STATE HIGHWAY PRESERVATION REPORT

FEBRUARY 2007

NEVADA DOT

Produced by the Operations Analysis Division

WHAT IS THE CONDITION OF NEVADA'S ROADS AND BRIDGES?

WHAT IS BEING DONE TO PROTECT AND IMPROVE THEM?

HOW MUCH WILL IT COST?

NEVADA DEPARTMENT OF TRANSPORTATION

State of Nevada
Department of Transportation

State Highway Preservation Report

Report to the 2007 Legislature
As Required by Nevada Revised Statute 408.203 (3)

February 2007

Nevada Revised Statute 408.203(3)

The director of the Nevada Department of Transportation shall report to the Legislature by February 1 of odd-numbered years the progress being made in the department's 12-year plan for the resurfacing of state highways. The report must include an accounting of revenues and expenditures in the preceding two fiscal years, a list of the projects which have been completed, including mileage and cost, and an estimate of the adequacy of projected revenues for timely completion of the plan.

Nevada Department of Transportation Mission

To efficiently plan, design, construct and maintain a safe and effective seamless transportation system for Nevada's economic, environmental, and social needs.

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EXECUTIVE SUMMARY

The State Highway Preservation Report is created biennially by the Nevada Department of Transportation to summarize our work to preserve the state highway system. This report also provides the Legislature with a tool to discern whether highway-preservation taxes are adequate. With regard to our state-maintained highways, this report answers the following questions: How do we fund their preservation? How do we care for them? What is their condition? What will they cost to maintain? What are we doing to protect and improve them? How has their condition changed over time?

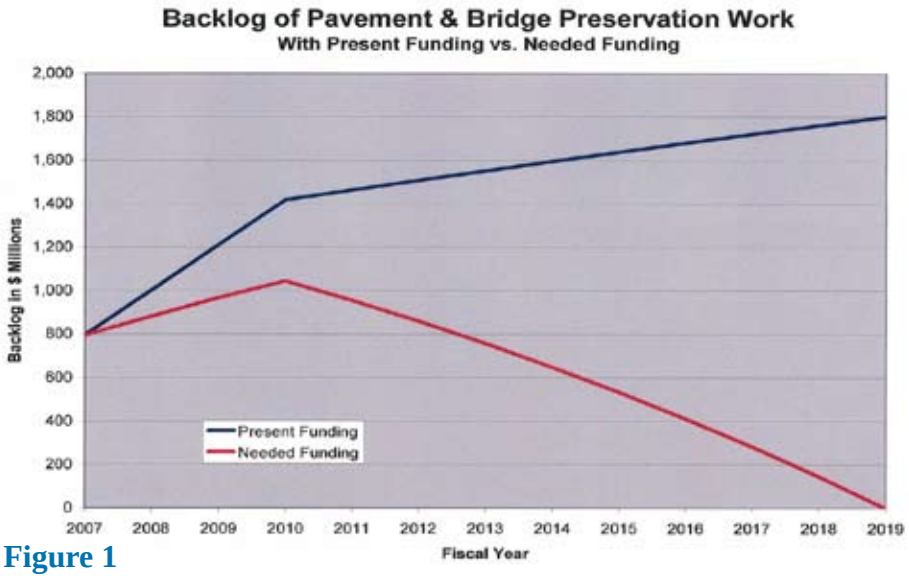


Figure 1

Over the last biennium, the backlog of pavement and bridge work increased $396 million to $795 million: $661 million for pavement and $134 million for bridges. Under present funding, the backlog is expected to jump to $1.4 billion in 2010, then continue to increase to $1.8 billion by 2019. This growth in backlog is due to huge highway-construction inflation that was not matched by revenue increases from gasoline taxes and vehicle registration fees. Furthermore, preservation work is forced to compete with congestion relief in our fast-growing state.

Figure 1 shows how the backlog of pavement and bridge work is expected to change during the next 12 years under present funding and if the needed funding were applied.

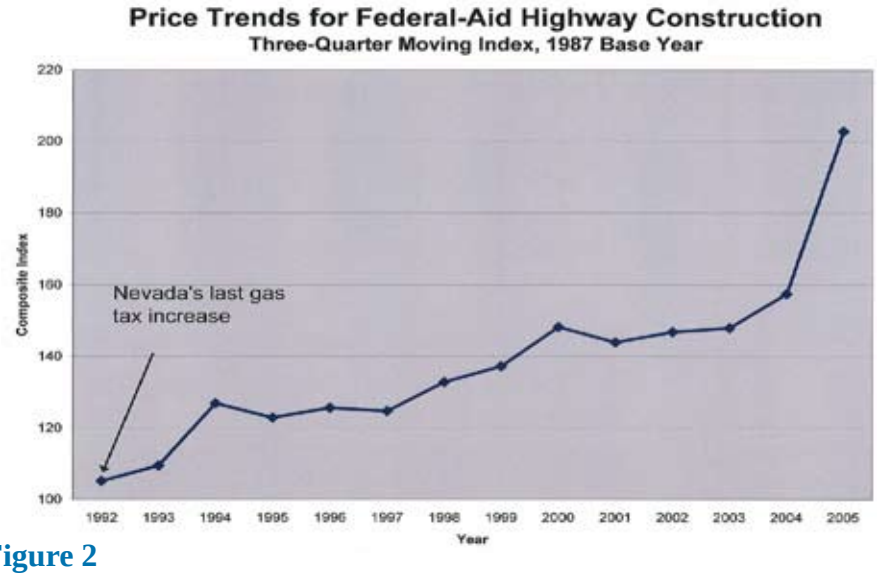


Figure 2

Highway construction is an energy-intensive process, and recent spikes in energy prices have significantly increased preservation costs. Figure 2 shows the Federal-Aid Highway Construction Price Index since Nevada's gasoline tax was last increased in 1992. Nationwide, Federal Aid Highway construction prices rose 75 percent from 1992 to 2005, with the biggest increase coming between 2004 and 2005 when energy prices skyrocketed nationally. Eighty-eight percent of state-maintained roads (4,789 of 5,422 miles) are on the federal-aid highway system.

Pavement

At $661 million, the 2007 pavement backlog is $374 million more than the $286 million we reported at the beginning of fiscal year 2005. This backlog increase is primarily due to inflation and pavement expenditures that were less than the deterioration costs over the last two years. During fiscal years 2005 and 2006, our department spent just $196.5 million on overlay and reconstruction work, or $100.2 million less than the inflation-adjusted biennial average committed from 1993 through 2003.

Table 1 shows the components of the fiscal year 2007 backlog by highway functional classification.

Backlog of Pavement and Bridge Work
State-Maintained System - 2007
Based on 2005 Condition Data

System	Pavement	Bridges	Total
Principal Arterial - Interstate	$93,110,000	$24,520,000	$117,630,000
Principal Arterial - Non-Interstate	$225,749,000	$14,788,000	$240,537,000
Minor Arterial	$108,532,000	$6,163,000	$114,695,000
Major Collector	$155,169,000	$9,082,000	$164,251,000
Minor Collector & Local	$78,479,000	$4,795,000	$83,274,000
System Not Identified (Seismic Retrofit)		$75,000,000	$75,000,000
	$661,039,000	$134,348,000	$795,387,000

Table 1

Of the 5,318 miles of state-maintained highways surveyed, 987 miles (19 percent) are in need of overlay or reconstruction. There are 214 more miles needing overlay or reconstruction in 2007 as compared to 2005. Our long-term action plan to address the remaining pavement backlog relies on continuing to apply timely overlays on our Interstate and other principal arterials, minor arterials, and other moderate-to high-volume roads; to further develop economical repair strategies for our low-volume roads; and to continue coordinating our routine maintenance activities with overlay and reconstruction work.

Because pavement funding planned for fiscal years 2007 through 2009 is inadequate to accommodate our long-term action plan, we have developed a short-term plan through fiscal year 2009 as follows:

1. Maintain our Interstate system at a high level of serviceability by applying timely overlays where possible, and reconstructing inferior segments.
2. Maintain our non-Interstate principal arterials by applying maintenance treatments such as chip seals and flush seals.
3. To apply seal coats or other short-term treatments to all other routes.

Figure 3 shows the huge increase in pavement overlay costs experienced in recent years. Nevada's average cost per lane-mile of overlay rose 69 percent from 2003 to 2004. From 2005 to 2006, prices declined 18 percent (for the modest sample of 2006 projects for which data were available). This decrease in construction prices after huge increases mimics the trends experienced in the oil crises of 1973-74 and 1979-80. Based on those oil crises, we expect construction prices have bottomed in the short term and will continue to increase with overall inflation in the future.

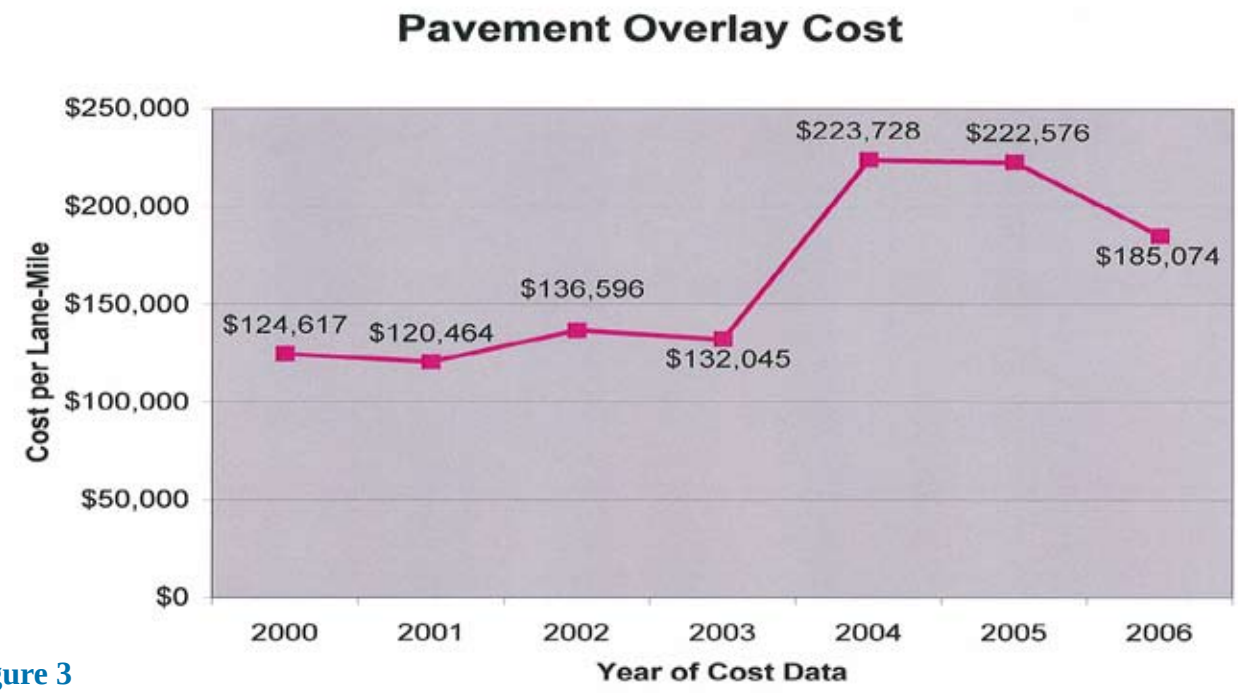


Figure 3

Huge increases in pavement costs without a commensurate increase in fuel taxes or motor-vehicle fees have made it impossible to proactively manage the state's pavement. The Nevada Department of Transportation's action plan for pavement hinges on applying timely overlays before expensive reconstruction is needed. Figure 4 shows the cost/condition relationship for pavement. On average, reconstructing pavements cost 62 percent more than overlays. But the marginal cost of waiting until pavement needs reconstructing averages four times that of an overlay. Or stated in practical terms, **inadequate funding for pavement preservation takes four dollars away from highway users for every dollar they could have invested in timely overlays.**

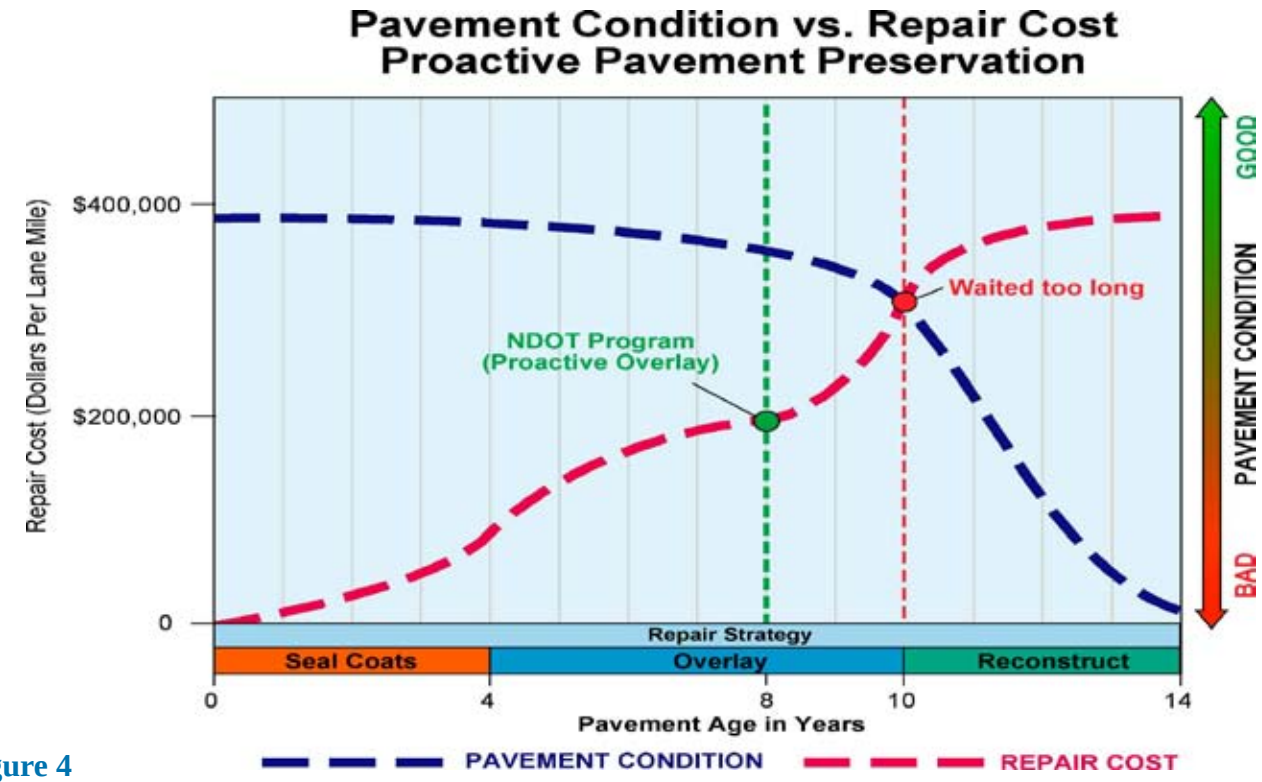


Figure 4

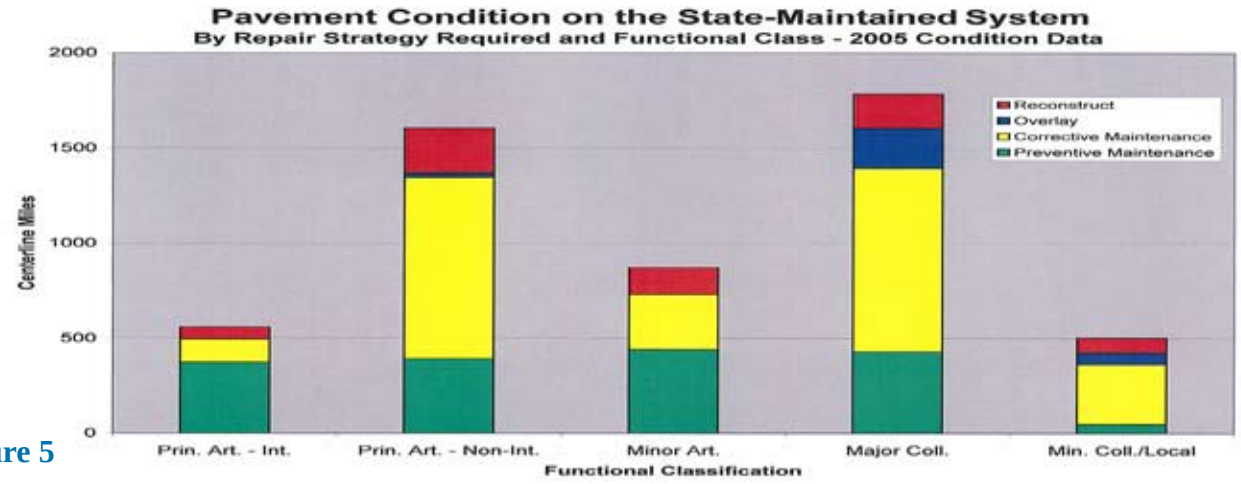


Figure 5

Figure 5 shows the current pavement condition on the state-maintained system.

Bridge

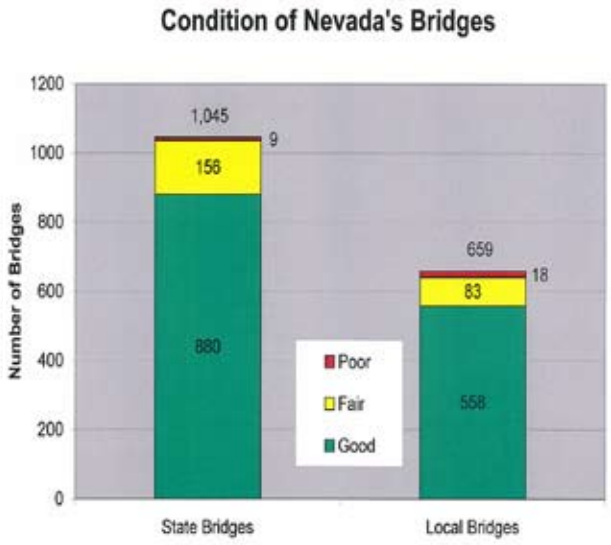


Figure 6

Because Nevada's bridges are relatively young and located in a generally warm, arid climate, they are in good condition compared to bridges in most states. There are 1,045 bridges on the state-maintained system. Seventeen of those bridges (1.6 percent) are functionally obsolete and no longer provide adequate service to the public. Another 20 bridges (1.9 percent) are structurally deficient. Since 1995, when NDOT began prioritizing bridges for seismic retrofits, it has replaced or retrofitted 81 structures. A high priority exists for seismic retrofit of at least 142 more state-owned bridges.

Figure 6 summarizes the condition of both state and local bridges.

Nevada spends about $16 million annually on bridge preservation: $12 million in federal funds, $3 million in state funds, and $1 million in local funds. The state and federal funds are considered minimally adequate to preserve the state-maintained bridges during the next five years. In the 2005-2006 biennium, we spent $25.8 million on preserving and protecting Nevada's bridges. Because bridges normally have a useful life of about 50 years, we expect increased costs during the 2010s when many bridges will be due for major work.

Figure 7 shows when Nevada bridges will reach 50-years old.

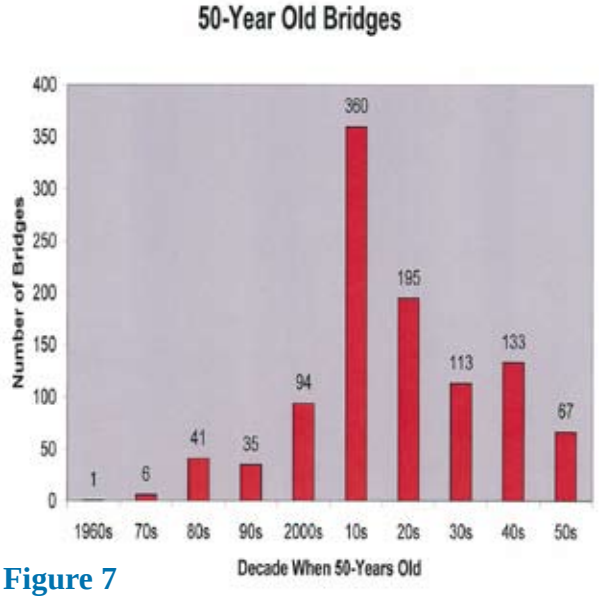


Figure 7

INTRODUCTION

As required by Nevada Revised Statute 408.203(3), this report details our efforts to preserve Nevada's state highways. With regard to our state-maintained highways, this report answers the following questions: How do we fund their preservation? How do we care for them? What is their condition? What will they cost to maintain? What are we doing to protect and improve them? How has their condition changed over time?

The Nevada Department of Transportation maintains 5,422 miles of highways. Of these highways 5,318 miles were surveyed for this report. State-maintained highways constitute only 16 percent of the roads in Nevada, but overwhelmingly, these highways are the most important in the state, carrying 58 percent of all traffic and 87 percent of all heavy trucks. Also, 1,045 of Nevada's 1,764 public bridges are located on these highways.

