

# Sonoma County



## Board of Supervisors Ad-Hoc Committee on Roads

June 19, 2012

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## Executive Summary

Most people acknowledge that road networks are a vital centerpiece to a vibrant economy. Roads provide connectivity of countless origins and destinations. Whether traveling by bicycle, bus, or automobile, county residents depend on a functional local streets and roads system. With a significant number of County roads and bridges to maintain with limited and declining revenues to address the repairs, needed County road maintenance has been deferred for decades. As a result, significant County road degradation has occurred and the costs to repair are staggering. It is estimated that 53% of our roads need to be reconstructed with an estimated cost to repair of \$926 Million over the next 10 years. New strategies and new funding sources need to be explored in order to repair, protect and preserve our transportation infrastructure. A safe and reliable County road system, which is critical for the movement of goods and services, supports local job growth. Every dollar spent preserving our County road system is a dollar invested in our local economy.

On February 7, 2012 the Board of Supervisors formed an Ad-Hoc Committee and assigned Supervisor Shirlee Zane and Supervisor David Rabbitt to : (1) Find additional dollars to address deferred maintenance; (2) Look for long-term and short-term solutions; (3) Review the use of prioritization; and (4) Put more General Fund dollars into Sonoma County roads.

Throughout the state and the nation, road infrastructure has been deteriorating gradually over time with the true cost and economic impact realized only after significant road distress is observed. Road deterioration and poor pavement quality adds cost to residents and businesses in a number of ways including: damage to vehicles, poor motor vehicle fuel economy, accelerated vehicle depreciation and reduced property values.

The Ad-Hoc Committee recognizes that improving the condition of our road system will take a determined effort by all stakeholders. There are five undeniable realities guided the Committee's discussion: (A) Regardless of past history, the focus needs to be on finding solutions affecting the future of our County road system; (B) County, cities, community groups, businesses, and residential partnerships are critical; (C) There is no single funding solution for our County roads but rather an integration of several diverse funding mechanisms; (D) Successful road condition improvement outcomes will take 10 years or more to achieve; and (E) Funding is and will always be a limited resource for which community priorities compete.

The committee proposes the Board of Supervisors consider the following recommendations:

### **Short-Term; \$15.5 Million General Fund Contribution for County Roads in FY 12/13**

1. Reconfirm the county's commitment to provide at least \$5.3 Million in General Fund revenue for corrective road maintenance which provides needed safety activities on ALL road segments under the responsibility of the county.
2. Maintain the \$2.2 Million General Fund investment (Solid Waste Franchise Fees) to match federal/state funding sources to preserve pavement integrity on 197.2 miles of primary roads.
3. Support and lobby for legislation to protect and grow federal, state and regional resource allocation formulas that fund our road maintenance needs.
4. Establish an \$8 Million one-time General Fund allocation in FY 12/13 from the Tax Loss Reserve Fund (Teeter) to be designated for the implementation of a Road Improvement Plan.
  - (a) Designate \$6.5 Million to improve road segments supporting and/or enhancing economic growth within the county;
  - (b) Designate \$1.5 Million to establish a county and community partnership program where county funds can be leveraged to match private funds and develop community initiatives where residents may be provided resources to conduct their own maintenance.

### **Long – Term; New Funding Strategies for Addressing the needs of All County Roads**

1. Support placing a local funding measure on a future ballot for road maintenance.
2. Support either the extension of Measure M, the ¼ cent regional Transportation Sales Tax or an additional ¼ cent regional Transportation Sales Tax focused on local road maintenance.
3. Further review and potential implementation of Road Maintenance Districts.
4. Support a statewide transportation user fee.

The Ad-Hoc Committee wants to recognize and thank community groups [Save Our Sonoma Roads](#) and [Save Lichau Road](#) for their valuable input and creative thinking, as well as their leadership and commitment to address the importance of our local roads. In addition, the cooperation, research, and analysis support provided by Transportation & Public Works and County Administrator's staffs is appreciated.

