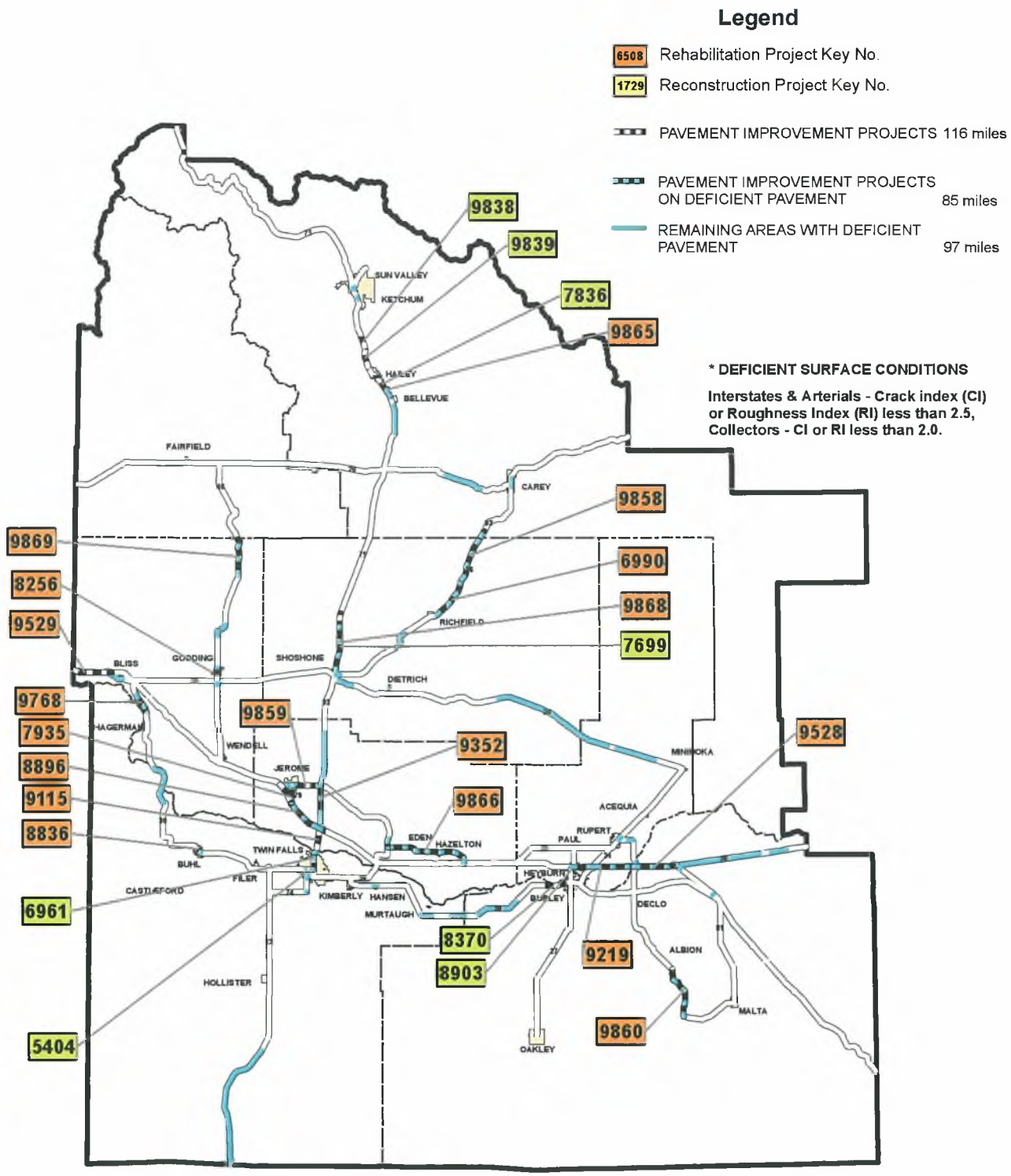


Map 11.