Nevada Department of Transportation's Role

Our investment in highways is substantial. Today's cost to replace the pavement surface is $4 billion, and replacing the state's bridges would cost $1.7 billion. The Nevada Department of Transportation is responsible for protecting highway assets, and preserving existing highways is a top priority.

Highway assets are managed using two systems: a pavement management system and a bridge inventory system. Both systems provide an inventory of our existing assets, their condition, needed repairs, and repair priorities. Known repair costs are used to forecast short- and long-term funding requirements.

Legislature's Role

The Nevada Department of Transportation depends on taxes authorized by Congress and the Nevada Legislature to preserve our highways. Since 70 percent of our highway-preservation funds are derived from state-levied taxes, the Legislature's involvement is critical to our success. This report provides the Legislature with a tool to determine whether those taxes are adequate.

PAVEMENT PRESERVATION

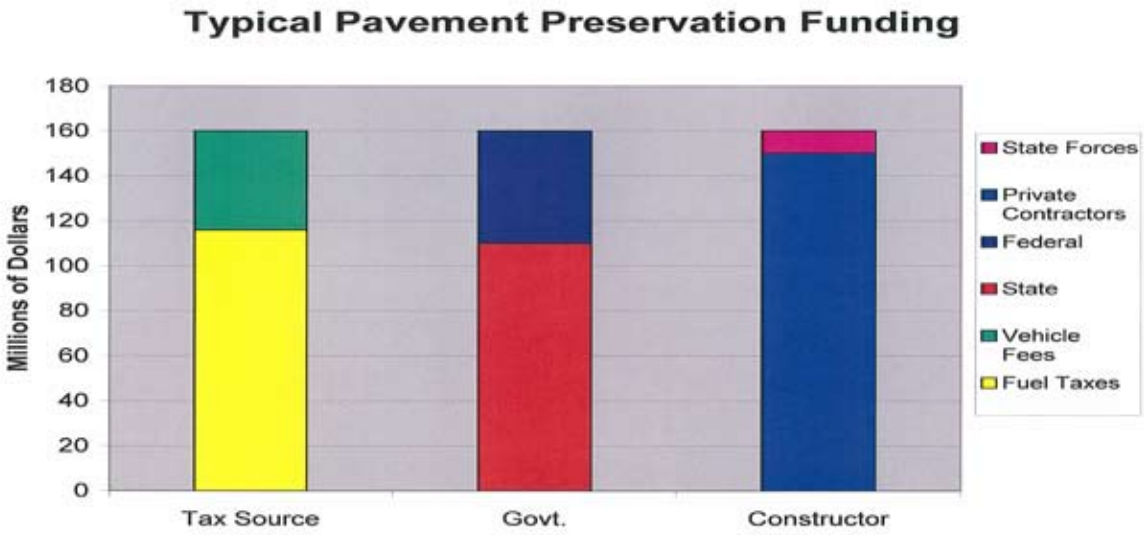
Generally, pavement-preservation work consists of sealing, crack filling, patching, milling, overlaying, or reconstructing the highway surface. Sealing, crack filling, and patching are typically accomplished by Nevada Department of Transportation maintenance crews. Milling, overlaying, or reconstructing the highway surface is normally contracted.

Because it represents a $4 billion investment, preserving pavement is a top priority for the Nevada Department of Transportation. Well-preserved pavements also provide the smooth ride that the public demands.

This section provides details concerning preservation funding, our pavement management system, the state-maintained highway inventory, pavement condition, the cost to preserve our pavements, available and needed preservation funding, and an action plan for maintaining high-quality, low-cost pavement.

Funding *(How do we pay for pavement preservation?)*

Nevada's state highways are financed by highway-user taxes — predominantly fuel taxes and vehicle registration fees. Typically, about $160 million is spent annually on pavement-preservation projects: $50 million is federal funds for Interstate maintenance, and $110 million is state funds. Of the $160 million spent annually, typically $150 million is contracted and $10 million is performed by Nevada Department of Transportation maintenance forces. These comparisons are displayed in Figure 8.



Figure

Timely preservation work is critical to achieving low-cost pavements. Preservation work, however, must compete for funding against capacity-improvement projects in our fast-growing state. During the last two fiscal years, $196.5 million were spent on overlay and reconstruction. This expenditure is $100.2 million less than the inflation-adjusted biennial average from 1993 to 2003. Despite timely, efficient application of the $196.5 million investment, inflation and underinvestment still produced a $396 million increase in the pavement backlog as compared to the 2005 State Highway Preservation Report.

Pavement Management *(How do we care for pavement assets?)*

Pavement assets are monitored via our Pavement Management System. This system provides an inventory of pavement location and its corresponding condition, traffic volumes, weather, maintenance costs, and accidents. The Pavement Management System allows us to improve the efficiency of our decision-making, expand its scope, provide feedback as to the consequences of decisions, and ensure the consistency of decisions made at different levels within the Department.

Pavement Condition *(How do we assess the health of our pavements?)*

The health of our pavements is assessed based on the age and type of pavement, route type, traffic volume, axle loads, and measured pavement distress.

The condition of the moderate- to high-volume routes is based on pavement age and type, route type, traffic volume, and axle loads as shown in Table 2 below. These routes have two-way average daily traffic greater than 400 vehicles per day. Generally, the Interstate and other principal arterials, minor arterials, and major collectors are moderate- to high-volume routes; however, some of the minor collector and local routes are also included.

Pavement Repair Strategy Determination for Moderate- to High-Volume Routes
Two-way average daily traffic greater than 400 vehicles
Controlled-access highways, National Highway System routes, and non-controlled-access highways

		Repair Strategy (based on pavement age in years)			
Route Parameters	**Pavement Type**	**Preventive Maintenance**	**Corrective Maintenance**	**Overlay**	**Reconstruct**
Interstates, Freeways, and All Other Controlled-Access Highways	Asphalt Concrete	Age ≤ 4 yrs. Age ≤ 10	4 < Age < 8 yrs. 10 < Age < 18	Age = 8 yrs. N/A	Age > 8 yrs. Age > 18
Non-Controlled-Access Highways with: ADT>10,000 or ESAL>540	Asphalt	Age ≤ 4	4 < Age < 10	Age = 10	Age > 10
Non-Controlled-Access Highways with: 1,600<ADT≤10,000 or 405<ESAL≤540 And National Highway System routes with ADT≤10,000	Asphalt	Age ≤ 4	4 < Age < 12	Age = 12	Age > 12
Non-Controlled-Access Highways off the National Highway System with: 400<ADT≤1,600 or 270<ESAL≤405	Asphalt	Age ≤ 4	4 < Age < 15	Age = 15	Age > 15

Notes: <means less than; ≤ means less than or equal to; > means greater than; 4 < Age < 8 yrs. means the age is greater than 4 but less than 8; N/A means Not Applicable
ADT = Average Daily Traffic (in vehicles per day)
ESAL = Equivalent 18,000-pound Single-Axle Loads imparted daily. It takes 2,500 cars to impart a single ESAL but just one modest-sized truck.

Table 2

Low-volume routes have two-way average daily traffic of up to 400 vehicles per day. They provide access to the higher-volume roads. Generally, they are minor collectors and local routes, but there are some minor arterials and major collectors that also are low-volume roads. The condition of these routes is based on pavement distress. To measure distress, a section within each mile of highway in each direction of highway is rated. The severity and extent of the following pavement distresses are measured:

Distresses Measured

Road Roughness	Fatigue Cracking
Rut Depth	Transverse Cracking
Patching	Block Cracking
Flushing	Non-Wheel-Path Longitudinal Cracking
Friction Loss	

The measured distresses are assigned points. These points are summed and a repair strategy is assigned as follows in Table 3.

Pavement Repair Strategy Determination for Low-Volume Routes
Two-way average daily traffic less than or equal to 400 vehicles
Non-controlled-access highways off the National Highway System

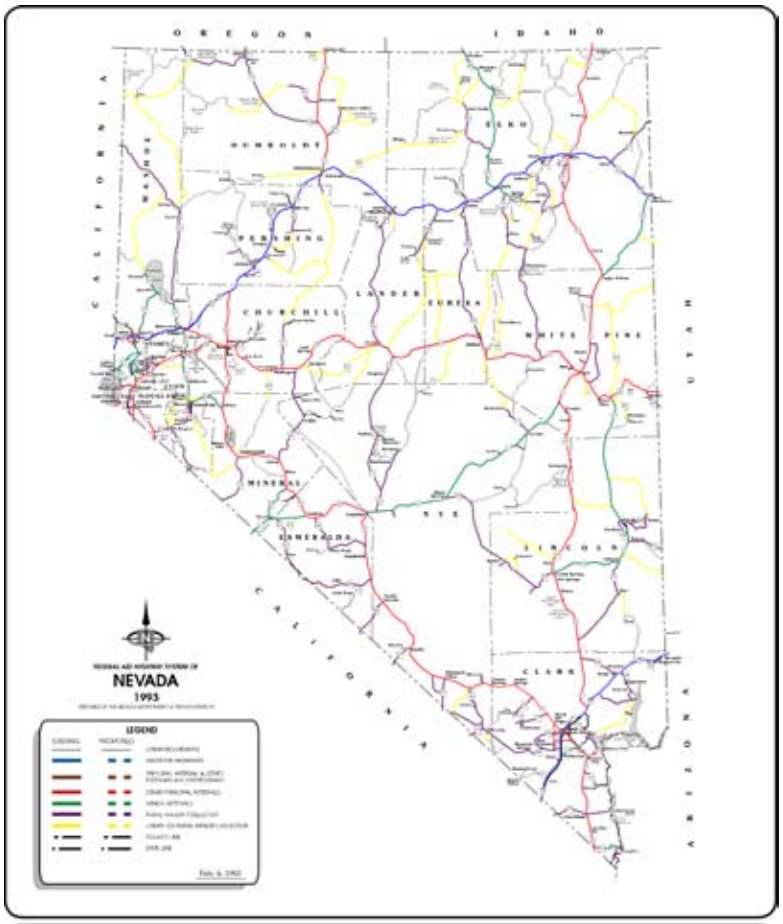
		Repair Strategy (based on pavement distress data)			
Route Parameters	**Pavement Type**	**Preventive Maintenance (points)**	**Corrective Maintenance (points)**	**Overlay (points)**	**Reconstruct (points)**
ADT≤400	Asphalt	0 to 49	50 to 399	400 to 699	>700

Notes: > means greater than; ≤ means less than or equal to
ADT = Average Daily Traffic (in vehicles per day)

Table 3

System Status *(What do we maintain?; What is its condition?; What is the cost to improve it?)*

Highway Inventory *(What do we maintain?)*



ROADWAY FUNCTIONAL CLASSIFICATION
NEVADA

Figure 9

The Nevada Department of Transportation is responsible for maintaining 5,422 miles of highways. Of these highways, 5,318 miles were surveyed for this report. These highways are functionally classified by federal standards. The functional classifications are made to discern the relative importance and capacity of the highway. In this report, state-maintained highways are grouped under these functional classes: principal arterials, minor arterials, major collectors, minor collectors, and local. Figure 9 shows those functional classes with state-maintained highways depicted by route markers.

Condition Survey Results *(What is the condition of our pavement?)*

Figures 10 and 11 show the pavement repair strategies required by functional class.

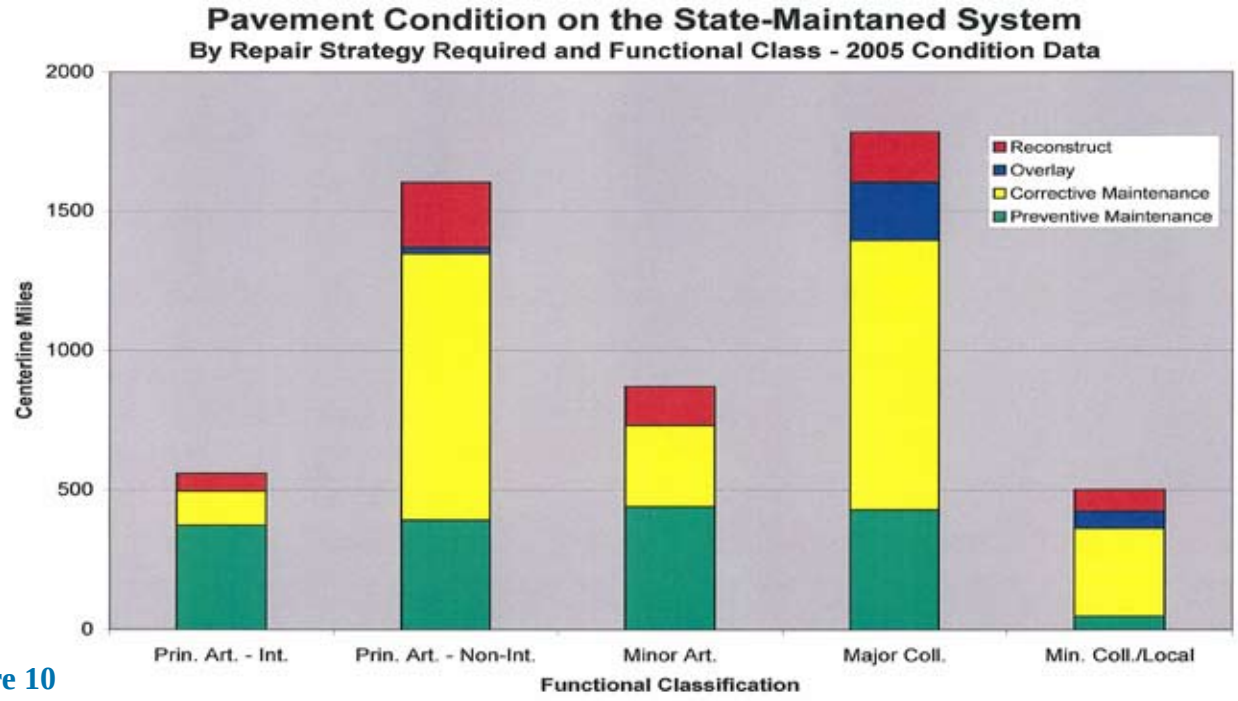


Figure 10

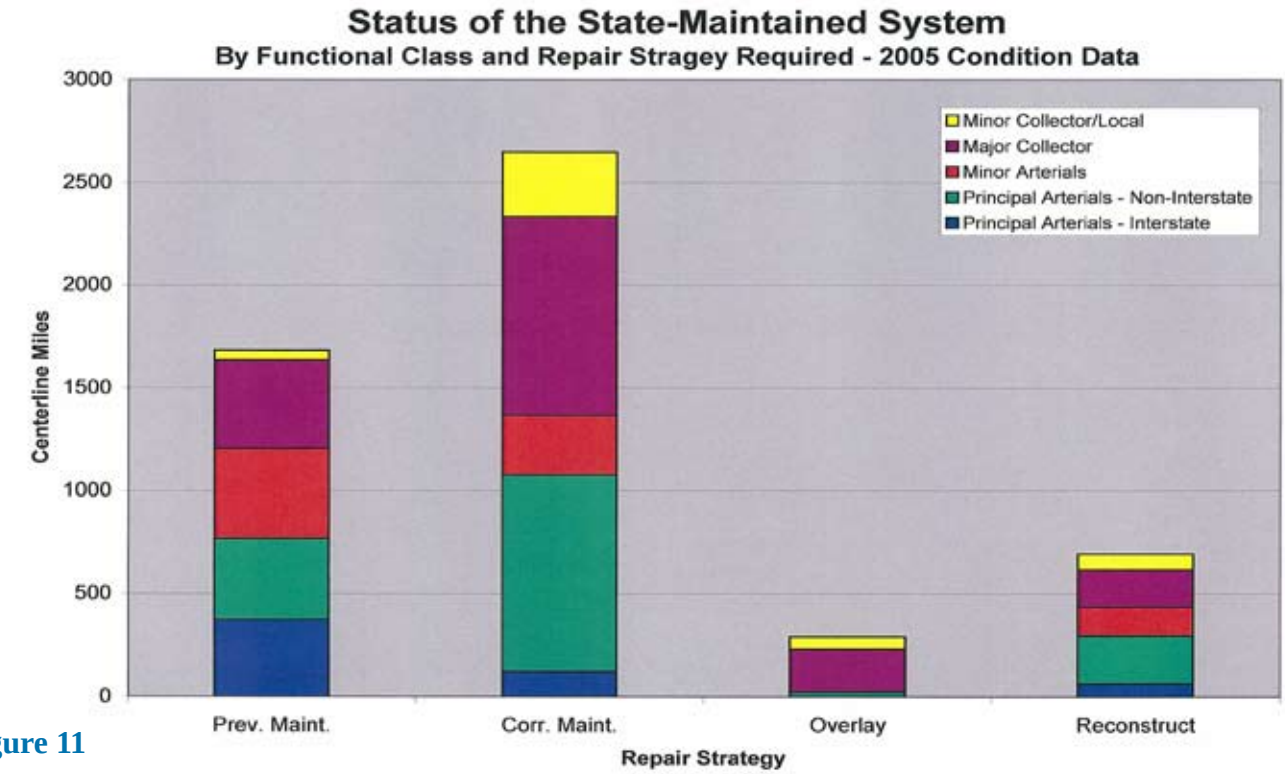


Figure 11

Figure 12 shows those roads that are in planned for overlay or reconstruction in the next biennium.

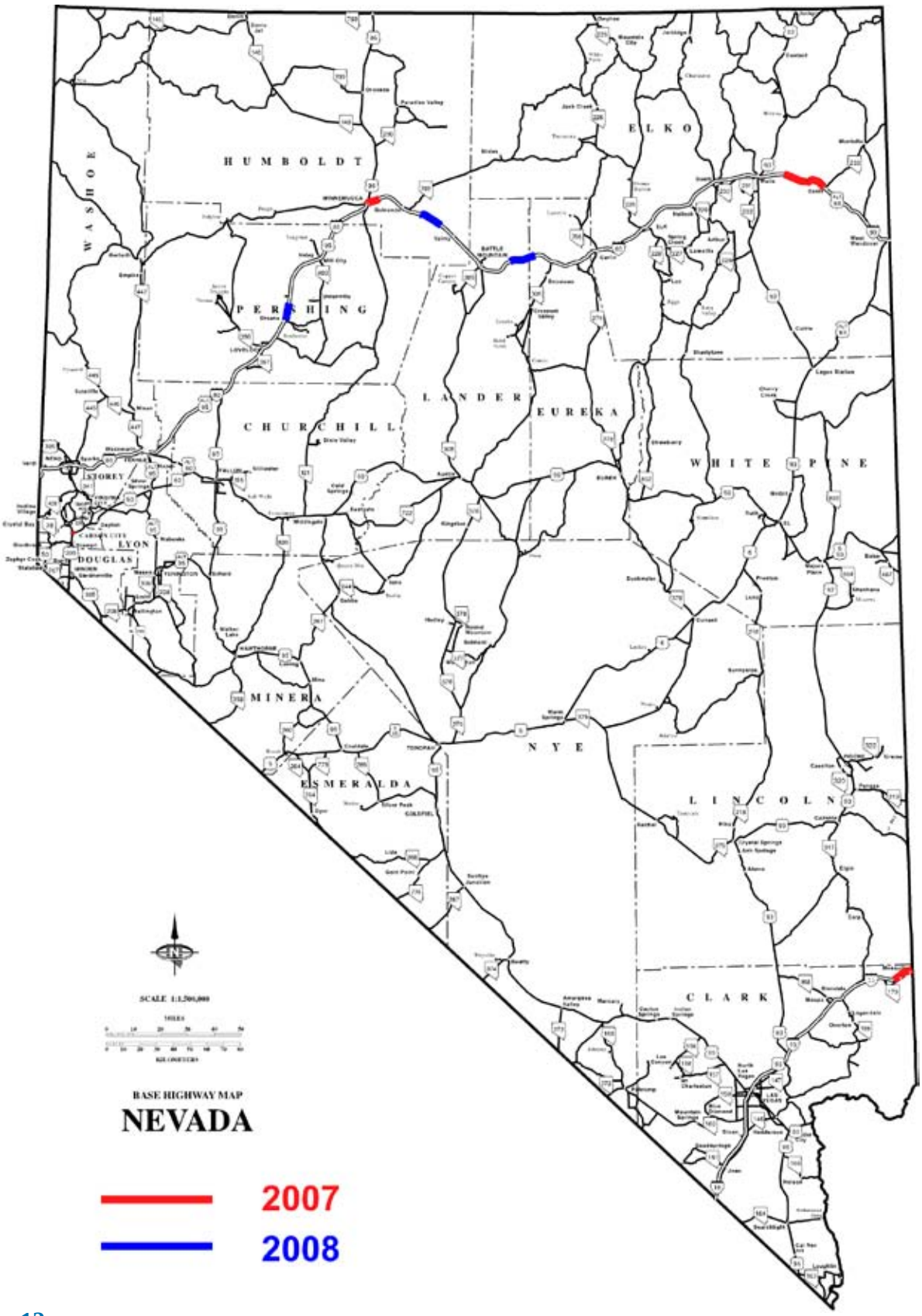


Figure 12

Roads planned for overlay or reconstruction in fiscal years 2007 and 2008.