# Introduction

The Sonoma County Board of Supervisors has a vision to create a beautiful, thriving and sustainable community for all County residents. Road Infrastructure is a key investment for our County’s future quality of life. The Board of Supervisors understands that the condition of our road infrastructure is declining, caused by many years of inadequate investment in maintenance and preservation.

To date, the Board’s efforts have been to focus the limited available resources for system preservation on a Primary Road Network. This Network is currently comprised of 197.2 miles of roads which are the most significant and highly traveled roads in the unincorporated County and serve as key connections between communities. Developing a plan for the remaining 1185.4 miles of county roads is our challenge.

The Board of Supervisors appointed an Ad Hoc Committee to develop and recommend a strategy for the full Board’s consideration which addresses the entire County road system. This Road Ad-Hoc Committee report was developed to assess the current county road system and to present recommendations for future improvements.

The first chapter of this report provides an overall description of the County road system and its’ funding history. The second chapter provides an assessment of the road system conditions and the relative costs to make system improvements. The Road Ad-Hoc Committee’s recommendations are presented in the third chapter and the fourth chapter consists of several appendices of supporting information.

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## Community Profile

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The County of Sonoma includes more than 1,575 square miles of land, much of which is hills and coastal mountains, with 76 miles of coastline. It is home to over 490,000 people, and about 338,000 of Sonoma County’s residents live in one of the nine incorporated cities and towns. Most of the land is in agricultural use or designated as open space and the County is one of the world’s premiere wine-growing regions. The County consistently ranks on the Forbes list of the best places to live and work.

In 2012, Sonoma County’s economy included 235,700 jobs, which produced a gross metropolitan product of about \$19.6 Billion. Major economic sectors include tourism (\$1.36 Billion), viticulture (\$430 Million), and other agriculture (\$160 Million). Each year, more than 7.7 Million tourists visit Sonoma County.

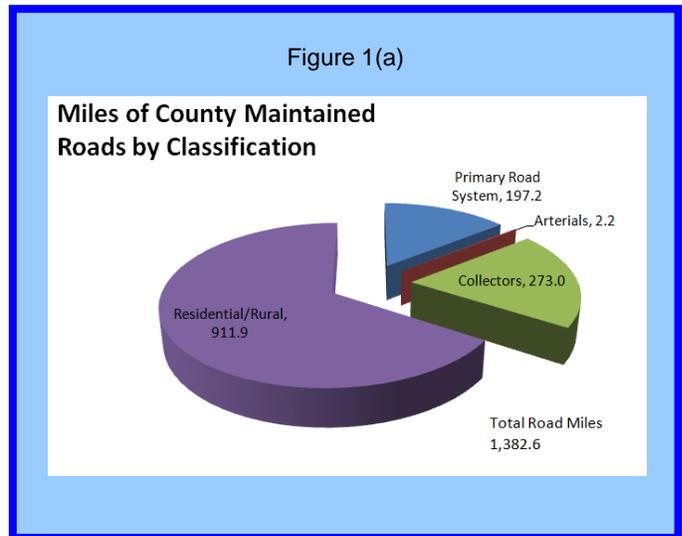
The vitality of Sonoma County’s economy and lifestyle depends on the transportation system that provides County residents and visitors access to all of the goods and services available in the County.



# 1. The Road System

## Road Responsibility

The County's 1382.6 miles of roads are classified by their use and the number of vehicle trips they carry. These include arterial roads, which are high volume and typically higher speed, and carry traffic between urban and suburban centers. Collector roadways, both high and low volume, move traffic between communities and from communities to arterial roads. Residential streets and rural roads are generally lower volume and lower speed, and carry traffic within communities. The County Board of Supervisors has identified a primary road network comprised of most of the arterials and some of the major collectors. Although the primary network was developed based upon funding priorities, the network represents those roads deemed most critical for circulation. Figure 1(a) illustrates the number of miles within each of the County-maintained road classifications.