District 4

Programmed Pavement Improvement Projects vs. Pavement Deficiencies

FY2006 — FY2010

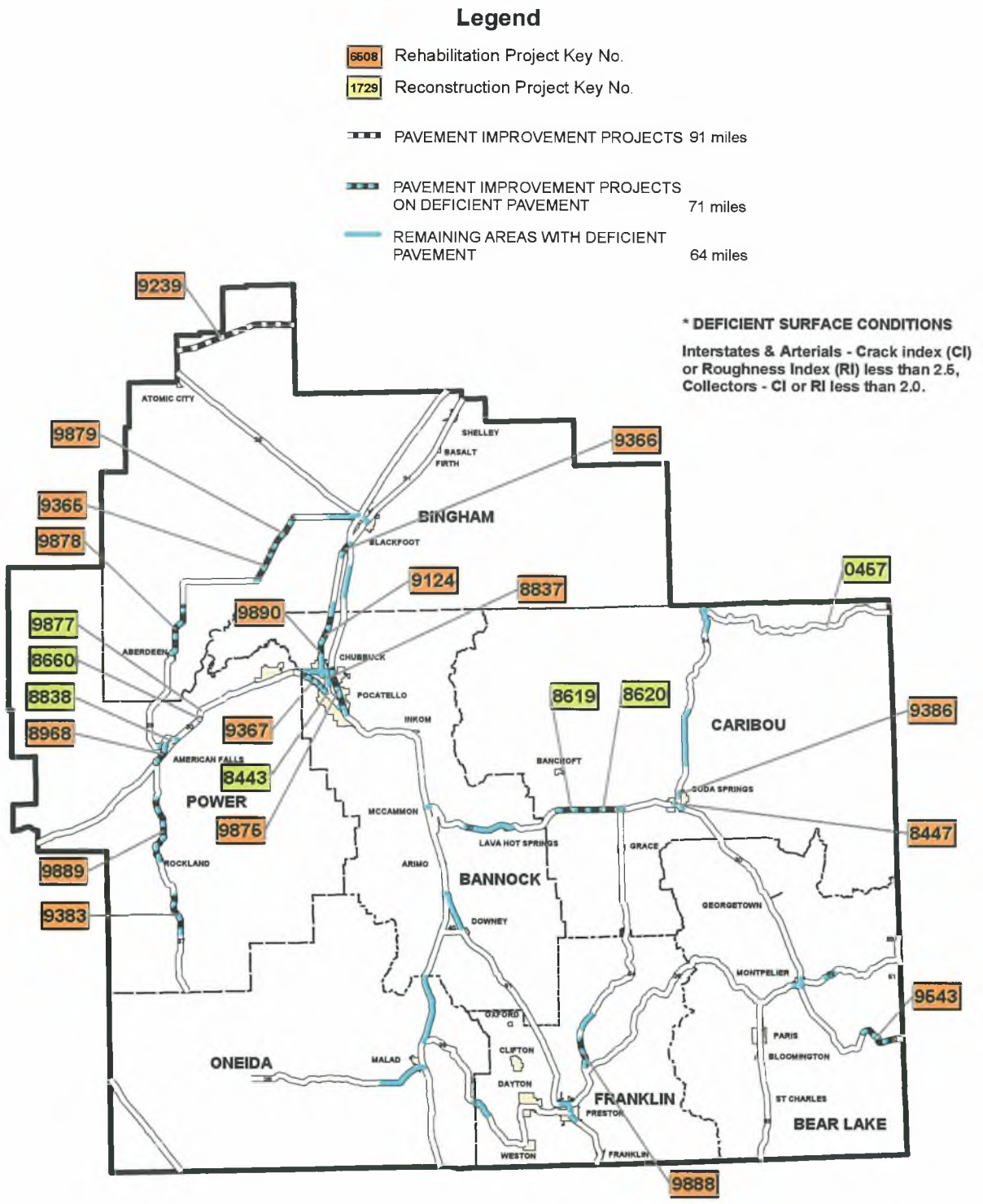


Map 12.