Pavement Condition on the State-Maintained System - 2007
By Repair Strategy Required
Based on 2005 Condition Data

CENTERLINE MILES

System	Repair Strategy Required: Preventive Maintenance		Corrective Maintenance		Overlay		Reconstruct		Total	
Principal Arterial - Interstate	373	7.0%	122	2.3%	0	0.0%	63	1.2%	558	10.5%
Principal Arterial - Non-Interstate	392	7.4%	955	18.0%	22	0.4%	234	4.4%	1,604	30.2%
Minor Arterial	441	8.3%	290	5.5%	1	0.0%	139	2.6%	870	16.4%
Major Collector	428	8.1%	967	18.2%	208	3.9%	181	3.4%	1,784	33.6%
Minor Collector & Local	48	0.9%	315	5.9%	61	1.2%	77	1.5%	501	9.4%
Total	1,682	31.6%	2,649	49.8%	292	5.5%	695	13.1%	5,318	100.0%

LANE MILES

System	Repair Strategy Required: Preventive Maintenance		Corrective Maintenance		Overlay		Reconstruct		Total	
Principal Arterial - Interstate	1,536	11.8%	520	4.0%	0	0.0%	293	2.2%	2,357	18.1%
Principal Arterial - Non-Interstate	1,094	8.4%	2,115	16.2%	63	0.5%	616	4.7%	3,888	29.8%
Minor Arterial	1,175	9.0%	620	4.8%	2	0.0%	351	2.7%	2,148	16.5%
Major Collector	870	6.7%	1,986	15.2%	415	3.2%	372	2.9%	3,644	27.9%
Minor Collector & Local	97	0.7%	638	4.9%	123	0.9%	156	1.2%	1,014	7.8%
Total	4,773	36.6%	5,886	45.1%	602	4.6%	1,789	13.7%	13,050	100.0%

Table 4

Backlog of Pavement Work *(What is the current cost to improve our roads to good condition?)*

We want to have all our pavements in good condition. Table 4 identifies how much work in each repair strategy would be required to achieve this. Table 5 shows that the current cost to get there is $661 million. Only those pavements from Table 4 that require overlay or reconstruct strategies are included in calculating our current pavement backlog because they need more extensive treatment. Pavements in the preventive and corrective maintenance categories are not included in the backlog because they are in fair to good condition and can be adequately maintained with existing routine-maintenance funds.

Backlog of Overlay and Reconstruction Work
State-Maintained System - 2007
Based on 2005 Condition Data in Lane Miles

System	Overlay		Reconstruct		Total	
	Lane Miles	Cost	Lane Miles	Cost	Lane Miles	Cost
Principal Arterial - Interstate	0	$0	293	$93,109,562	293	$93,109,562
Principal Arterial - Non-Interstate	62	$13,372,893	616	$212,376,338	679	$225,749,231
Minor Arterial	2	$313,399	351	$108,218,622	353	$108,532,022
Major Collector	415	$63,194,547	372	$91,974,829	787	$155,169,376
Minor Collector & Local	123	$25,577,418	156	$52,901,878	279	$78,479,296
Total	**602**	**$102,458,257**	**1,789**	**$558,581,230**	**2,391**	**$661,039,486**

Table 5

The backlog shown in Table 5 includes the cost for pavement, ancillary repairs, and engineering on projects. Ancillary repairs typically include repairing signs and signals, replacing traffic delineators, repairing ditches and culverts, and grading shoulders.

Figure 13 shows the age distribution of pavement in Nevada. For comparison, the same information from the 2005 report is shown in Figure 14. Note that most of the work done in the last biennium was done to keep aging pavement on Interstates in newer condition. This is the same strategy that will be employed in the coming biennium (see Figure 12 on page 10). It should be noted that the pavement that is being allowed to age, specifically the hundreds of miles in the 7- to 8-year age range in figure13, is approaching the time when it will require overlay or reconstruction (see Table 2 on page 7).

The large number of centerline miles in the 7- to 8-year age range in Figure13 is due to an aggressive preservation program in 1999 and 2000, and the impact of that work is reflected in the condition of the system, as shown in Figures 20 and 21 on pages 24 and 25.

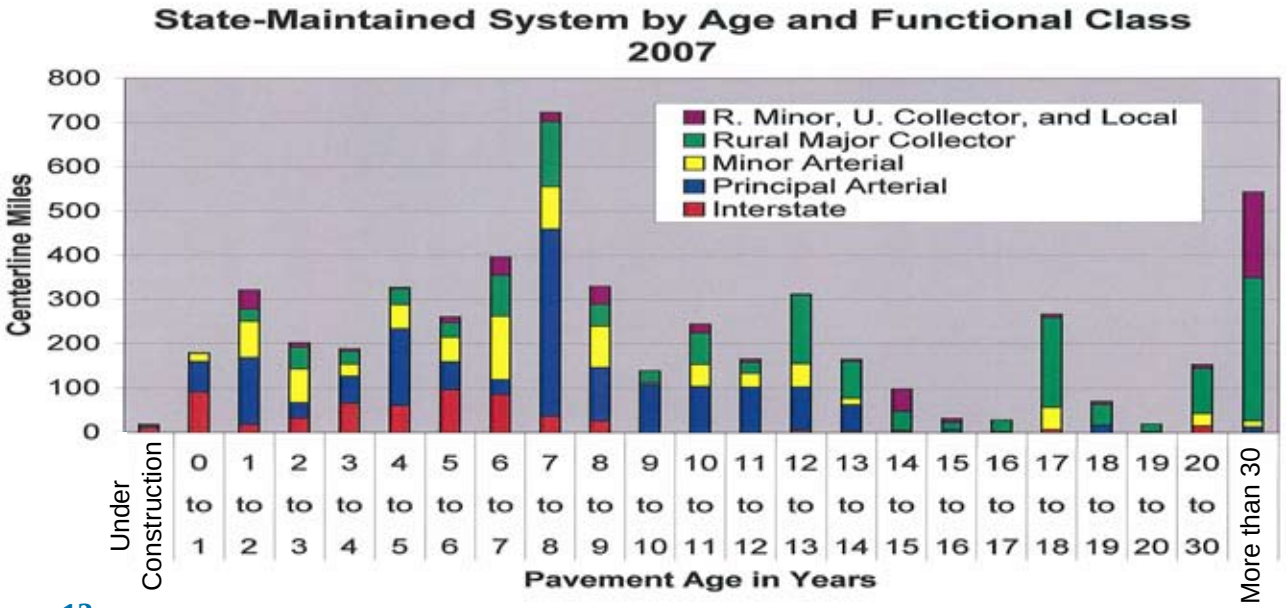


Figure 13

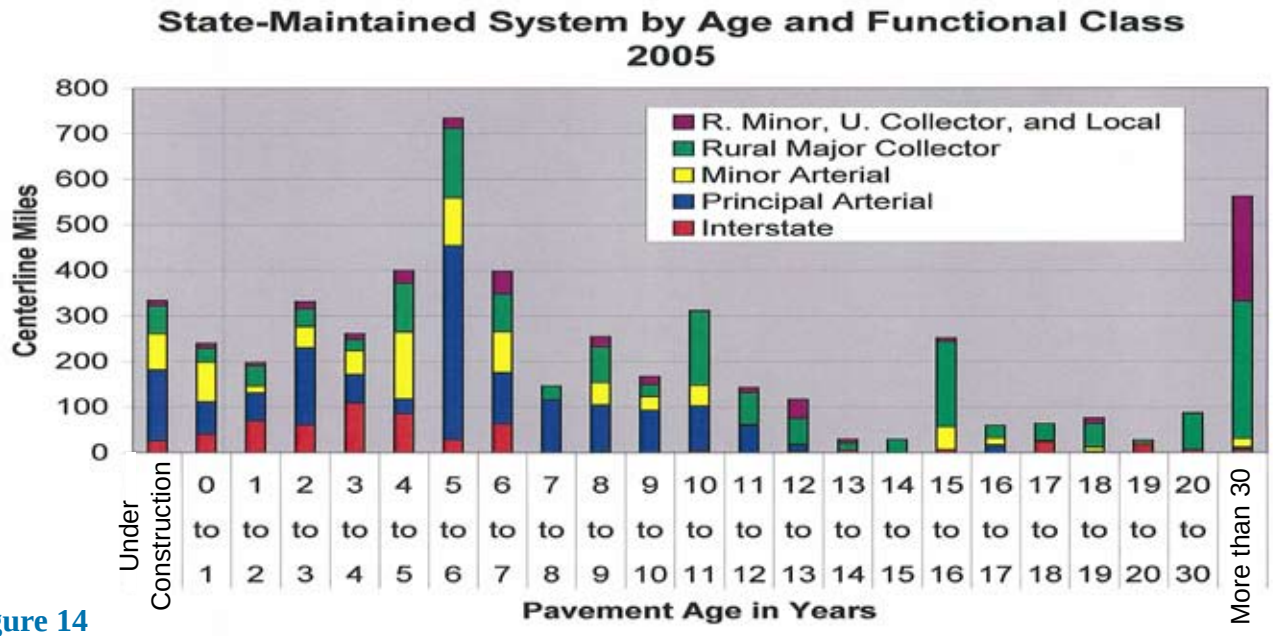


Figure 14

Action Plan *(In general, how will we improve our pavements?; How do we prioritize the work?; What financial resources are needed?)*

Preserving high-quality pavement at low cost requires an action plan that optimizes the use of available funds. In the long-term, our action plan is the same as that first detailed in the 2003 State Highway Preservation Report because we accomplished our goal of keeping high- to moderate-volume roads in superior condition by overlaying them before more expensive reconstruction is needed. In fact, our proactive goal was to increase the historical ratio of overlay to reconstruction work from 3:1 to 9:1, and that ratio has climbed to 9.2:1. However, due to inflation and budgetary constraints, that ratio is expected to shift back to the 5:1 range. Our long-term action plan relies on legislative action to adequately fund preservation, and is listed in priority order as follows:

Long-Term Action Plan (assumes legislative action regarding preservation funding)

1. Continue to maintain our Interstate system and high-volume roads at a high level of serviceability by applying timely overlays and reconstructing inferior segments.
2. Continue to maintain our non-Interstate principal arterials, minor arterials, and other moderate volume roads at a modest to high level of serviceability by applying timely overlays and reconstructing inferior segments.
3. To further develop economically sound methods to improve our low-volume roads and maintain them at a limited, but acceptable, level of serviceability.
4. To continue coordinating and integrating our routine pavement maintenance activities with planned overlay and reconstruction work.

When even modest pavement distresses appear, the cost to repair a road skyrockets. By continuing our proactive approach of overlaying the road before these distresses appear, we can produce significant savings. This is the impetus behind our plan to apply timely overlays in tasks 1 and 2 of the action plan. Based primarily on pavement age, traffic volume, and traffic loads, we can predict when distresses will appear and perform the overlays in advance of these distresses. This proactive technique is overwhelmingly responsible for reducing the pavement backlog reported in 1999 from $528 million to the $287 million backlog in 2005, despite below-average expenditures during the four fiscal years from 2001 through 2004.

On average, reconstructing pavements cost 62 percent more than overlays. But the marginal cost of waiting until pavement needs reconstructing averages four times that of an overlay. Or stated in practical terms, **inadequate funding for pavement preservation takes four dollars away from highway users for every dollar they could have invested in timely overlays.**

Figure 15a shows the logic behind the long-term action plan in providing cost-effective, proactive pavement maintenance.

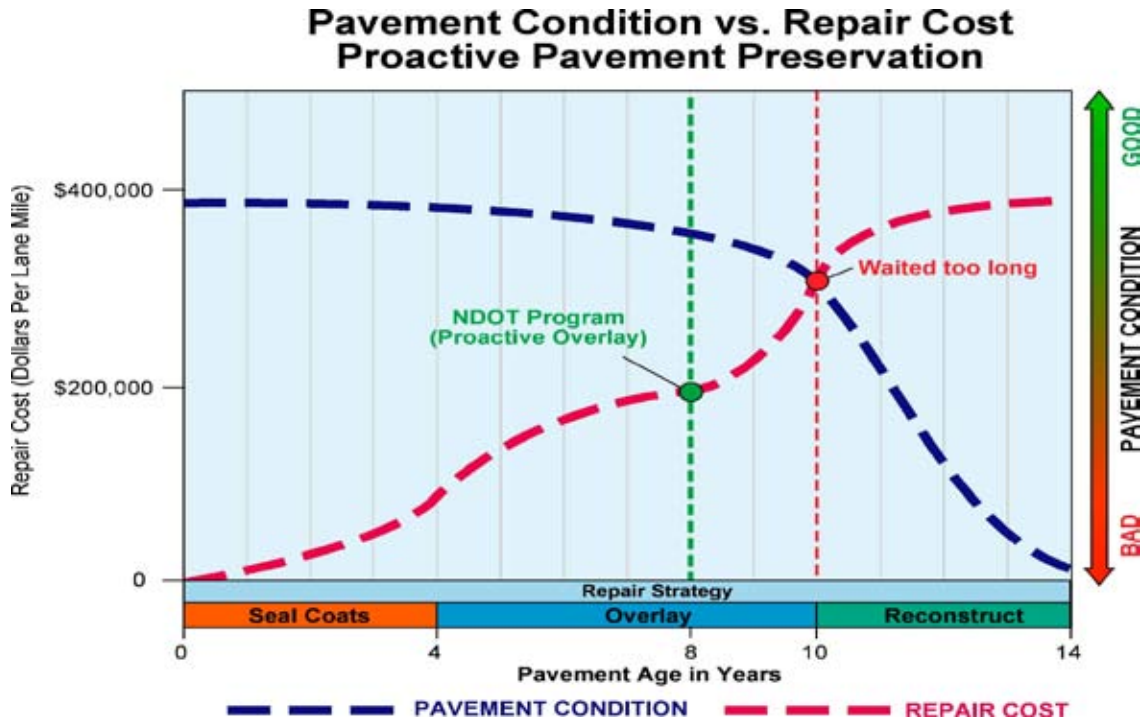


Figure 15

While recognizing the success of this strategy, it is also understood that budget constraints are a limiting factor. Capacity projects to alleviate congestion compete with preservation work and are prioritized against each other for the highest overall public benefit. Nevada has not applied preservation funding commensurate with normal pavement deterioration, and these effects are becoming tangible.

Unfortunately, planned preservation expenditures for fiscal years 2007 through 2009 are inadequate to accommodate our long-term plan. Consequently, we have developed a short-term plan that protects some of our most valuable pavement assets, while allowing others to fall into the reconstruct category (versus timely overlay). Our short-term plan is shown below:

Short-Term Plan *(assumes no legislative action regarding preservation funding through fiscal year 2009)*

1. Maintain our Interstate system at a high level of serviceability by applying timely overlays, where possible, and reconstructing inferior segments.
2. Maintain our non-Interstate principal arterials by applying maintenance treatments such as chip seals and flush seals.
3. To apply seal coats or other short-term treatments to all other routes.

Although reactive, this short-term plan partially protects our pavement assets while recognizing that the pavement backlog will rise from the current $661 million to $ 1.3 billion in 2010.

Project Priorities *(How do we prioritize individual projects?)*

Our action plan tells how we prioritize the highway network as a whole. Within the goals of our action plan, we prioritize individual projects based on pavement age, traffic volume, axle loads, and condition. This prioritization scheme is consistent with the method by which we assess the health of our pavements. Because our preservation finances are limited by competition with capacity projects in our fast-growing state, the funds available are also a key consideration in prioritizing projects.

A list of statewide candidate pavement preservation projects is developed, and the **projects are ranked based on the financial consequences of not doing the projects in a timely manner**. For example delaying a project on the Interstate system by one year can add several million dollars to the cost; whereas, delays on a moderate- or low-volume road will have a less significant impact. A field-survey team reviews these candidate projects and refines the repair strategy to be used. The team also recommends an appropriate funding level to accomplish our preservation goals for the year. In addition, we include input from our district engineers to fairly allocate the modest funding available for low-volume routes.

Present versus Needed Funding *(What financial resources are needed to improve our pavements?)*

Under the present user-fee structure, the current $661 million backlog of pavement work will increase to $1.3 billion in 2010, and climb to $1.6 billion in 2019. The needed funding scenario, which requires substantial revenue increases in future years, will close out the backlog in 2019. Figure 16 and Table 6 show how these increases are needed to eliminate the backlog.

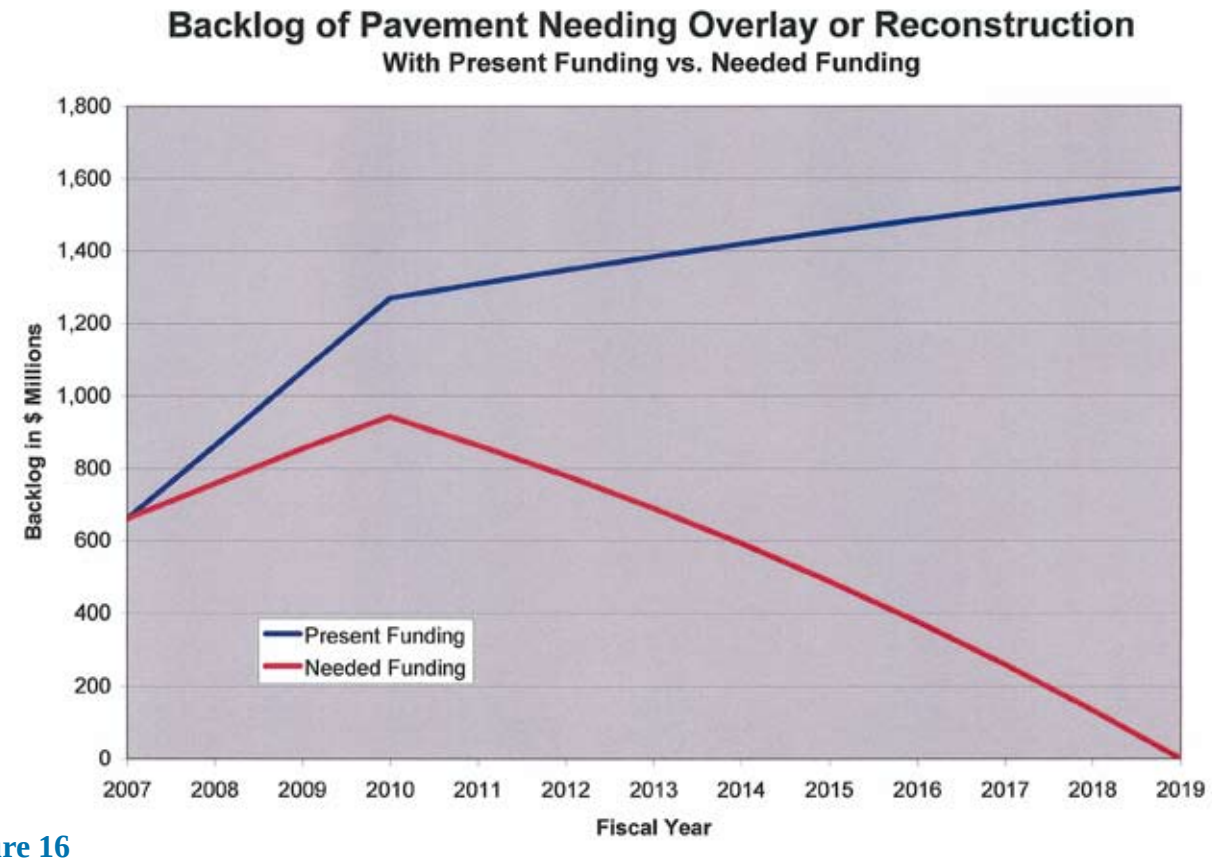


Figure 16

Pavement Backlog, Costs, and Funding
State-Maintained System - 2007
(in millions of dollars)

Present Funding

		Pavement Preservation Costs * (Normal Annual Deterioration Costs)			Pavement Preservation Funds ** (Funds Planned for Preservation Work)				
Fiscal Year	Backlog of Pavement Work	Overlay & Reconstruction	Preventive & Corrective Maintenance	Total	State Overlay & Reconstruction	Federal Overlay & Reconstruction	State Pavement Maintenance		Total
2007	661.0	255.2	10.3	265.5	2.6	50.1	10.3		63.0
2008	863.5	262.4	10.6	273.0	2.9	54.2	10.6		67.7
2009	1068.9	303.9	10.9	314.8	45.6	56.4	10.9		112.9
2010	1270.8	257.5	11.3	268.7	160.0	58.7	11.3		229.9
2011	1309.6	265.2	11.6	276.8	166.4	61.0	11.6		239.0
2012	1347.4	273.2	11.9	285.1	173.1	63.5	11.9		248.5
2013	1384.0	281.4	12.3	293.7	180.0	66.0	12.3		258.3
2014	1419.4	289.8	12.7	302.5	187.2	68.6	12.7		268.5
2015	1453.4	298.5	13.0	311.5	194.7	71.4	13.0		279.1
2016	1485.9	307.5	13.4	320.9	202.5	74.2	13.4		290.1
2017	1516.6	316.7	13.8	330.5	210.5	77.2	13.8		301.6
2018	1545.6	326.2	14.3	340.4	219.0	80.3	14.3		313.5
2019	1572.5								

Needed Funding

		Pavement Preservation Costs * (Normal Annual Deterioration Costs)			Pavement Preservation Funds ** (Funds Planned & Needed for Preservation Work)				
Fiscal Year	Backlog of Pavement Work	Overlay & Reconstruction	Preventive & Corrective Maintenance	Total	Existing State Overlay & Reconstruction	Federal Overlay & Reconstruction	State Pavement Maintenance	Needed Additional Overlay & Reconstruction	Total
2007	661.0	255.2	10.3	265.5	2.6	50.1	10.3	104.7	167.7
2008	758.9	262.4	10.6	273.0	2.9	54.2	10.6	108.8	176.5
2009	855.4	303.9	10.9	314.8	45.6	56.4	10.9	113.2	226.1
2010	944.1	257.5	11.3	268.7	160.0	58.7	11.3	117.7	347.6
2011	865.2	265.2	11.6	276.8	166.4	61.0	11.6	122.4	361.4
2012	780.5	273.2	11.9	285.1	173.1	63.5	11.9	127.3	375.8
2013	689.9	281.4	12.3	293.7	180.0	66.0	12.3	132.4	390.7
2014	592.9	289.8	12.7	302.5	187.2	68.6	12.7	137.7	406.2
2015	489.1	298.5	13.0	311.5	194.7	71.4	13.0	143.2	422.3
2016	378.4	307.5	13.4	320.9	202.5	74.2	13.4	149.0	439.1
2017	260.2	316.7	13.8	330.5	210.5	77.2	13.8	154.9	456.5
2018	134.2	326.2	14.3	340.4	219.0	80.3	14.3	161.1	474.6
2019	0.0								

* Inflation assumed at 3.00% per annum.