One useful concept for understanding the magnitude of this asset is the estimated replacement cost of all of the County maintained roads in current construction dollars. The total replacement value of county maintained roads is approximately \$2.5 Billion. Table 1(a) shows the breakdown of replacement value by classification.

Classification	Replacement Value
Primary Road Network	\$ 1.25 Billion
Arterial	\$ 46.1 Million
Collector	\$ 812.3 Million
Residential/Rural	\$390.1 Million
<b>Total</b>	<b>\$ 2.5 Billion</b>

**Table 1(a)**  
**Replacement Value of County Roads**

The main roadway through Sonoma County, U.S. Highway 101, is part of an interconnected state highway system. The road was built and is maintained by the California Department of Transportation (Caltrans) in part with federal highway funds. Highway 101 through Santa Rosa is seeing its first major improvement in over 50 years of use, funded with local tax dollars.

The County also has other state highways, including Highways 1, 12, 37, 116, 121, and 128. These roads also were constructed and are maintained by Caltrans. Local streets and roads make up the majority of road miles in the County. As shown in Table 1(b), over half of the road miles in the geographic County were built and are maintained by the County of Sonoma.

The County has two to three times the number of miles to maintain than any of the other counties in the Bay Area. In addition to road miles, the county is responsible for critical roadway structures, which include over 330 bridges, as well as guardrails, retaining walls, cattle guards, and fish ladders. Of the Bay Area counties, Santa Clara has the next highest number of roads to maintain at 685 miles and the next highest number of bridges to maintain at 139.

Table 1(b): Roads Responsibilities		
Jurisdiction	Road Miles	% of Total
State	250	9%
County	1,383	51%
Cities	955	36%
Other	102	4%

## Funding Sources

On average, over the last nine fiscal years, the County has received from all roads funding sources a total of about \$36.2 Million per year. Revenues have been significantly higher in recent years, due primarily to increases in federal funds. Figure 1(b) shows a nine-year total revenue history. Note the appearance of Measure M funds in FY 05/06, and the sporadic nature of storm reimbursements.

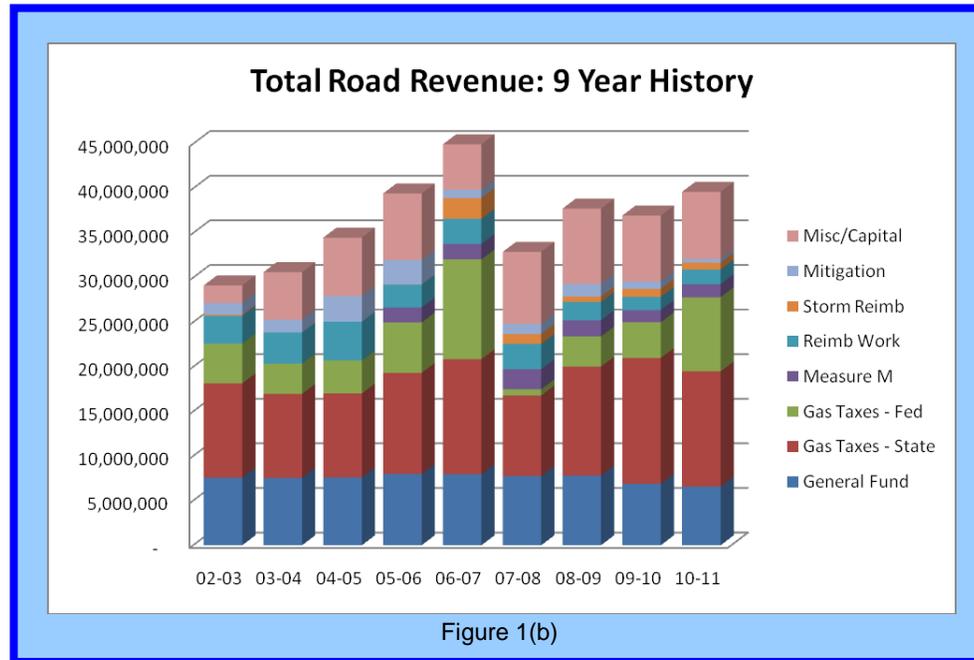


Figure 1(b)

Note the appearance of Measure M funds in FY 05/06, and the sporadic nature of storm reimbursements.