District 5

Programmed Pavement Improvement Projects vs. Pavement Deficiencies

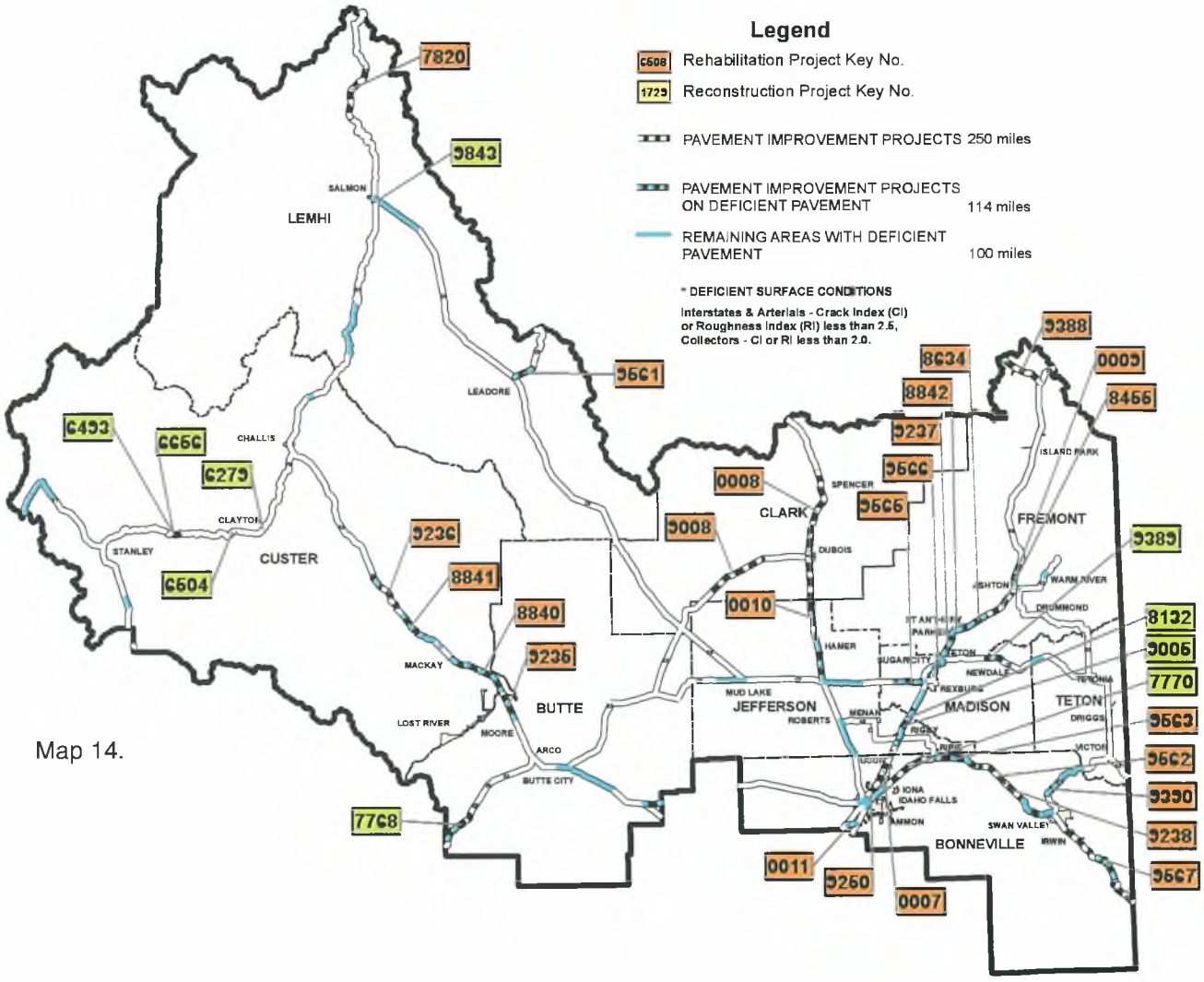
FY2006 — FY2010



District 6

Programmed Pavement Improvement Projects vs. Pavement Deficiencies

FY2006 — FY2010



Map 14.

Section 5
SEALCOATS

Sealcoats apply a cover coat of gravel chips over hot liquid asphalt to seal cracks in the original pavement, prolonging the life of the road and improving 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 2001 through 2005.

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 (11.8% or 201 lane miles).

Figures 22 through 27 show the miles sealcoated from 2001 to 2005 in each of ITD's six districts.