** Revenue growth rate assumed is 4.00% per annum.

Note: Backlog of pavement work is as of beginning of fiscal year; preservation costs are those incurred during the fiscal year; and preservation funds are those that are available during the fiscal year.

Table 6

Pavement Management System Improvements *(How will we improve our asset management?)*

Our action plan for preserving pavement was developed to keep costs low and pavement smooth. Based on the overwhelming success of that plan, the Nevada Department of Transportation will not make any major changes with regard to asset management, with the exception of continuing to improve the preservation strategies used for low-volume roads. We have also developed departmental performance measures for managing our assets. The key measure for pavement is the pavement smoothness seen by the average driver, and agency and user costs of current repair strategies as compared to historic costs.

Pavement roughness is measured by a global standard called the International Roughness Index. The Federal Highway Administration considers any pavement with an International Roughness Index less than 60 to be in "excellent" condition, 60 to 94 to be "good", 95 to 119 to be "fair" for the Interstate, and 95 to 170 to be "fair" on non-Interstate routes. Nevada's actual values for average traffic-weighted International Roughness Index have been "good" since 2001, as shown in Figure 17.

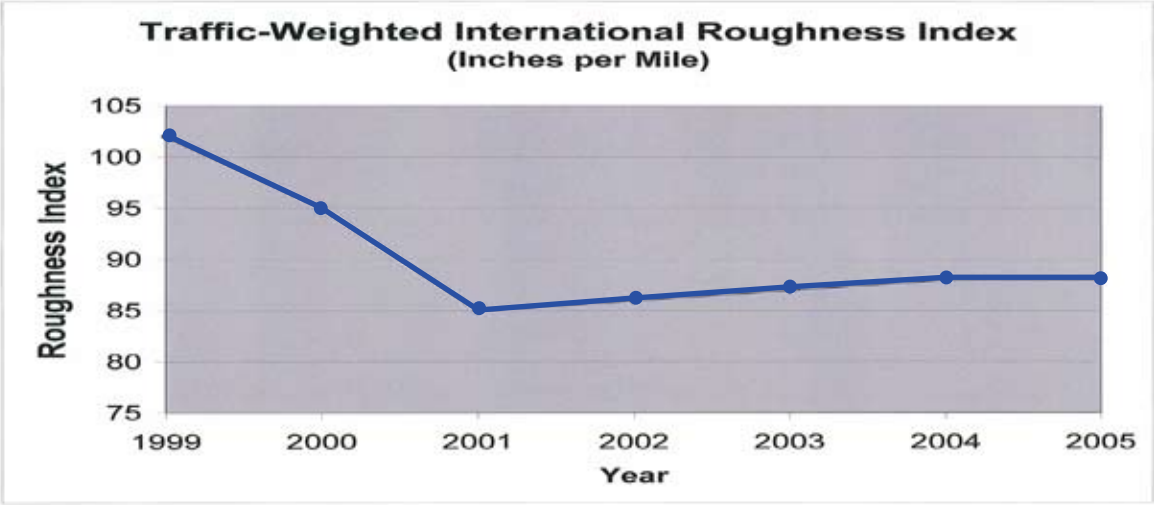


Figure 17

Pavement Research *(What research are we conducting to improve our pavements?)*

We are continuing to research and review the implementation of the SUPERPAVE asphalt paving system. We have implemented the use of performance-graded asphalt and will monitor its benefits. Our Materials Division continues to research durable pavement markings, pavement crack-sealing materials and methods, implementation of existing pavement research products, the effects of temperature segregation of paving material, and the impact of construction variability on pavement performance. In addition, we continue to cooperate in nationwide studies investigating both asphalt and concrete pavements.

In the summer of 2002, NDOT constructed the first low-volume road test section using strategies on State Route 230 that had previously been untested in Nevada. Some tested strategies included soil stabilization, roadbed modification, fabric underlay, and foamed-asphalt stabilization. On U.S. 6 in 2003, various methods of cold recycling were tested, and single and double chip seals were placed for evaluation. In 2004, State Route 226 was cold-recycled using several test binders and sealing methods.

Several new strategies have been added to the existing rehabilitation methods. These strategies include hot in-place recycling, slurry seals, and foamed asphalt. Some of these strategies are being utilized to help Nevada save millions of dollars under the action plan.

One recently completed research project aimed at keeping moisture out of seams between "mats", or lanes, of asphalt overlays determined suitable joint densities. This study also found that three of the five joint geometries tested met recommended joint-density specifications.

Another study prepared by the Department of Transportation's Research Division utilized infrared images to examine hot-mix asphalt as it was being placed and compacted. Studying temperatures and corresponding density values of new road surfaces led to several recommendations on reducing segregation of asphalt components and improving pavement density.

Historical Perspectives *(What have we expended on pavements?; How has the condition changed?)*

Biennial Expenditures, Fiscal Years 2005-2006 (What have we expended on pavements?)

During fiscal years 2005 and 2006, NDOT obligated $196.5 million for pavement overlay and reconstruction work, addressing the needs of 288 miles of highways. This is an expenditure of only $3 million less than the previous biennium; however, 100 less miles of roadway received overlay or reconstruction due to huge inflation in construction prices. Preventive and corrective maintenance work consisting of patching and sealing pavements was completed at a cost of $20 million over the biennium. Table 7 summarizes expenditures and corresponding mileage, and Figure 18 shows those highways receiving overlays or reconstruction during the 2005-2006 biennium.

Pavement Expenditures and Miles of Highway Overlaid and Reconstructed
Fiscal Years 2005 and 2006

	Repair Strategy						
Fiscal Year	Preventive & Corrective Maintenance Expenditures	Overlay Expenditures	Overlay Miles	Reconstruct Expenditures	Reconstruct Miles	Total Expenditures	Total Miles
2005	$9,643,479	$111,560,911	214	$4,819,224	2	$116,380,135	216
2006	10,416,898	38,260,201	43	41,892,204	28	82,454,698	71
Biennium Total	$20,060,412	$149,821,112	257	$46,711,428	31	$198,834,833	288

Table 7

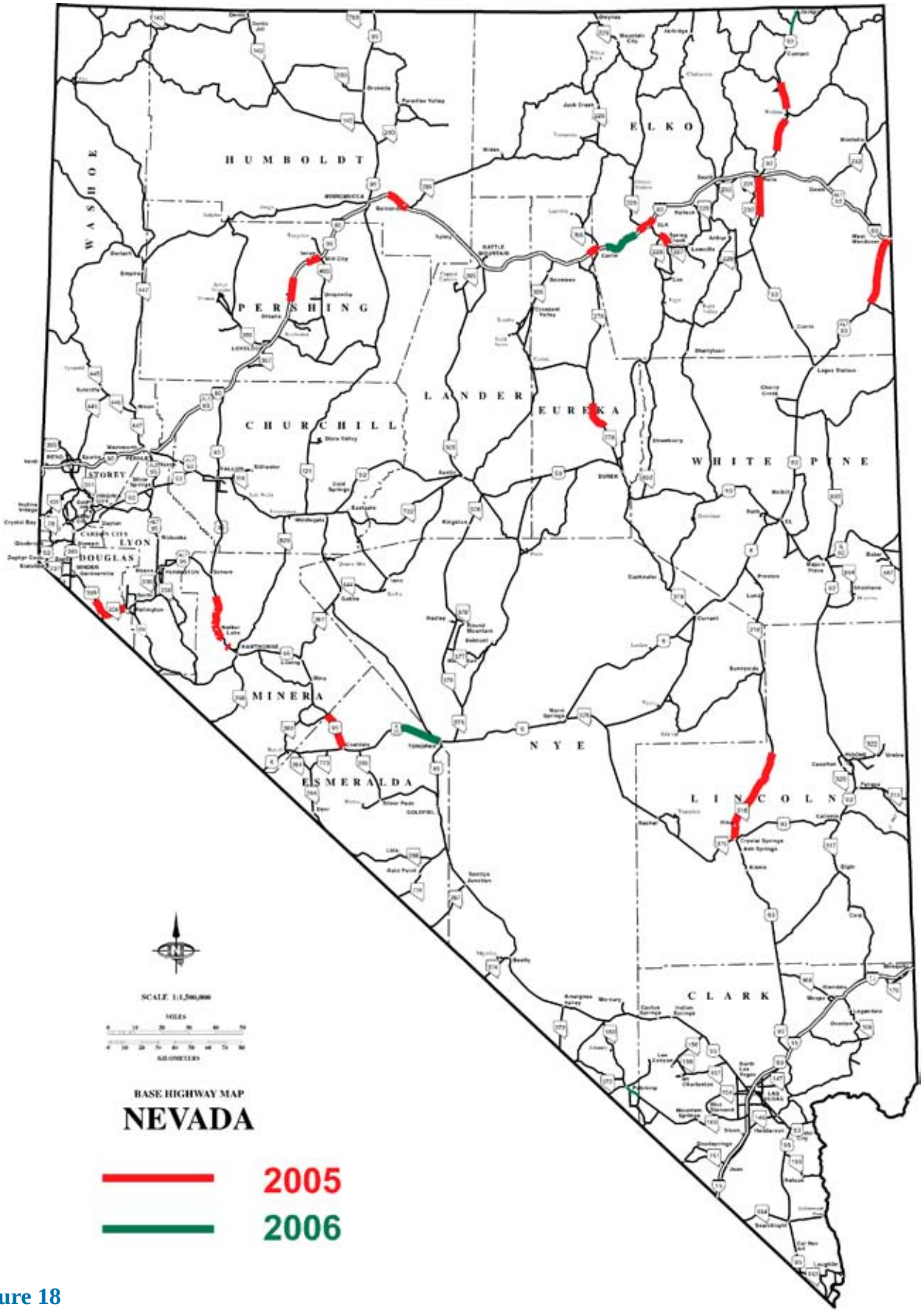


Figure 18

Overlay and reconstruction projects advertised in fiscal years 2005 and 2006.

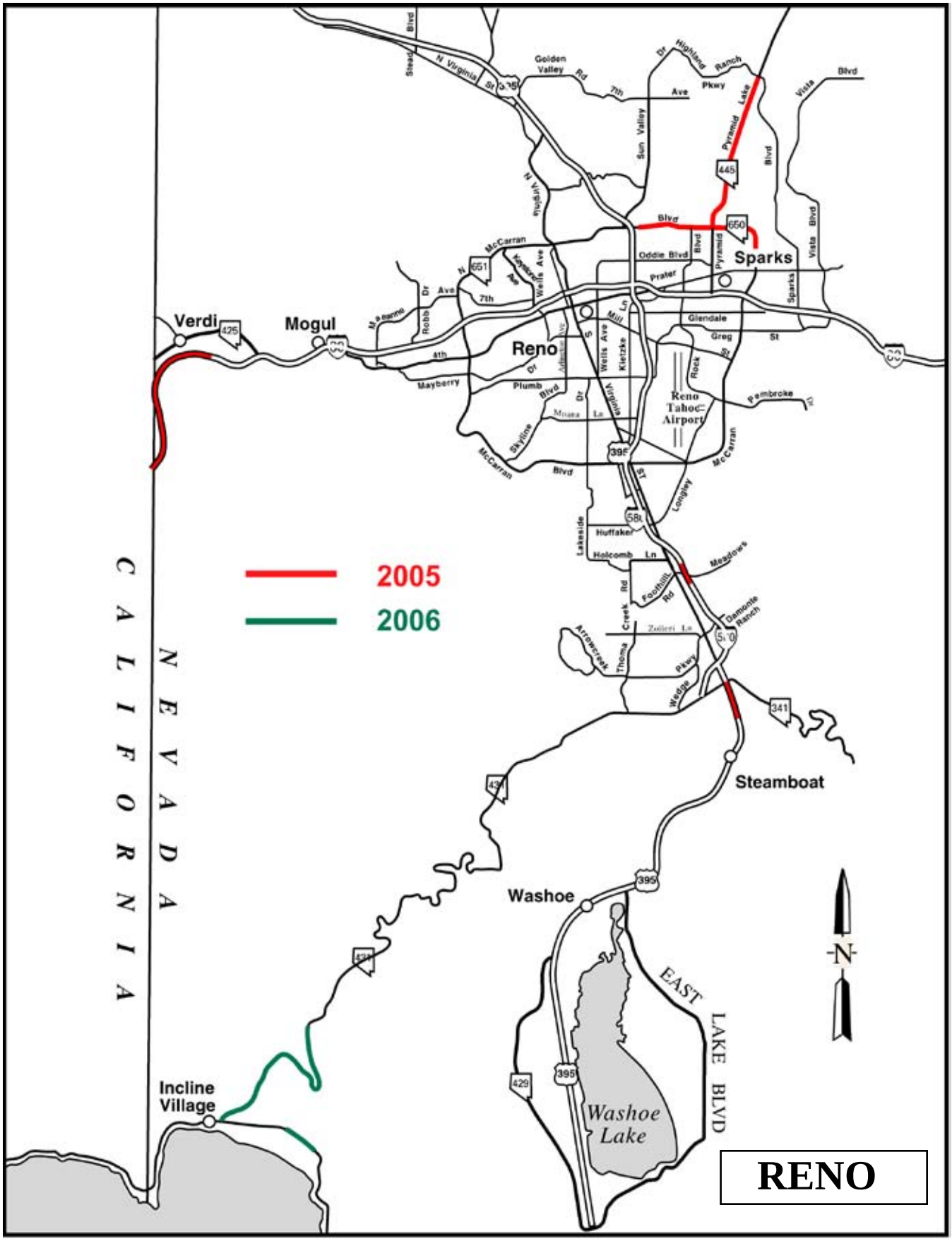


Figure 18A

Overlay and reconstruction projects advertised in fiscal years 2005 and 2006.

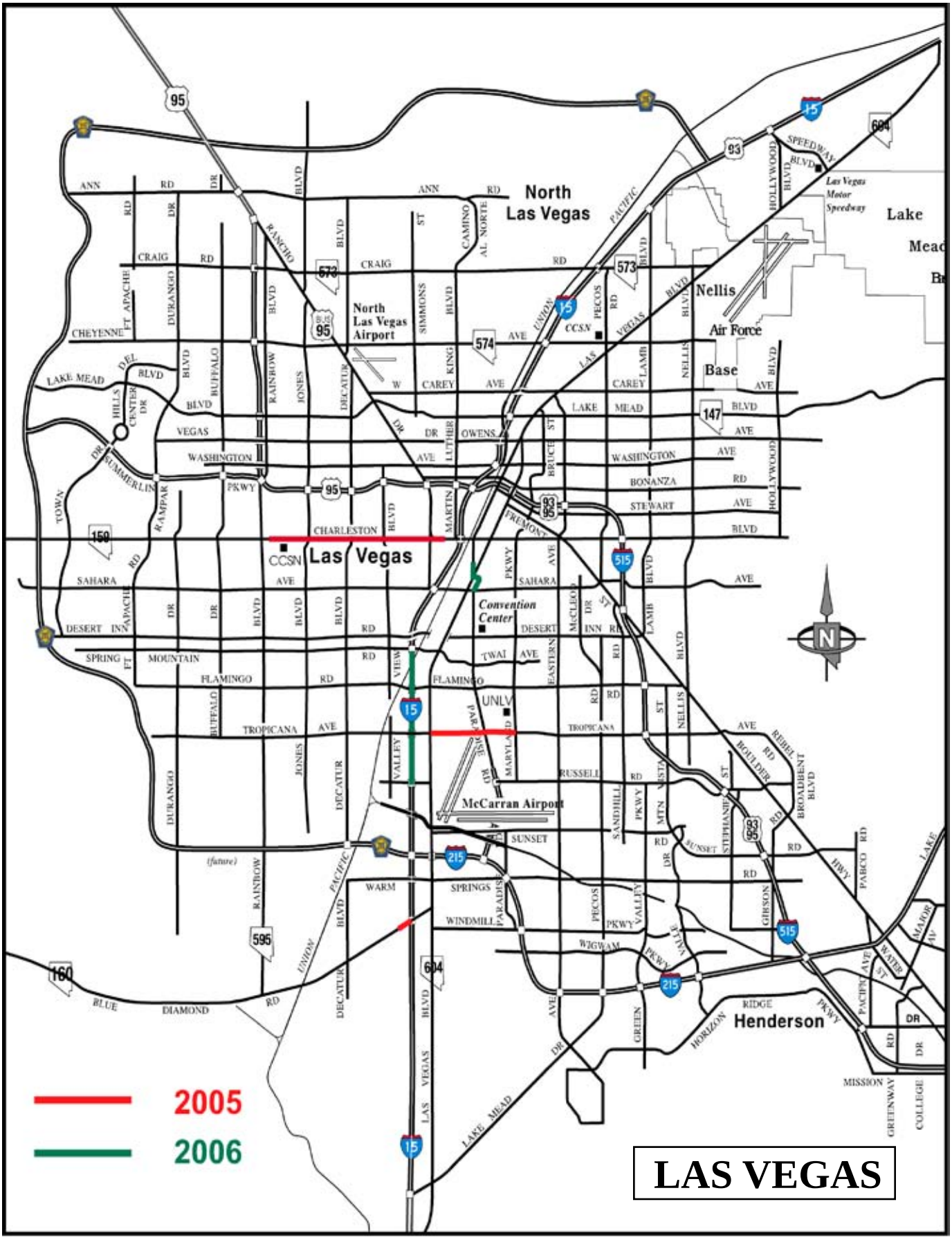


Figure 18B

Overlay and reconstruction projects advertised in fiscal years 2005 and 2006.