A large portion of the fiscal resources are for a prescribed use. The majority of funds are directed to new construction projects or to projects that extend the life of the road, in which the specific projects are identified in order to receive the funds. State gas taxes and general fund are the fully discretionary funds that may be used for corrective maintenance, which are the activities designed to keep the roads as safe as possible.

Other funds are for defined activities, such as reducing discharge into streams, augmenting fish passage structures, or installing ramps under the Americans with Disabilities Act. Often, administrative costs cannot be recovered, or can only partially be recovered.

Specifically Sonoma County Roads Division budget funding resources are:

### Federal

- Excise tax on gasoline is 18.4 cents per gallon of fuel sold, and the federal tax on diesel fuel is 24.4 cents per gallon of fuel sold. Because these taxes are on the unit of fuel, not on the cost of the transaction, the revenues rise only if more fuel is sold. Consequently, dramatic increase in fuel costs at the pump tend to reduce fuel purchases or shifting to alternative fuel vehicles (hybrid or electric), which ultimately lowers funding for the county. These revenues are deposited in the Highway Trust Fund and distributed to states for qualifying projects that meet categorical program definitions.
- Congress approves Surface Transportation bills which authorizes expenditures from the Highway Trust fund over a typical 6-year period of time. The last bill expired on September 30, 2009 and Congress has yet to enact a new authorization act. There have been many Continuing Resolutions which have extended funding through the end of this Federal Fiscal Year.
- The State assigns a significant portion of the funds to the Metropolitan Transportation Commission (MTC) and other regional planning agencies. The MTC develops and administers the funding programs which include the program that has historically funded our County's pavement preservation program, which are the preventive maintenance activities designed to extend road pavement life. This funding stream may be reduced by the new OneBayArea Grant Program proposal from MTC which attempts to integrate the region's federal transportation program with California's climate law (Senate Bill 375) and the Sustainable Communities Strategy.

**State**

- **Gas Tax** - The 18 cents per gallon excise tax is levied per gallon on the sale of gasoline and diesel fuel and not on the price of the fuel. Revenues are deposited within the Highway Users Tax Account (HUTA) with nearly two thirds (about 64%) distributed the State Highway Account. The balance is allocated for specific projects. Out of the HUTA account counties’ share consists of 3 cents of the excise tax and is allocated based on each county’s number of registered vehicles and their road mileage. Another 1 cent of the state fuel excise tax is shared between cities and counties, based on the number of registered vehicles and population.

In 2010, the State Legislature approved the “swapping” of 5% of the sales tax collected on fuels for Transportation purposes to an equivalent 17.7 cents per gallon additional gas tax increment. Although the paying customer does not see a difference, the effective excise tax on motor vehicles is now 35.7 cents per gallon.

The state gas tax allocation is biased toward Counties with large incorporated populations. The distribution of gas tax per maintained road-mile for all of the California Counties ranges from \$120,000/mile to a low of \$7,000/mile. Sonoma County receives less than \$20,000 per maintained road-mile. Given the significant reductions in state gas consumption as shown in Figure 1(c), serious concerns have been raised about gas tax sustainability.

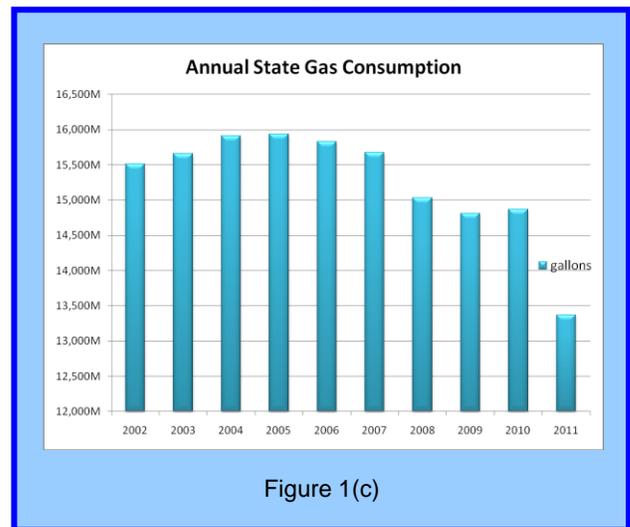


Figure 1(c)