STATEWIDE FIVE-YEAR SEALCOAT HISTORY

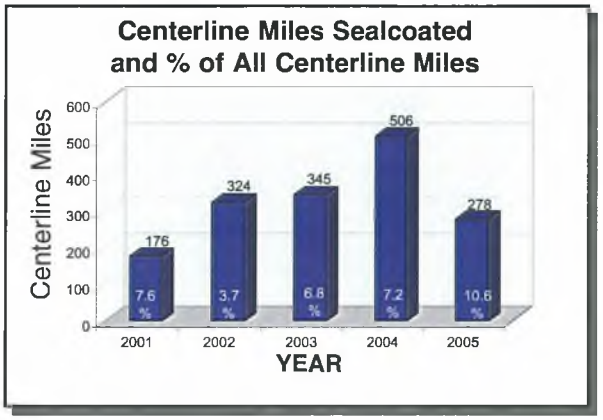


Figure 19

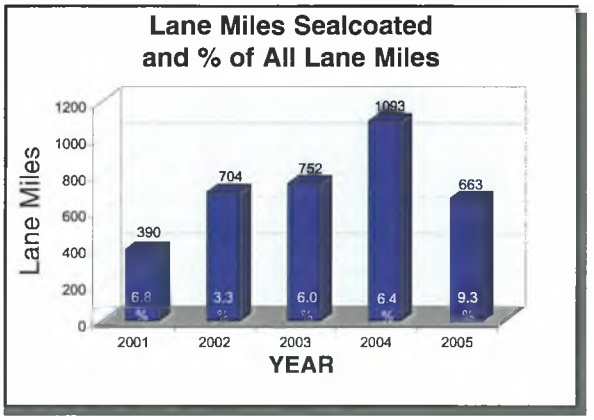


Figure 20

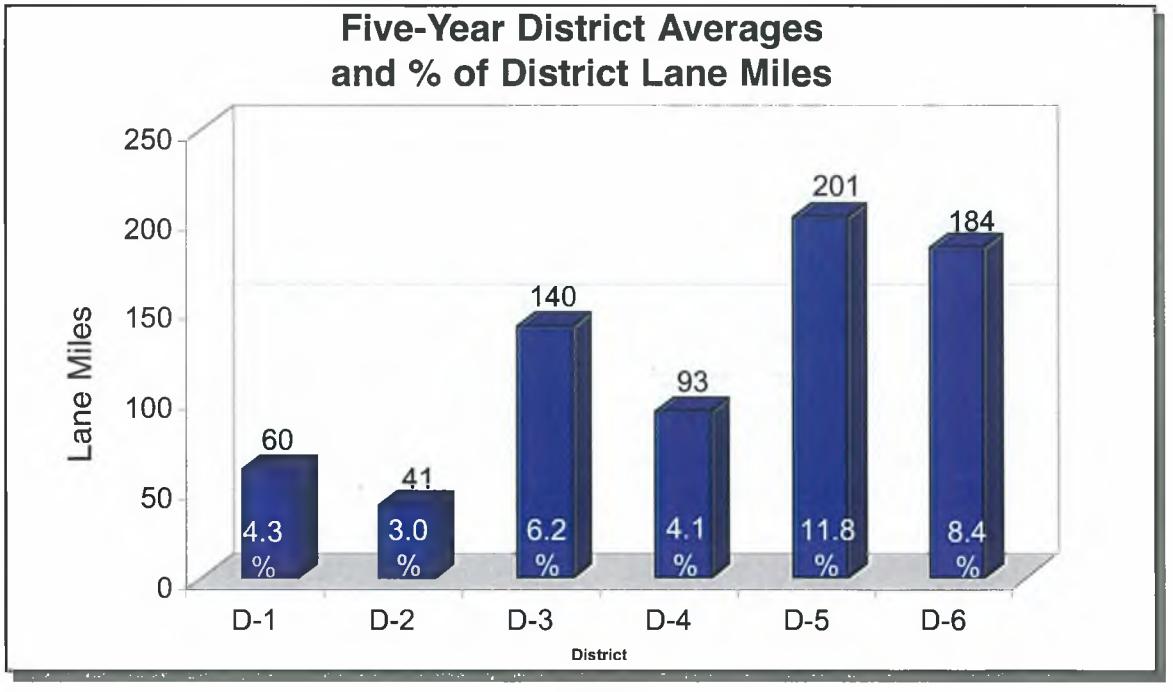
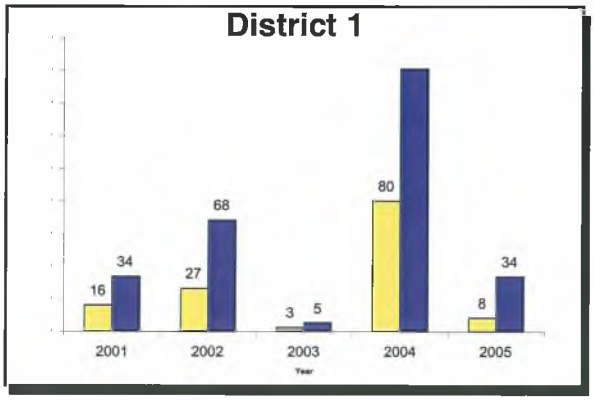
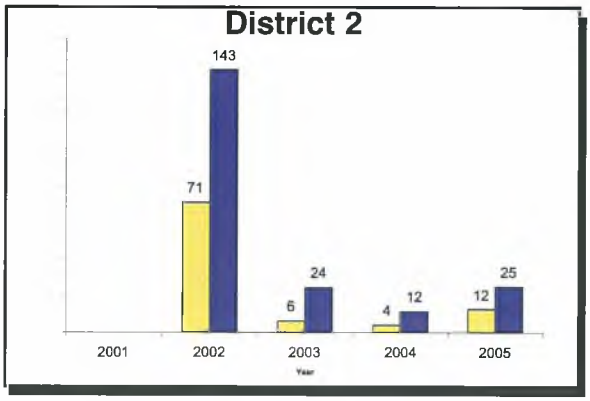