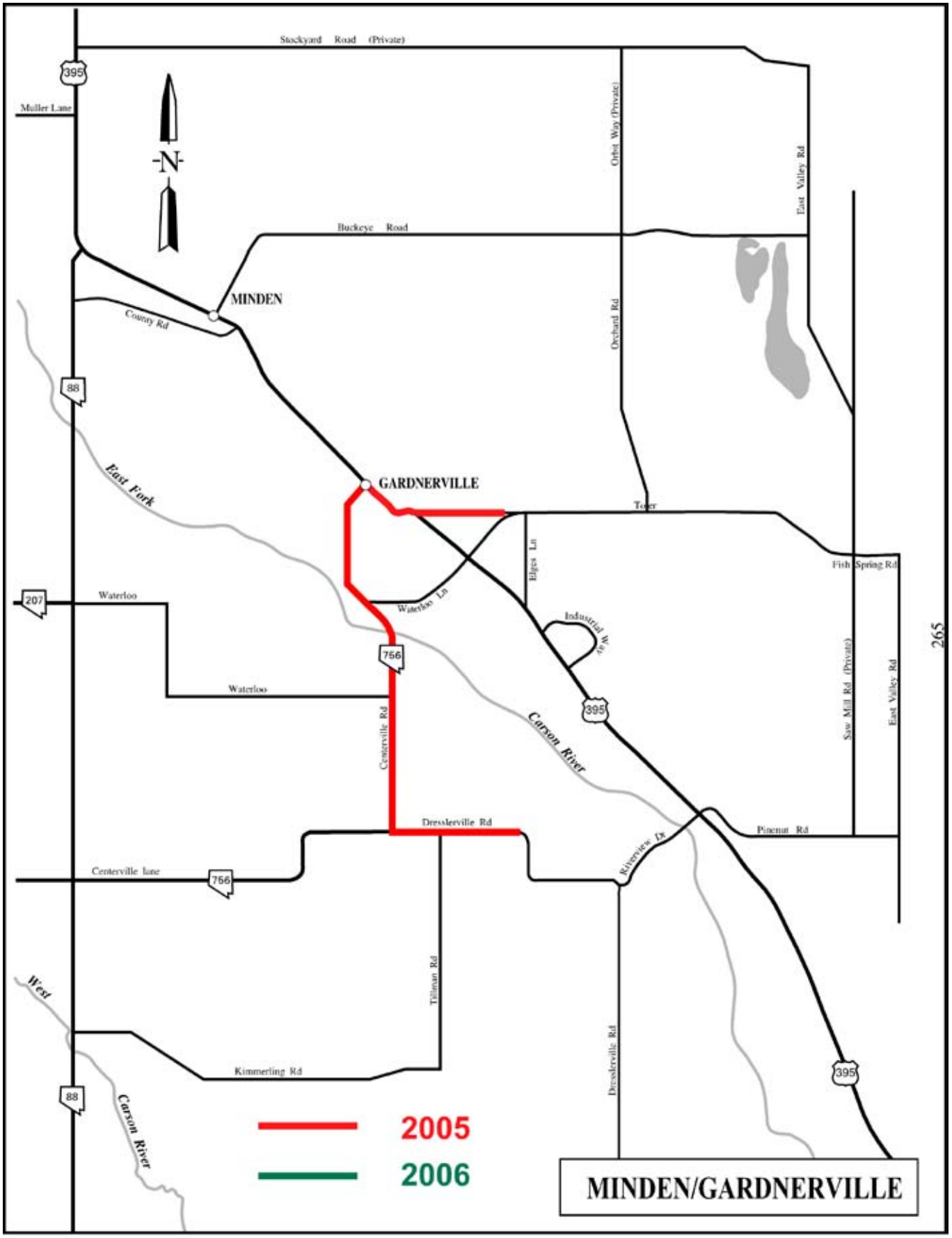


Figure 18C

Overlay and reconstruction projects advertised in fiscal years 2005 and 2006.

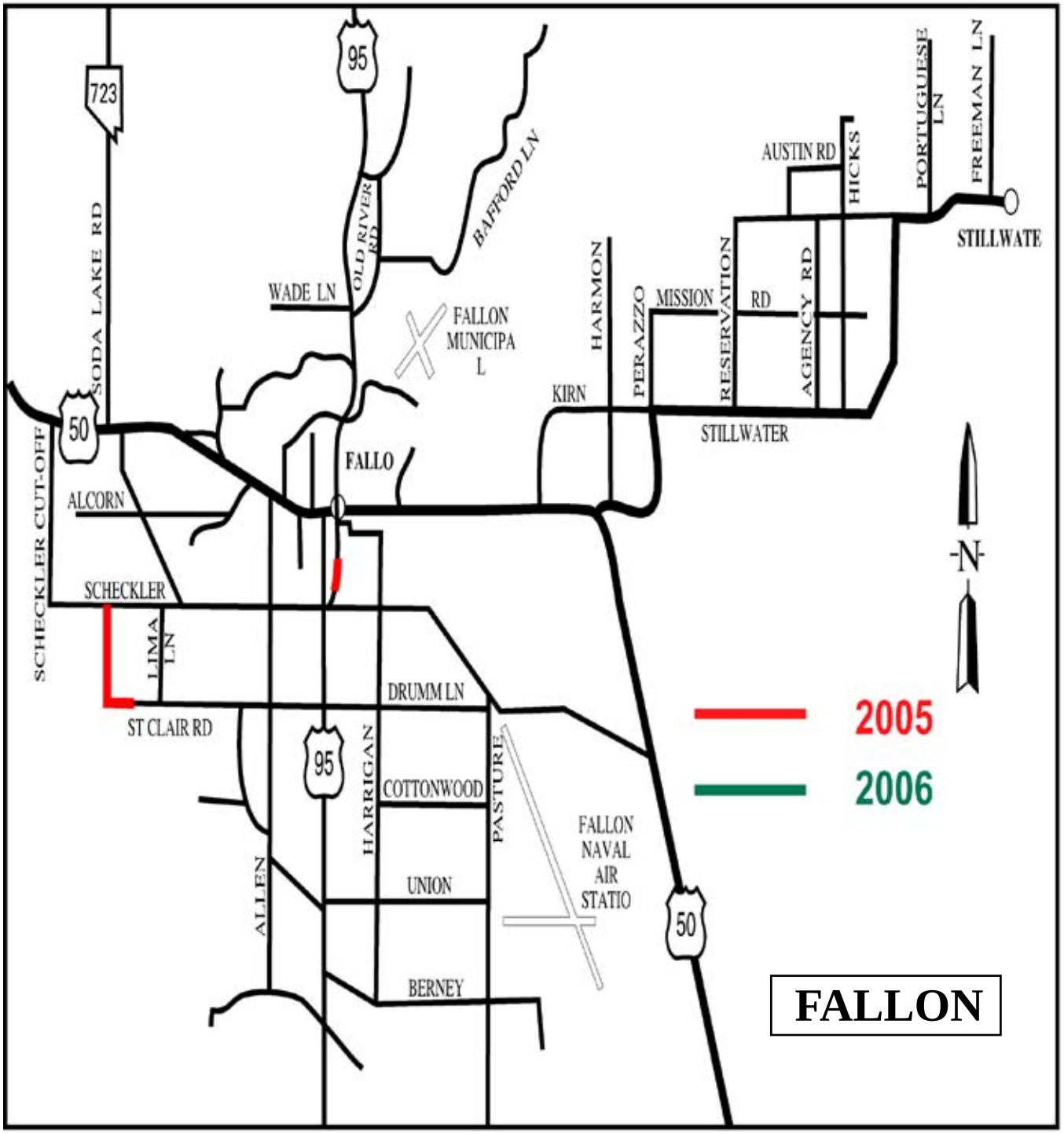


Figure 18D

Overlay and reconstruction projects advertised in fiscal years 2005 and 2006.

Pavement Condition Over Time *(How has our pavement condition changed?)*

Figure 19 shows how the condition of our pavements has changed since 1985. Generally, the condition has remained fairly consistent, but since 2005, the miles needing overlay or reconstruction have increased, while those needing merely preventive or corrective maintenance have decreased. Essentially, deterioration is occurring and can be seen as pavement needing only preventive or corrective maintenance now requires more costly action. A significant rehabilitation program in 1999 and 2000, along with a proactive action plan that was first detailed in our 1999 preservation report, have kept the system in fair condition, but many routes rehabilitated in 1999 and 2000 are aging and will soon require overlays or reconstruction.

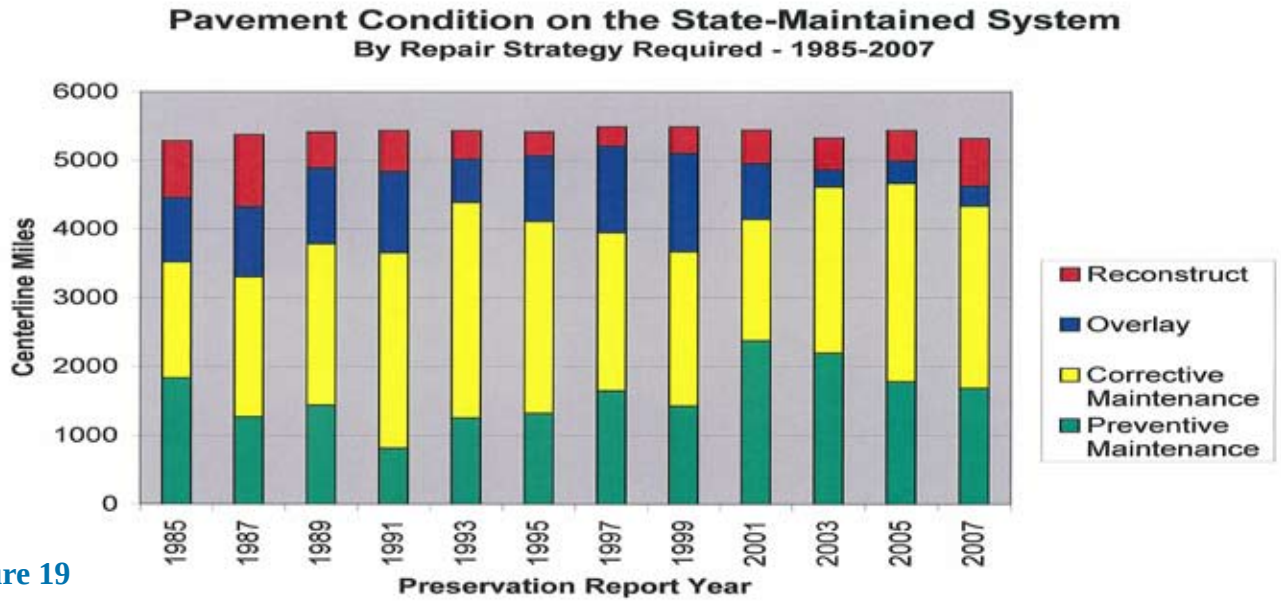


Figure 19

Figure 20 shows how the financial needs for pavement repairs have changed since 1985. Generally, the total needs increased with inflation until 1999, then decreased with the aggressive preservation program of the late 1990s. Current needs are the direct result of huge highway construction inflation, and an inadequate investment in preservation work.

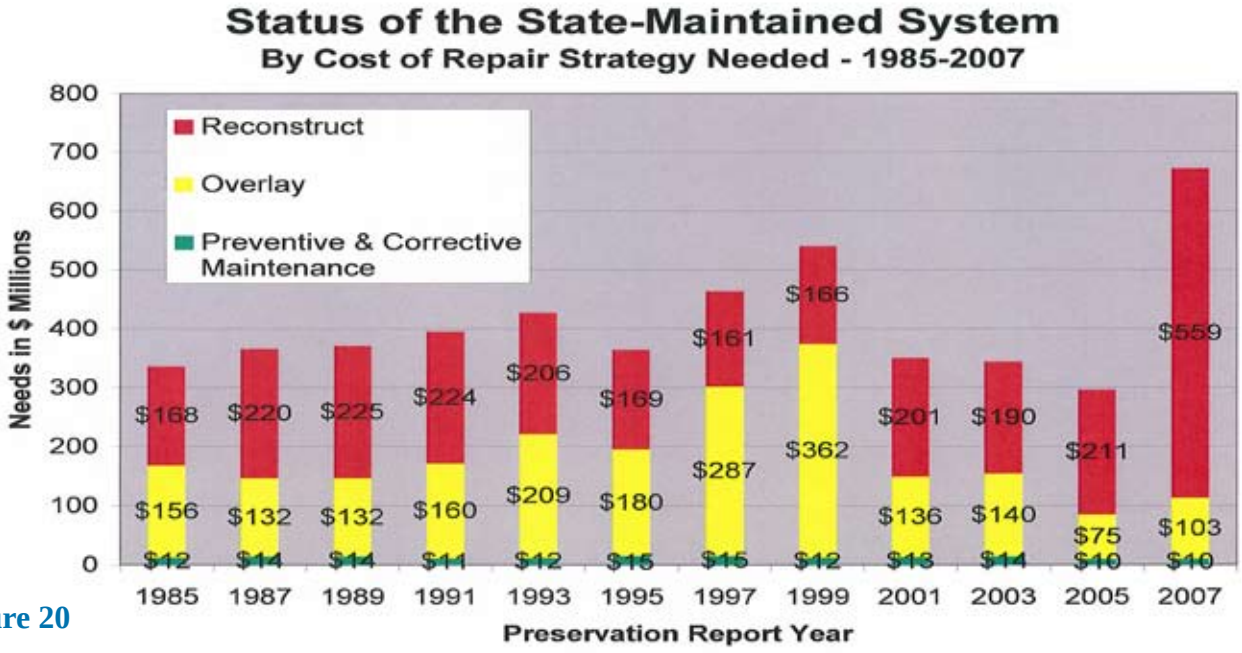


Figure 20

Figure 21 shows the financial needs for pavement repairs, as depicted in Figure 20, but inflation-adjusted to 2007 dollars.

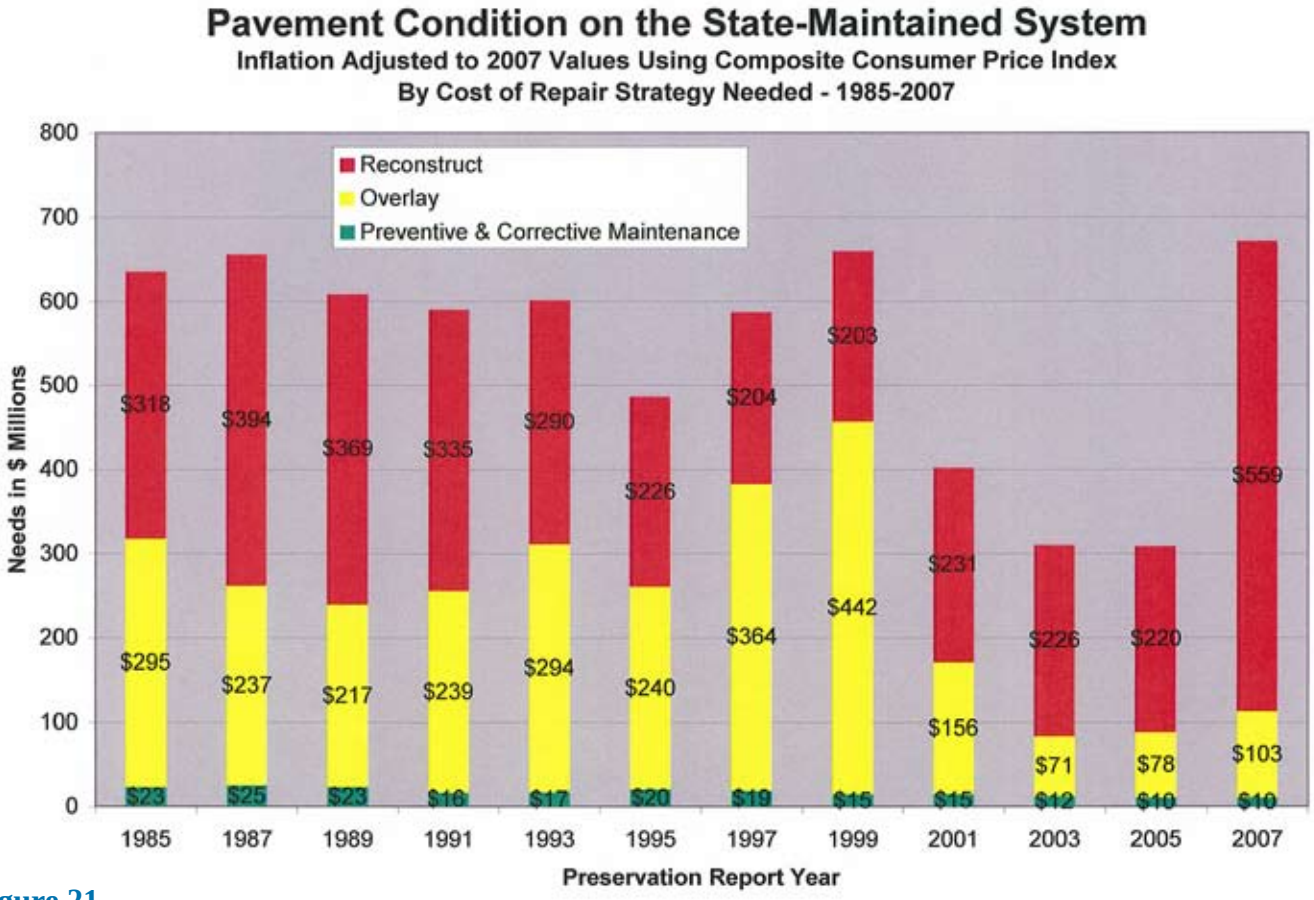


Figure 21

BRIDGE PRESERVATION

A bridge is a structure spanning 20 feet or more that carries traffic over a depression or obstruction, and includes multiple box culverts and pipes. Generally, bridge-preservation work consists of rehabilitating or replacing structurally deficient or functionally obsolete structures, seismically retrofitting earthquake-prone structures, sealing or replacing travel surfaces, and replacing worn joints.

Nevada's bridges represent a $1.7 billion investment. To detail how we are protecting that investment, this section provides information concerning bridge preservation funding, our bridge management system, the state's bridge inventory, the condition of our bridges, the cost to preserve the bridges, available and needed preservation funding, and an action plan for maintaining high-quality, low-cost bridges.

Although the focus in this section is on state-maintained bridges, information on other public bridges is also included because they are eligible for federal funds that are administered by the Nevada Department of Transportation. Furthermore, we are responsible for surveying and reporting the condition of these bridges.

Funding *(How do we pay for bridge preservation?)*

Like pavement, we pay for bridges with fuel taxes and vehicle registration fees. About $16 million is spent annually on bridge preservation: $12 million in federal funds, $3 million in state funds, and $1 million in local funds. Historically, available funding has been sufficient to offset annual deterioration costs.

Federal funds are available for bridge replacement, rehabilitation, or seismic retrofits. To qualify for replacement, the bridge must be either functionally obsolete or structurally deficient and have a sufficiency rating less than 50. To qualify for rehabilitation, the bridge must be either functionally obsolete or structurally deficient and have a sufficiency rating less than 80. (Sufficiency ratings and functionally obsolete or structurally deficient bridges are defined in the Bridge Condition Survey section.) Typically, about 85 percent of bridge funds are spent on bridge rehabilitation and replacement and about 15 percent on seismic retrofit work.

Under federal funding guidelines, "off-system" bridges must receive 15 percent of available federal funds. The remaining 85 percent can be used on- or off-system. On-system and off-system status is determined by the functional classification of the roadway that the bridge carries. Of the 1,045 state bridges, 971 are on-system and 74 are off-system. Of the 659 county, city, and private bridges, 344 are on-system and 315 are off-system.

Bridge Management *(How do we care for our bridge assets?)*

Bridges are managed via the Pontis Bridge Management System. This system provides an inventory of bridge condition and location, needed repairs, load limits, susceptibility to flooding, and ownership information. A separate inventory allows us to ascertain earthquake susceptibility and risks. Together, these inventories allow us to identify preservation priorities and monitor the state's progress toward eliminating the backlog of bridge work.

Bridge Condition Survey *(How do we assess our bridges' health?)*

The serviceability of bridges in Nevada is evaluated using a numerical assessment called the sufficiency rating. Sufficiency ratings vary from 0 to 100, with 100 being a bridge with no deficiencies.

While the sufficiency rating is primarily used to determine eligibility for federal funding, it also is used to assess the overall condition of a bridge. The sufficiency rating includes three components: a condition assessment, an inventory rating, and an appraisal rating.

Condition assessments are primarily a visual evaluation of the structure. The deleterious effects of age, environment, fatigue, hydrologic scour, settling, and traffic collisions are assessed. Each of the bridges in Nevada is inspected at least once every two years. Bridges in poor condition are inspected more often. Besides impacting condition assessments, visual inspections also affect a bridge's inventory rating.

The inventory rating denotes the strength of the bridge compared to design-truck loading. Structures with low condition assessments or inventory ratings are classified as "structurally deficient." Structurally deficient bridges are not necessarily about to fail. Rather, they become a priority for corrective measures and may be posted for restricted vehicle usage.

The appraisal rating measures how well the bridge serves the public, or its functionality. Included in the appraisal rating are a structural evaluation and a review of the deck geometry, under-bridge clearance, waterway adequacy, and approach geometry. Under the appraisal rating, a substandard structure is termed "functionally obsolete". Like structurally deficient bridges, functionally obsolete bridges are able to serve the public, but are susceptible to congestion, collisions, or flooding because of their restrictive clearances and geometries. Although functionally obsolete bridges are generally not as great a concern as structurally deficient ones, they may also become a priority for corrective measures and may be posted for restricted vehicle usage.

Separate from the sufficiency rating, a bridge's susceptibility to seismic activity is considered when assessing its health. Nevada is the third most seismically active state behind California and Alaska. The central and western parts of Nevada are the most active, but southern Nevada does have the potential for damaging earthquakes.

System Status *(What do we maintain?; What is its condition?; What is the cost to improve it?)*

Bridge Inventory *(What do we maintain?)*

All bridges in Nevada which are open to the public are included in the Nevada Department of Transportation's bridge inventory. There are currently 1,764 public bridges in Nevada. The Nevada Department of Transportation maintains 1,045; county or city governments, 646; federal agencies, 60; private entities, nine; and other state agencies, four.

Condition Survey Results *(What is the condition of our bridges?)*

Generally, bridges with sufficiency ratings more than 80 can be considered good, ratings of between 50 and 80 can be considered fair, and ratings less than 50 are considered poor. Figure 22 shows the condition of Nevada's bridges. Figure 23 shows those bridges that are substandard and functionally obsolete

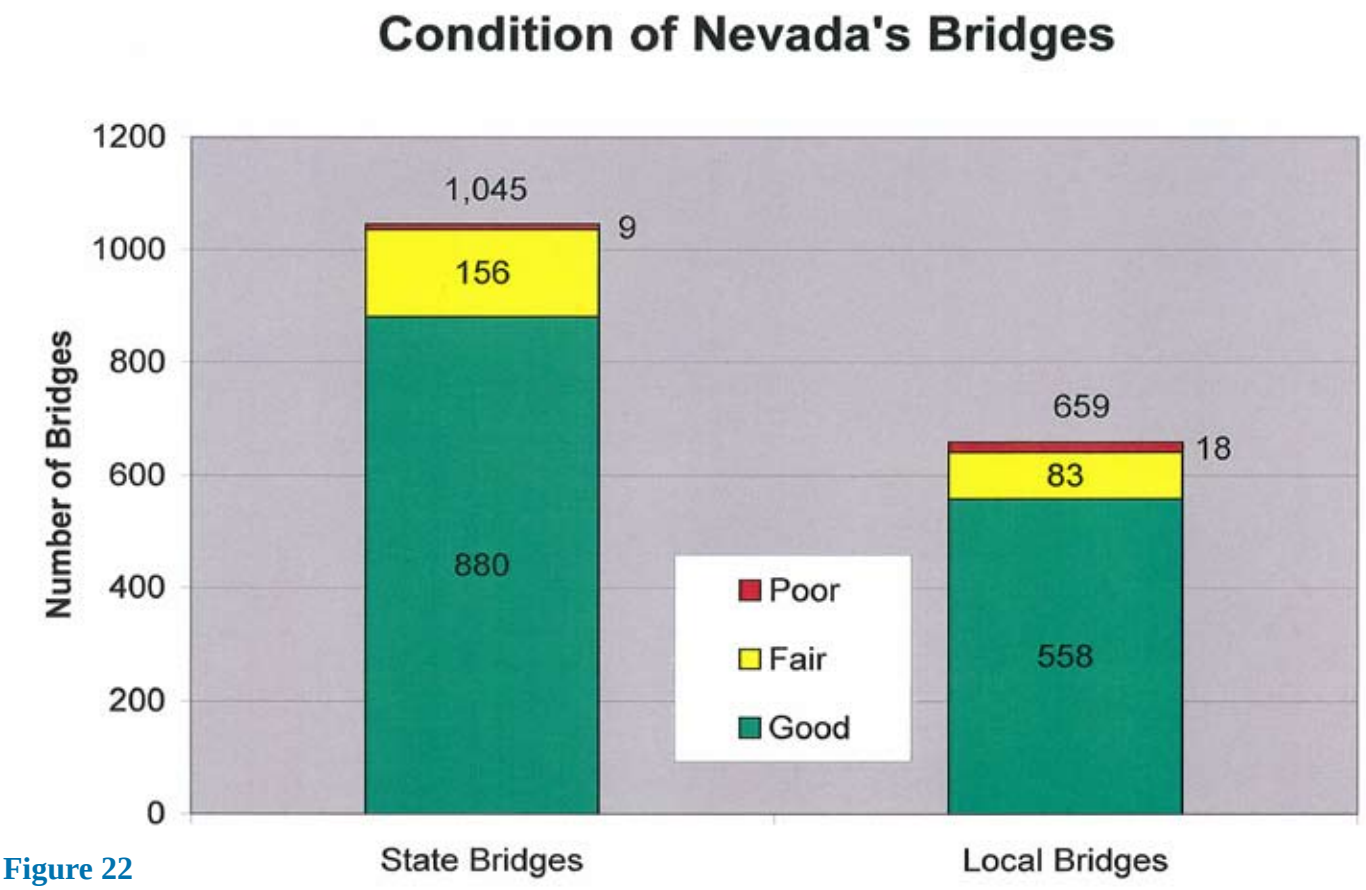


Figure 22

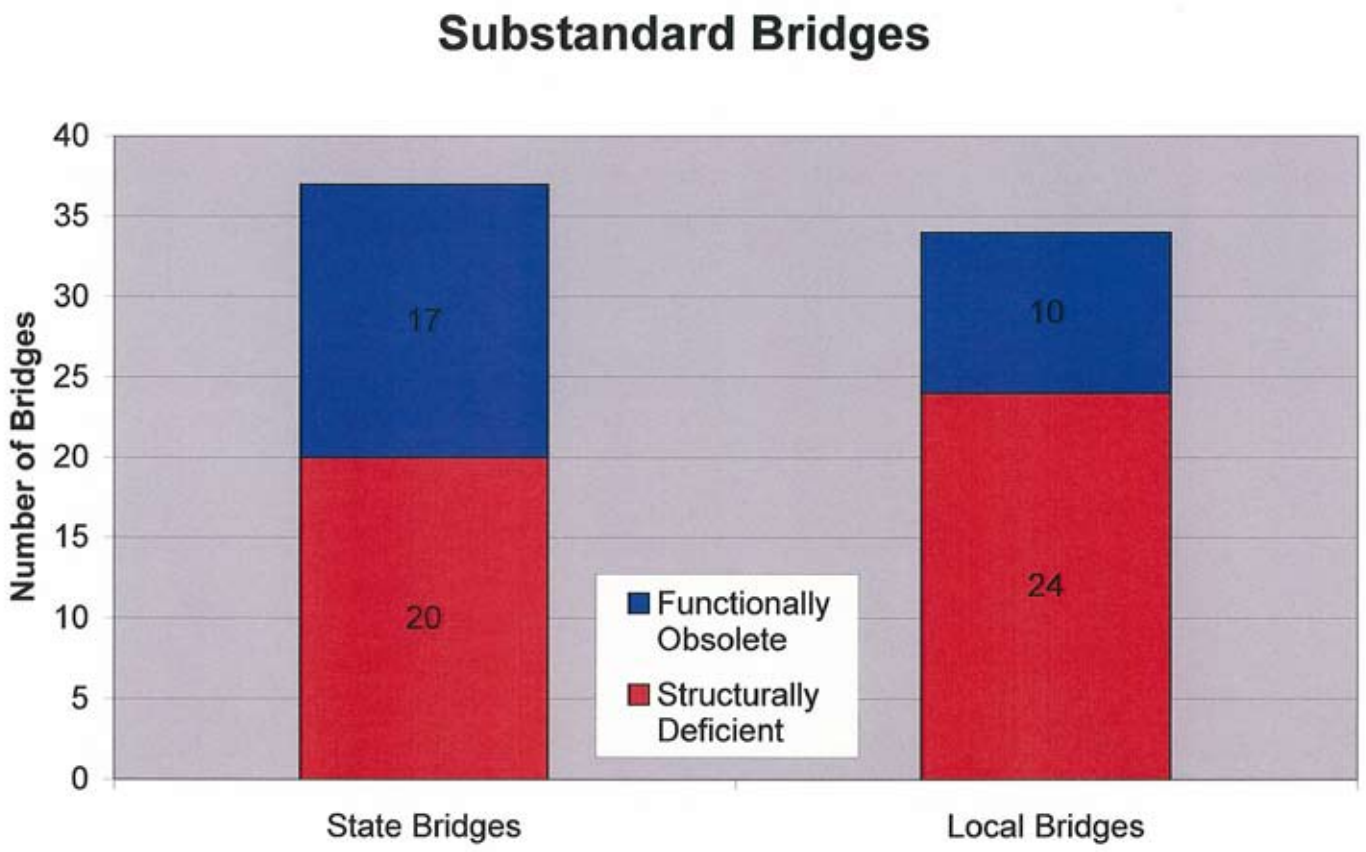


Figure 23

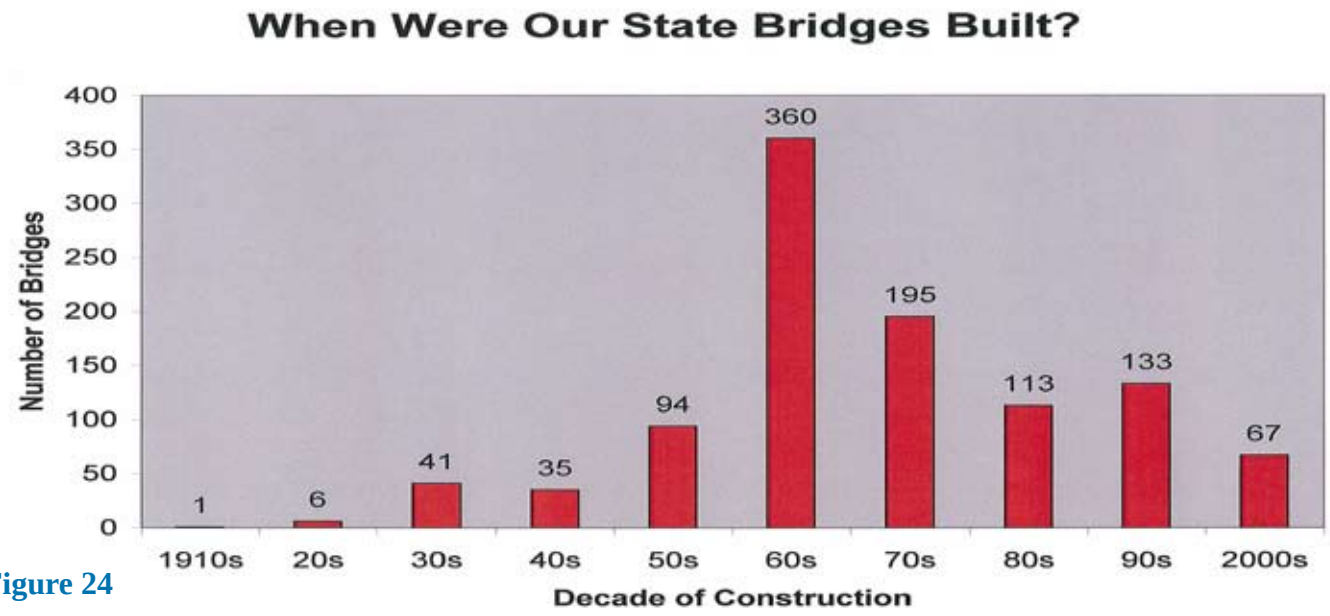


Figure 24

Overall, Nevada bridges are in good shape compared to many other states. This is mainly due to our favorable environment and relatively "youthful" bridges. Most bridges have a useful life of at least 50 years. The age distribution for state bridges is shown in Figure 24.

Since seismic prioritization began, NDOT has replaced or retrofitted 81 structures at a cost of over $27 million. However, NDOT has placed a high priority on 142 more state-owned bridges in need of seismic retrofitting. The cost to upgrade these bridges is estimated at $75 million. We do not have adequate information to fully assess the need to retrofit non-state bridges; therefore, no cost estimate has been made.

Backlog of Bridge Work *(What is the current cost to improve our bridges to good condition?)*

There is currently a $134 million backlog of state bridge work. Table 8 shows the needed bridge repairs. Note that preventive maintenance needs are not included in the bridge backlog because this work is performed using our routine-maintenance funds.

Backlog of Bridge Work
State Bridges - 2007
Based on 2006 Condition Data

	Repair Strategy Required				
System	**Corrective Maintenance**	**Rehabilitation**	**Replace**	**Seismic Retrofit**	**Total**
Principal Arterial - Interstate	$14,552,000	$9,968,000	$0	-	$24,520,000
Principal Arterial - Non-Interstate	4,365,000	9,833,000	590,000	-	14,788,000
Minor Arterial	3,768,000	2,395,000	0	-	6,163,000
Major Collector	4,327,000	2,066,000	2,689,000	-	9,082,000
Minor Collector & Local	1,089,000	1,114,000	2,592,000	-	4,795,000
System Not Identified	-	-	-	75,000,000	75,000,000
Total	**$28,101,000**	**$25,376,000**	**$5,871,000**	**$75,000,000**	**$134,348,000**

Table 8

Figures 25 to 25F shows those state bridges that are structurally deficient or functionally obsolete.

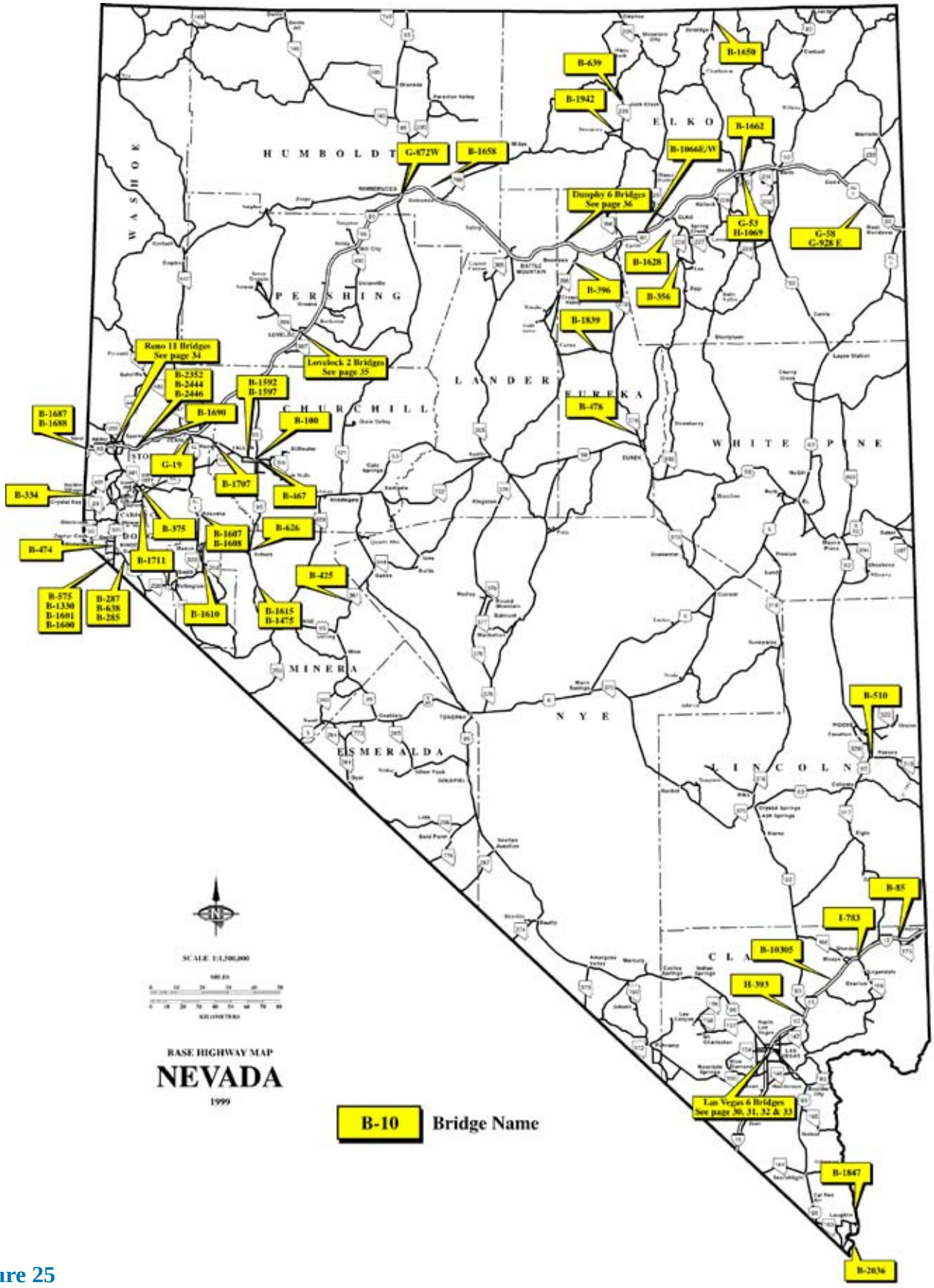


Figure 25

Locations of structurally deficient or functionally obsolete state bridges.

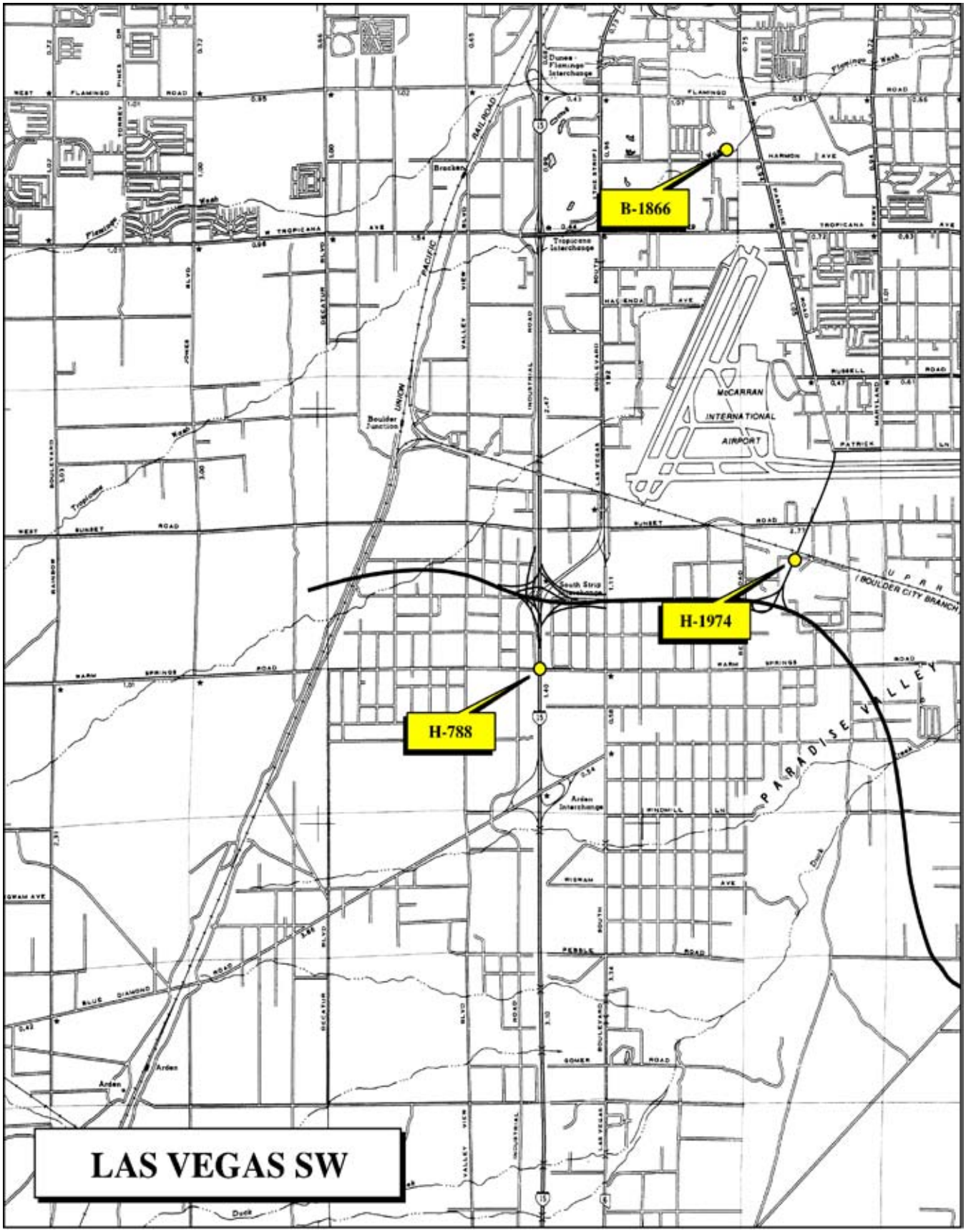


Figure 25A

Locations of structurally deficient or functionally obsolete state bridges.

Figure 25B

Locations of structurally deficient or functionally obsolete state bridges.