Figure 21

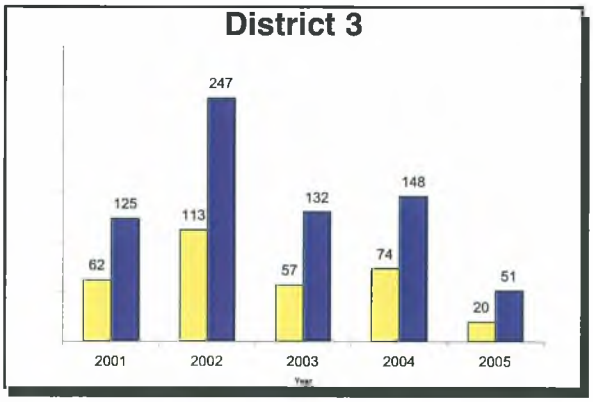
STATEWIDE FIVE-YEAR SEALCOAT HISTORY BY DISTRICT



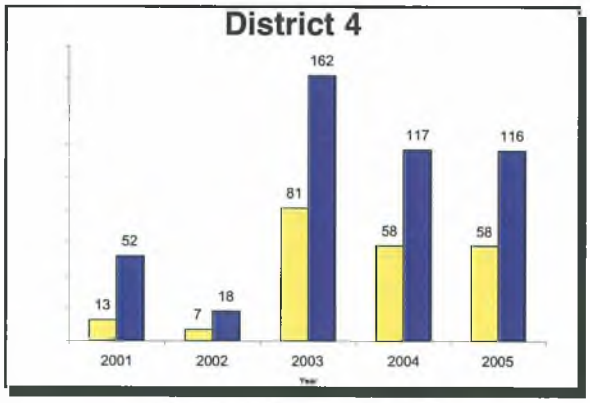
5-Year Lane Mile Average = 60



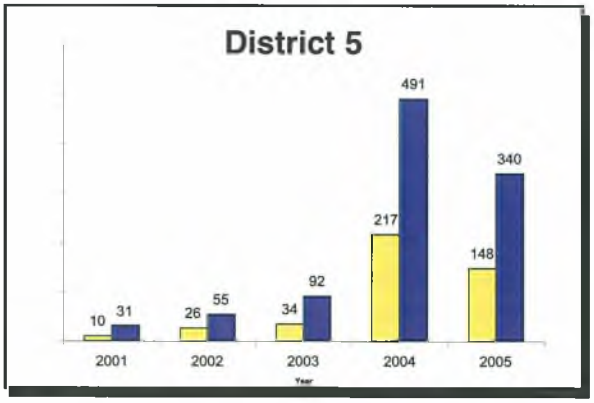
5-Year Lane Mile Average = 41



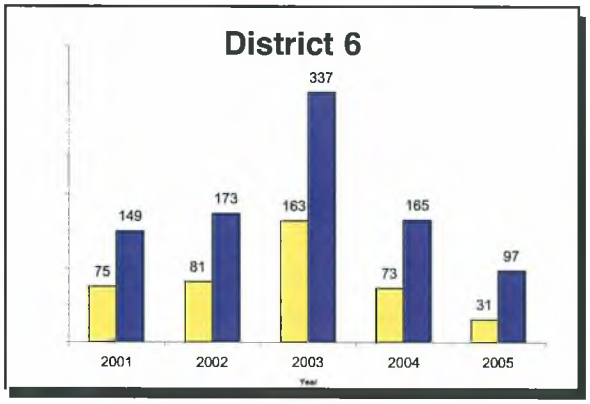
5-Year Lane Mile Average = 140



5-Year Lane Mile Average = 93



5-Year Lane Mile Average = 201



5-Year Lane Mile Average = 184

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 19% by calendar year 2005.