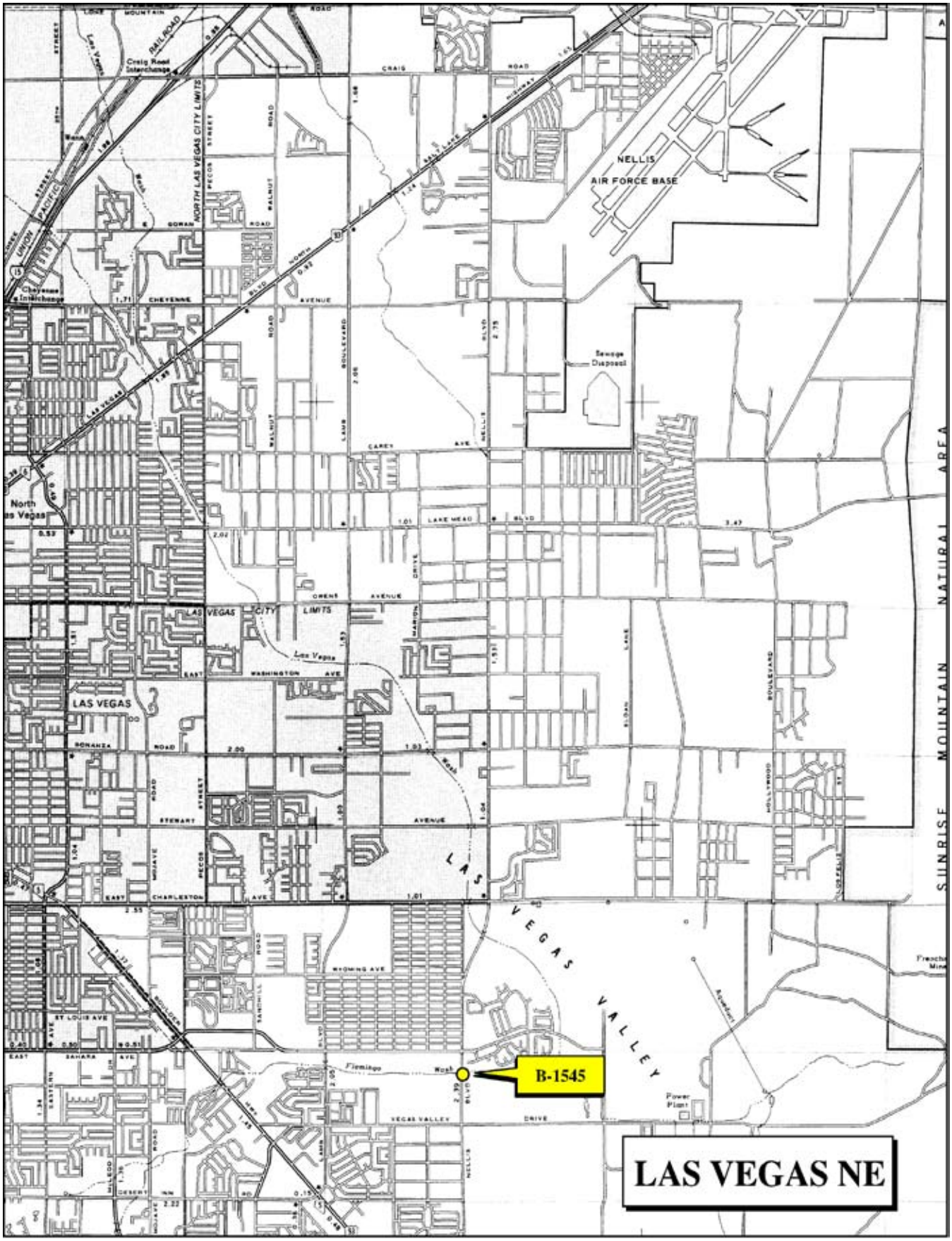


Figure 25C

Locations of structurally deficient or functionally obsolete state bridges.

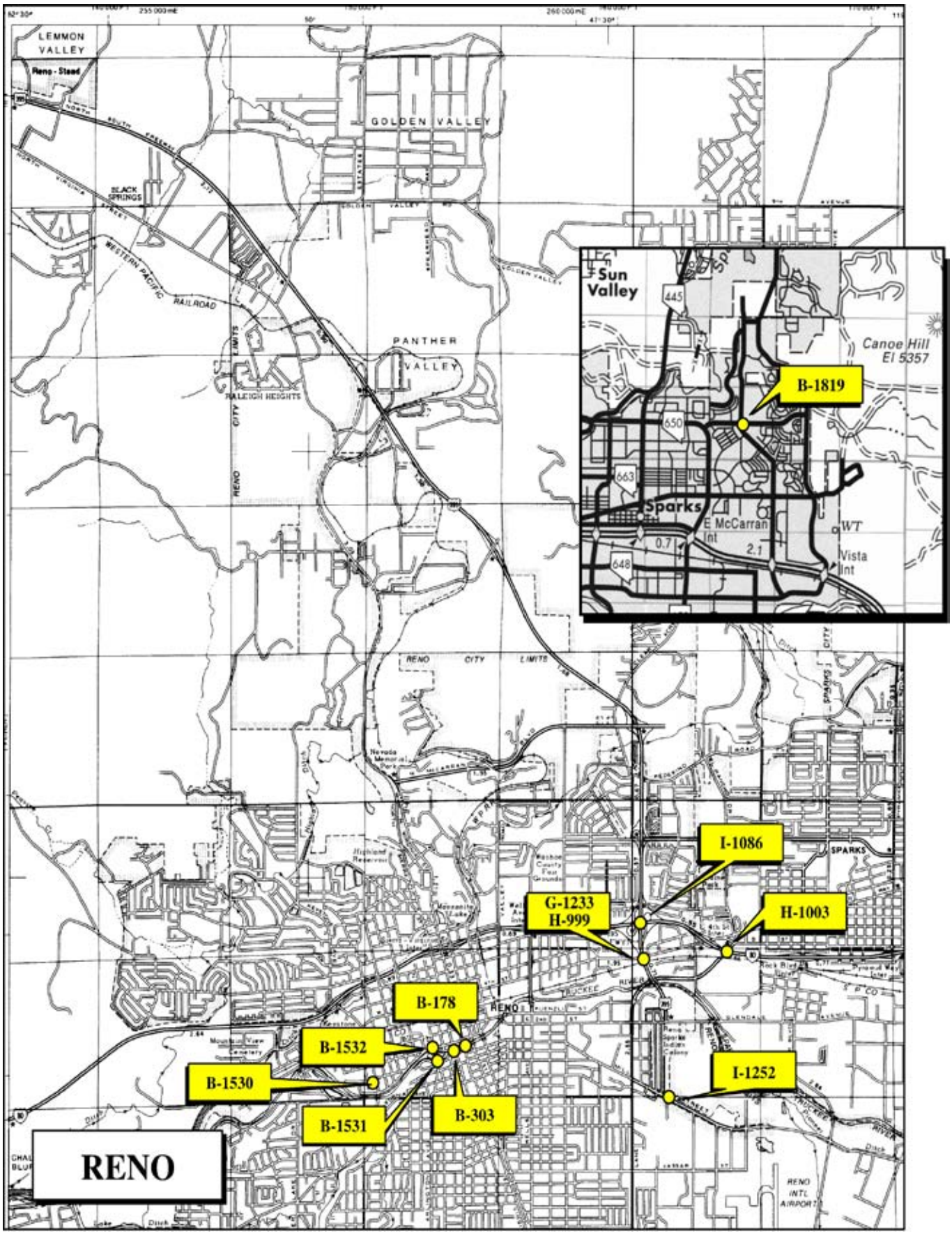


Figure 25D

Locations of structurally deficient or functionally obsolete state bridges.

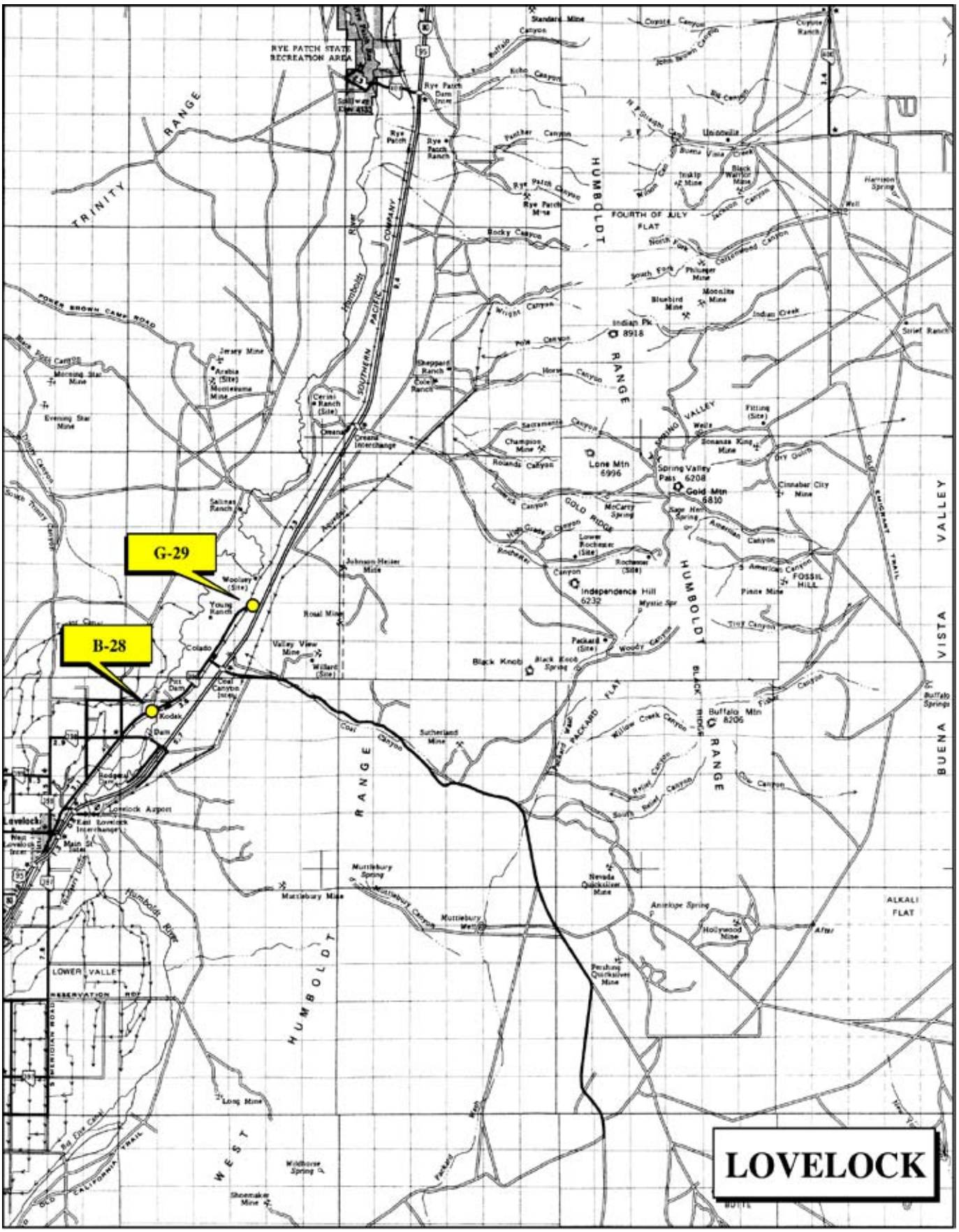


Figure 25E

Locations of structurally deficient or functionally obsolete state bridges.

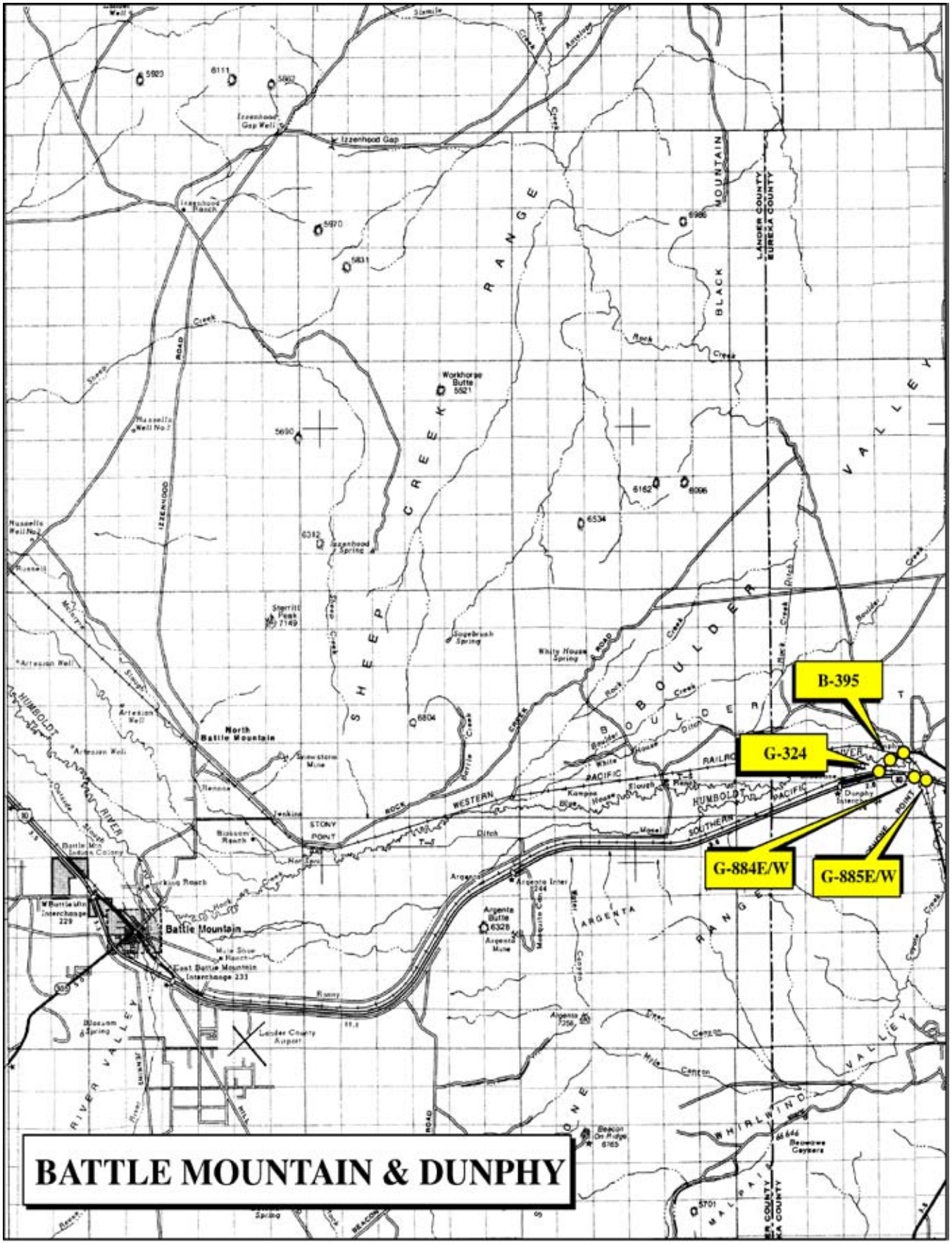


Figure 25F

Locations of structurally deficient or functionally obsolete state bridges.

Action Plan *(How will we improve our bridges?)*

To preserve Nevada's public bridges in good condition, our action plan in priority order includes the following tasks:

1. Replace or rehabilitate structurally deficient bridges before they become hazardous or overly burdensome to users.
2. Replace or rehabilitate functionally obsolete bridges before they become hazardous or overly burdensome to users.
3. Seismically retrofit bridges that do not meet current seismic standards.
4. Apply timely repairs to existing structures.

Generally, bridges with sufficiency ratings of less than 50 would fall under tasks 1 and 2. Just 1.5 percent (27 of 1,764) of Nevada's public bridges have sufficiency ratings that low. Only 0.9 percent (9 of 1,045) of the state bridges are rated that low.

Many of Nevada's most seismically vulnerable bridges have already been retrofitted. The others in task 3 above have been prioritized for seismic retrofit based on their importance and earthquake vulnerability.

Project Priority *(How do we prioritize individual projects?)*

Bridge repairs are normally scheduled when pavement repairs are planned in the same vicinity. However, bridge repairs may be planned separate from pavement work when we can repair several bridges together.

Our sufficiency rating system guides the prioritization of bridge replacement and rehabilitation work. Since the sufficiency rating contains factors for structural integrity, traffic use, and safety, it is an excellent prioritization tool.

Seismic retrofit work is prioritized based on a bridge's earthquake vulnerability and importance. We have investigated the seismic vulnerability of all state-owned bridges. Certain bridge types, such as culverts, do not need retrofit.

Present versus Needed Funding *(What financial resources are needed to improve our bridges?)*

The majority of state bridges were built between the mid-1950s and mid-1970s during Interstate construction. Since bridges normally have a useful life of 50 years or more, we can forward their construction date 50 years to estimate when the bridges may need rehabilitation or replacement. As shown in Figure 26, many will be due for major work beginning in 2010.

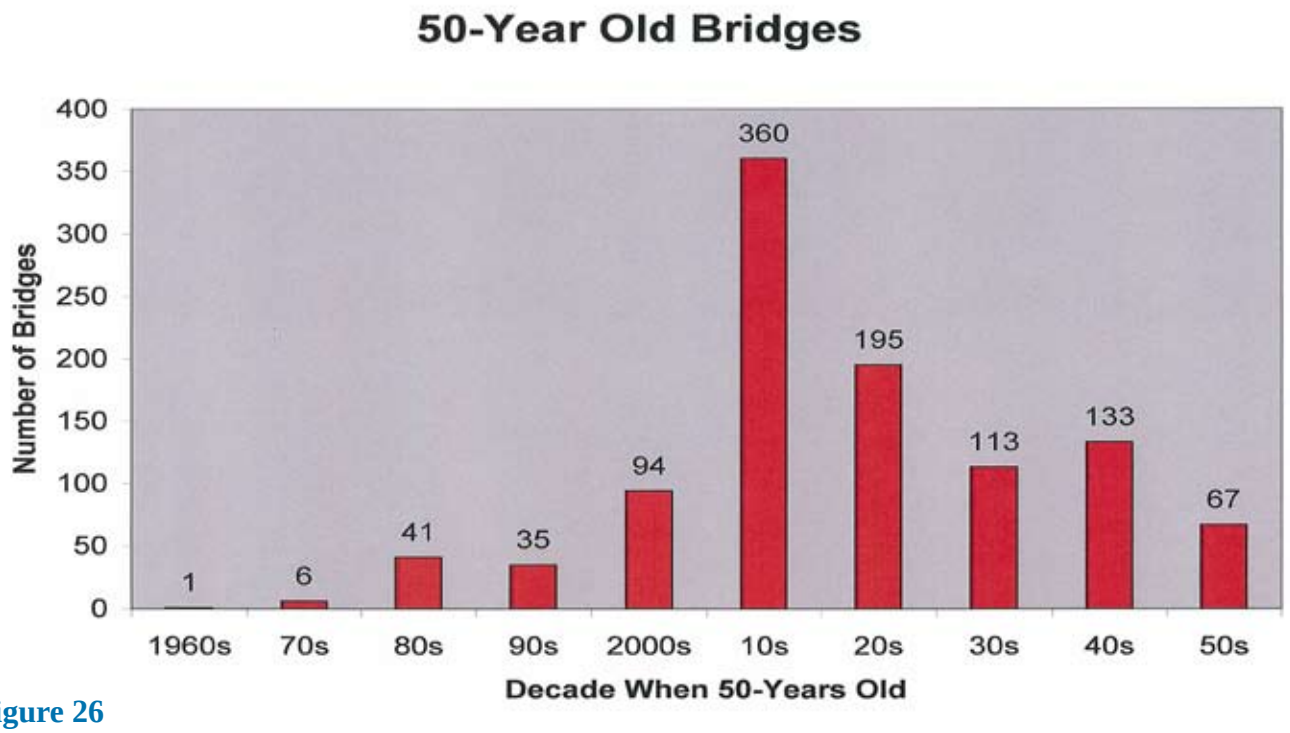


Figure 26

Under the present user-fee structure, the current $134 million backlog of bridge work will increase gradually through 2019. The needed funding scenario, which requires moderate revenue increases in future years, will close out the backlog in 2019. Figure 27 and Table 9 show how these increases are needed to eliminate the backlog.

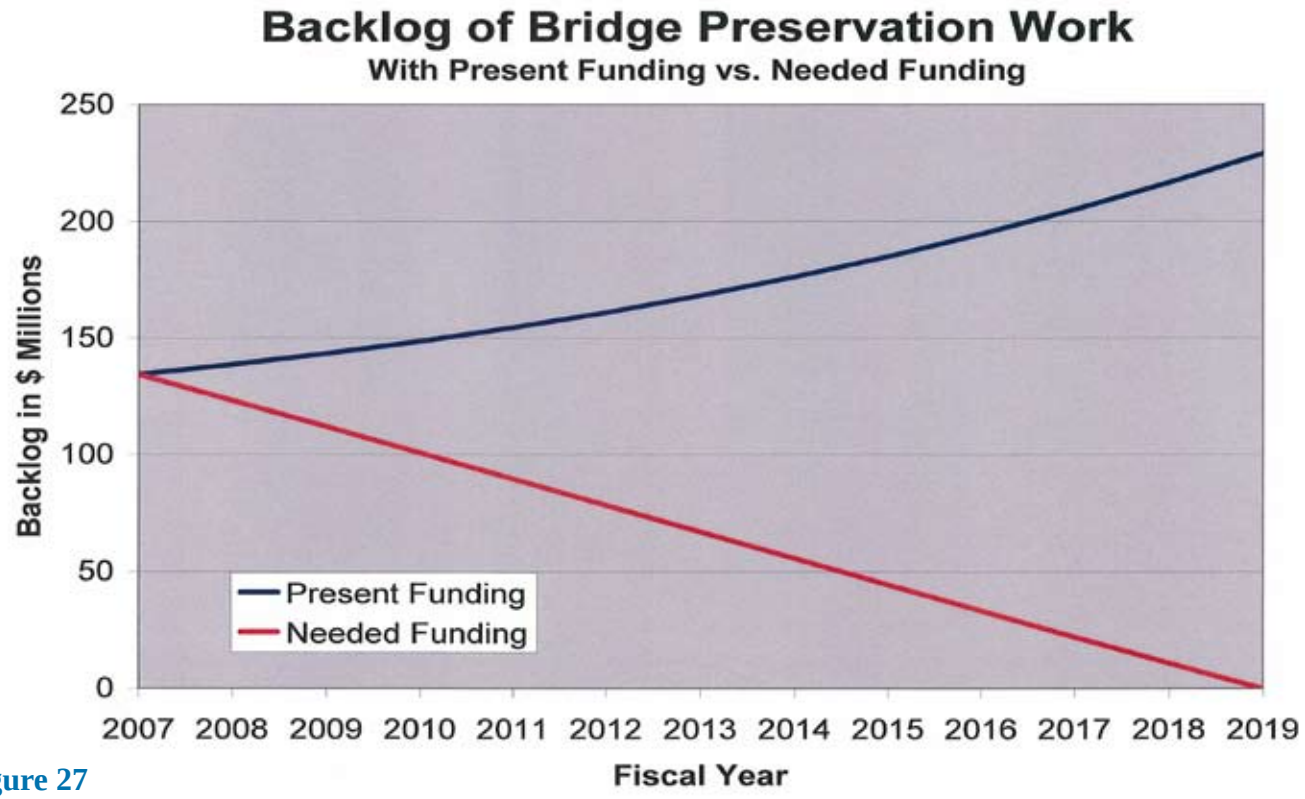


Figure 27

Bridge Backlog, Costs, and Funding
State-Maintained System - 2007
(in millions of dollars)

Present Funding

		Bridge Preservation Costs * (Normal Annual Deterioration Costs)			Bridge Preservation Funds ** (Funds Planned for Preservation Work)				
Fiscal Year	Backlog of Bridge Work	Corrective Maintenance, Rehabilitation, Replacement, & Seismic Retrofit	Preventive Maintenance	Total	State Corrective Maintenance, Rehabilitation, Replacement, & Seismic Retrofit	Federal Corrective Maintenance, Rehabilitation, Replacement, & Seismic Retrofit	State Preventive Maintenance		Total
2007	134.3	17.5	0.4	17.9	2.6	10.3	0.4		13.4
2008	138.9	18.6	0.4	19.1	2.7	10.9	0.4		14.0
2009	143.9	19.8	0.4	20.2	2.8	11.4	0.4		14.6
2010	149.5	21.0	0.5	21.5	2.9	11.8	0.5		15.2
2011	155.8	22.3	0.5	22.7	3.1	12.3	0.5		15.8
2012	162.7	23.6	0.5	24.1	3.2	12.8	0.5		16.4
2013	170.4	25.0	0.5	25.5	3.3	13.3	0.5		17.1
2014	178.8	26.5	0.5	27.0	3.4	13.8	0.5		17.8
2015	188.1	28.1	0.5	28.6	3.6	14.4	0.5		18.5
2016	198.2	29.7	0.5	30.3	3.7	14.9	0.5		19.2
2017	209.3	31.4	0.6	32.0	3.9	15.5	0.6		20.0
2018	221.3	33.2	0.6	33.8	4.0	16.2	0.6		20.8
2019	234.4								

Needed Funding

		Bridge Preservation Costs * (Normal Annual Deterioration Costs)			Bridge Preservation Funds ** (Funds Planned for Preservation Work)				
Fiscal Year	Backlog of Bridge Work	Corrective Maintenance, Rehabilitation, Replacement, & Seismic Retrofit	Preventive Maintenance	Total	State Corrective Maintenance, Rehabilitation, Replacement, & Seismic Retrofit	Federal Corrective Maintenance, Rehabilitation, Replacement, & Seismic Retrofit	State Preventive Maintenance	Needed Additional Bridge Preservation	Total
2007	134.3	17.5	0.4	17.9	2.6	10.3	0.4	15.6	29.0
2008	123.3	18.6	0.4	19.1	2.7	10.9	0.4	16.2	30.2
2009	112.1	19.8	0.4	20.2	2.8	11.4	0.4	16.9	31.5
2010	100.8	21.0	0.5	21.5	2.9	11.8	0.5	17.5	32.8
2011	89.5	22.3	0.5	22.7	3.1	12.3	0.5	18.2	34.1
2012	78.2	23.6	0.5	24.1	3.2	12.8	0.5	19.0	35.4
2013	66.9	25.0	0.5	25.5	3.3	13.3	0.5	19.7	36.8
2014	55.6	26.5	0.5	27.0	3.4	13.8	0.5	20.5	38.3
2015	44.4	28.1	0.5	28.6	3.6	14.4	0.5	21.3	39.8
2016	33.1	29.7	0.5	30.3	3.7	14.9	0.5	22.2	41.4
2017	22.0	31.4	0.6	32.0	3.9	15.5	0.6	23.1	43.1
2018	11.0	33.2	0.6	33.8	4.0	16.2	0.6	24.0	44.8
2019	0.0								

Table 9

* Inflation assumed at 3.00% per annum.
** Revenue growth rate assumed is 4.00% per annum.

Note: Backlog of bridge work is as of beginning of fiscal year; preservation costs are those incurred during the fiscal year; and preservation funds are those that are available during the fiscal year.

Bridge Management System Improvements *(How will we improve the management system?)*

To improve our management of bridge assets, we are implementing the use of Pontis software that was developed by the Federal Highway Administration. The strength of Pontis is its ability to prioritize bridge replacement, rehabilitation, and major maintenance. Our current sufficiency-rating method prioritizes only replacement and rehabilitation, but not major maintenance. Ultimately, Pontis will provide objective prioritization of bridge preservation.

We will also develop a method to merge seismic-retrofit priorities with our replacement and rehabilitation priorities. Currently, seismic work is prioritized separately from other preservation work because no method exists to merge the two.

Bridge Research *(What research are we conducting to improve our bridges?)*

Since bridges represent a major investment, we must do what we can to make them perform as long as possible. To improve concrete performance and the life expectancy of our bridges, we have identified and implemented creep, shrinkage, and modulus of elasticity requirements on concrete in appropriate structures.

The High Performance Concrete Task Force has conducted research to increase the quality of materials used in the state's bridges. High performance concrete requirements have been fully implemented in Las Vegas at the I-15/Lamb Boulevard extension and U.S. 95 widening, and in the Reno/Carson area on the I-580 freeway extension.

New research is being conducted on self-consolidating concrete for applications where construction forms are congested with reinforcing steel, as commonly found in bridge structures (especially in seismically vulnerable areas).

Historical Perspective *(What have we expended on bridges?; How has their condition changed?)*

Biennial Expenditures, Fiscal Years 2005-2006 *(What have we expended on bridges?)*

During fiscal years 2005 and 2006, we obligated $25.8 million for bridge preservation work, as outlined in Table 10.

Bridge Expenditures
Fiscal Years 2005 and 2006

	Repair Strategy					
Fiscal Year	Preventive Maintenance	Corrective Maintenance	Rehabilitation	Replacement	Seismic Retrofit	Total
2005	$350,570	$667,334	$315,543	$19,195,384	$0	$20,528,831
2006	473,265	0	3,417,795	883,565	450,344	5,224,969
Biennium Total	$823,835	$667,334	$3,078,949	$20,166,293	$450,344	$25,753,800

Table 10

During fiscal years 2005 and 2006, $24.3 million was spent to rehabilitate, replace, or seismically retrofit 13 bridges as shown in Table 11.

Number of Bridges Rehabilitated, Replaced, or Seismically Retrofitted
Fiscal Years 2005 and 2006

Fiscal Year	Entity	Repair Strategy: On Federal-Aid System?	Rehabilitation	Replacement	Seismic Retrofit	Total
2005	State	On-System		7		7
2006	State	On-System	2	2	1	5
	Local/Other	Off-System		1		1
		Total	2	10	1	13

Table 11

Bridge Condition Over Time *(How has the condition of our bridges changed?)*

Figure 28 shows that the condition of the state bridges has changed little since 1994. Figure 29 shows that the numbers of functionally obsolete and structurally deficient bridges have decreased significantly since the mid 1990s.

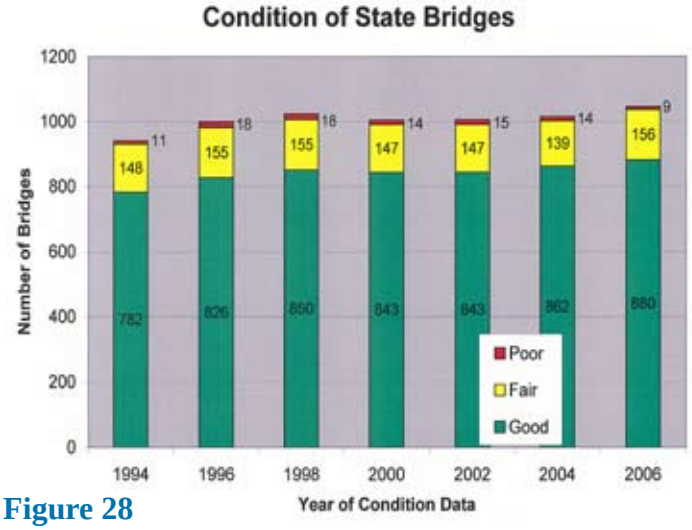


Figure 28

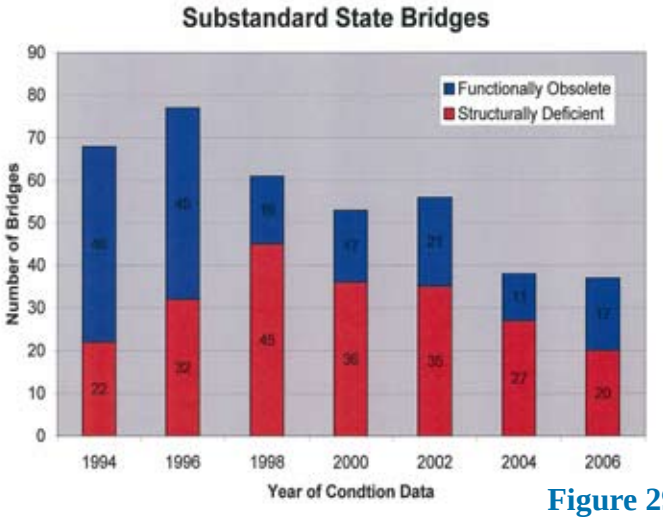


Figure 29

Figures 29 and 30 show that the condition of locally maintained bridges has changed only moderately since 1994, but there are significantly more bridges.

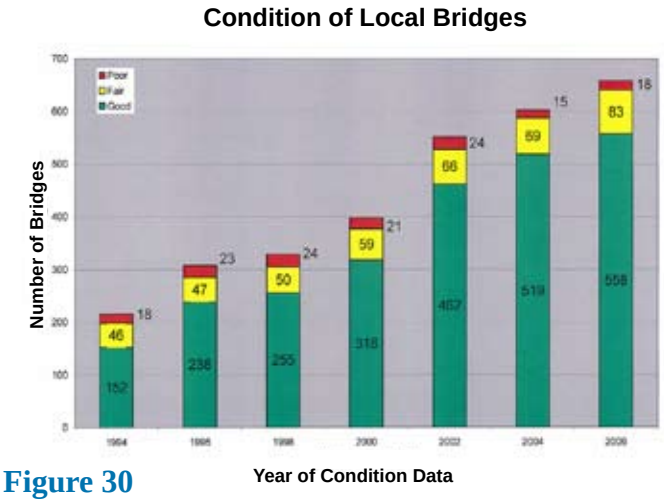


Figure 30

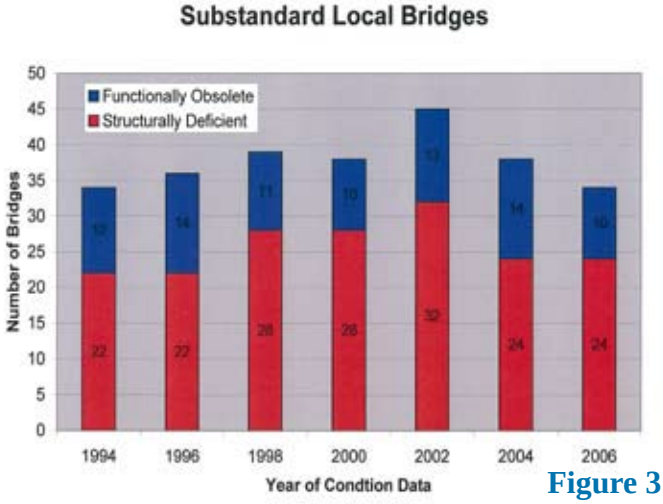


Figure 31

PAVEMENT & BRIDGE PRESERVATION SUMMARY

Preserving our highways means preserving both pavements and bridges. Our combined pavement and bridge backlog is $795 million as shown in Table 12. The funds needed to eliminate this backlog are shown in Figure 32 and Table 13.

Backlog of Pavement and Bridge Work
State-Maintained System - 2007
Based on 2005 Condition Data

System	Pavement	Bridges	Total
Principal Arterial - Interstate	$93,110,000	$24,520,000	$117,630,000
Principal Arterial - Non-Interstate	$225,749,000	$14,788,000	$240,537,000
Minor Arterial	$108,532,000	$6,163,000	$114,695,000
Major Collector	$155,169,000	$9,082,000	$164,251,000
Minor Collector & Local	$78,479,000	$4,795,000	$83,274,000
System Not Identified (Seismic Retrofit)		$75,000,000	$75,000,000
	$661,039,000	$134,348,000	$795,387,000

Table 12

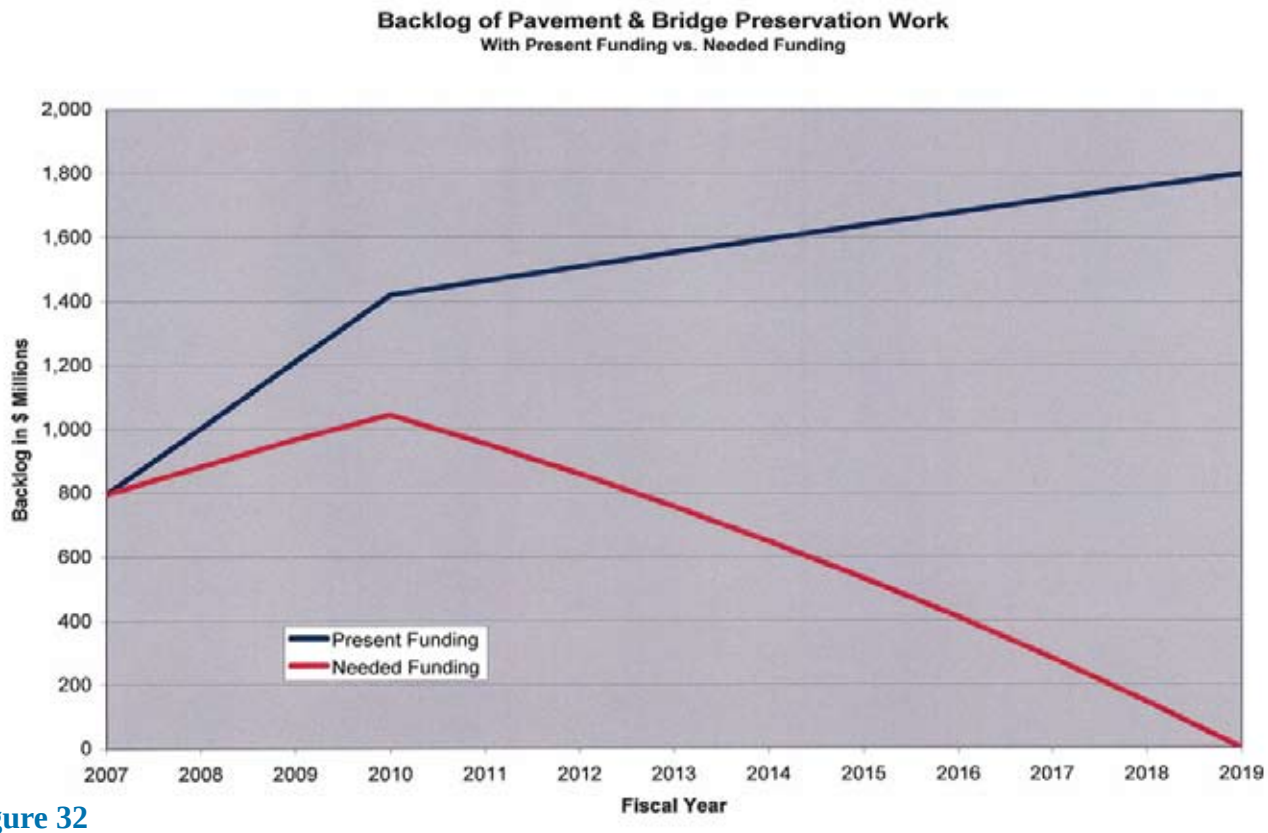


Figure 32

Combined Pavement & Bridge Backlog, Costs, and Funding
State-Maintained System - 2007
(in millions of dollars)

Present Funding

		Preservation Costs * (Normal Annual Deterioration Costs)			Pavement & Bridge Preservation Funds ** (Funds Planned for Preservation Work)			
Fiscal Year	**Backlog of Pavement & Bridge Work**	Pavement Total	Bridge Total	Pavement & Bridge Total	State	Federal		Total
2007	**795.3**	265.5	17.9	283.5	15.9	60.4		76.4
2008	**1002.4**	273.0	19.1	292.1	16.6	65.1		81.7
2009	**1212.8**	314.8	20.2	335.0	59.8	67.8		127.6
2010	**1420.3**	268.7	21.5	290.2	174.6	70.5		245.1
2011	**1465.4**	276.8	22.7	299.6	181.5	73.3		254.8
2012	**1510.1**	285.1	24.1	309.2	188.7	76.2		264.9
2013	**1554.4**	293.7	25.5	319.2	196.1	79.3		275.4
2014	**1598.2**	302.5	27.0	329.5	203.8	82.5		286.3
2015	**1641.5**	311.5	28.6	340.2	211.8	85.8		297.6
2016	**1684.1**	320.9	30.3	351.2	220.2	89.2		309.3
2017	**1725.9**	330.5	32.0	362.5	228.8	92.8		321.6
2018	**1766.9**	340.4	33.8	374.3	237.8	96.5		334.3
2019	**1806.9**							

Needed Funding

		Preservation Costs * (Normal Annual Deterioration Costs)			Pavement & Bridge Preservation Funds ** (Funds Planned for Preservation Work)			
Fiscal Year	**Backlog of Pavement & Bridge Work**	Pavement Total	Bridge Total	Pavement & Bridge Total	State	Federal	**Needed Additional Overlay, Reconstruct, and Bridge**	Total
2007	**795.3**	265.5	17.9	283.5	15.9	60.4	**120.3**	196.6
2008	**882.2**	273.0	19.1	292.1	16.6	65.1	**125.1**	206.8
2009	**967.5**	314.8	20.2	335.0	59.8	67.8	**130.1**	257.6
2010	**1044.9**	268.7	21.5	290.2	174.6	70.5	**135.3**	380.4
2011	**954.7**	276.8	22.7	299.6	181.5	73.3	**140.7**	395.5
2012	**858.8**	285.1	24.1	309.2	188.7	76.2	**146.3**	411.2
2013	**756.8**	293.7	25.5	319.2	196.1	79.3	**152.2**	427.5
2014	**648.5**	302.5	27.0	329.5	203.8	82.5	**158.2**	444.5
2015	**533.5**	311.5	28.6	340.2	211.8	85.8	**164.6**	462.1
2016	**411.5**	320.9	30.3	351.2	220.2	89.2	**171.2**	480.5
2017	**282.2**	330.5	32.0	362.5	228.8	92.8	**178.0**	499.6
2018	**145.1**	340.4	33.8	374.3	237.8	96.5	**185.1**	519.4
2019	**0.0**							

Table 13

* Inflation assumed at 3.00% per annum.
** Revenue growth rate assumed is 4.00% per annum.

Note: Backlog of pavement and bridge work is as of beginning of fiscal year; preservation costs are those incurred during the fiscal year; and preservation funds are those that are available during the fiscal year.