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.

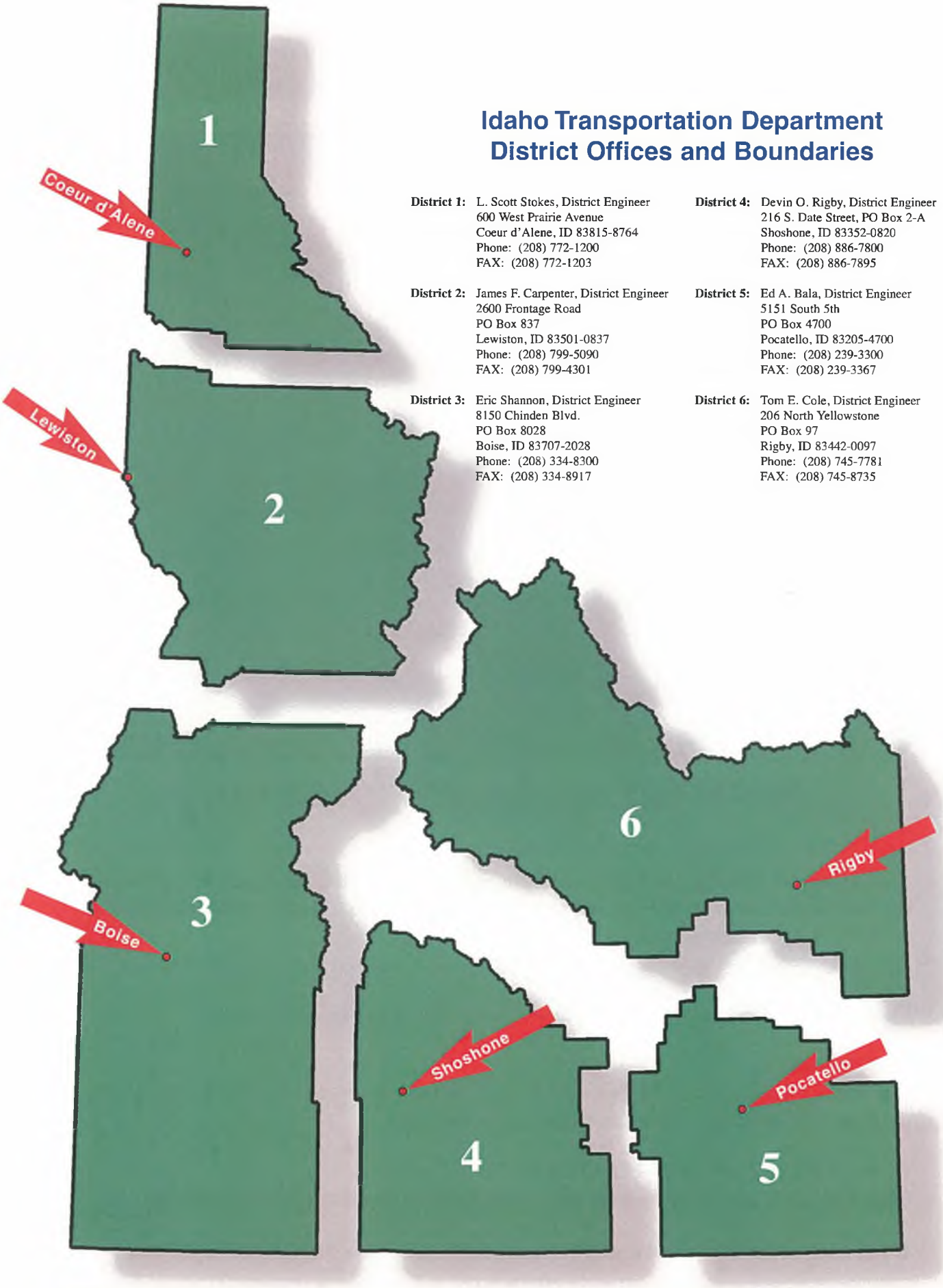
- **Reconstruction:** When pavements have reached the end of their service life an effective reconstruction program is necessary.

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: Eric Shannon, 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.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 transporation in Idaho, our site is just a click away!

Notes

Pavement Management System

– 2006 –