- **Fees** - The State levies fees on trucks based on their weight. These fees are deposited into the State Highway Account and are used for projects on state highways and local streets and roads, and distributed with other funds from that account.
- **Bonds**- California voters approved Proposition 1B (Prop 1B), the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006. Prop 1B provides almost \$20 Billion for various transportation projects. This bond provides \$11.3 Billion for capital improvements to reduce congestion and increase capacity on state highways and local roads, for projects to rehabilitate state highways and local roads, and for certain grants for public transit projects<sup>[1]</sup>. Counties will receive \$1 Billion for local street and road projects, as will cities. Funds are appropriated by the Legislature through the budget process for state and local projects. Sonoma County was awarded \$16.7 Million between FY 08/09 and FY 09/10 for capital projects. The County does expect to receive about \$7 Million of Prop 1B funds for seismic retrofits over the next five years, which will be used as the local match for available federal bridge funds.

**Local funds**

Sonoma County roads benefit from a number of locally derived funds. These include funds from Measure M, mitigation fees for developments, developer donations, air quality grants, contributions from cities and agencies, and contributions from the County’s General Fund.

<sup>[1]</sup> Prop 1B also provides \$4 Billion for capital improvements to local transit and intercity rail projects; \$3.2 Billion to improve goods movement and mitigate the associated air quality impacts; and \$1.5 Billion for projects that improve security and disaster response capability on public transit systems, and at ports, harbors, and at ferry terminals, and that improve safety at rail crossings, and seismically retrofit bridges, ramps, and overpasses.

- Measure M- These funds were approved by Sonoma County voters in 2004 to pay for a specified list of projects. The funds derive from a ¼-cent local sales tax, with the majority to be used as matching funds for specified capital projects. Approximately 20% of Measure M funds are used for local street rehabilitation. On average, the County has received about \$1.7 Million in Local Street Rehabilitation funds in each of the six fiscal years since the measure was passed. The revenues shown in Figure 1(c) appear lower because the figure shows a nine year average (from FY 02/03 – FY 10/11) and no Measure M funds were received in the first three of those nine years.
- Mitigation Fees- These funds are assessed on a mitigation area for projects to reduce congestion in that area. The funds are limited to the percentage of traffic impact coming from the mitigation area through the project site, and are generally used to provide a match for funds from other sources. Over the last nine years, the County, on average, has received about \$1.5 Million a year in mitigation fees.
- Donations and Reimbursements- The majority of these funds are received from county special districts/agencies (such as Community Development Commission) for project costs. Additionally, similar to mitigation fees, developer donations for capital improvements are collected to alleviate the traffic impacts of a specific development. They are paid by the project developer, and are generally used to provide a match for funds from other sources. On average, over the last nine years, the County has received about \$1.9 Million annually in donations and reimbursements (shown as part of "Reimbursed Work" in Figure 2(c)).
- Reimbursable Work- When the County's Department of Transportation and Public Works performs road related work for Non-Enterprise Funded County departments (such as General Services), those departments reimburse the Department for the work done. In addition, other Divisions within the Department (such as Sonoma County Transit) reimburse for staff time paid on road related work. On average, over the last nine years, the County has received about \$2.7 Million a year in reimbursement for work done for County and Department projects. Total reimbursed work, as shown in Figure 1(c), and has averaged about \$4.6 Million a year.
- Air Quality Grants- These funds are awarded by the local air quality agency for projects that reduce or mitigate air quality impacts from vehicle use. They are generally used as a match for specific elements within an overall project that is primarily funded through other sources. The funds are highly variable and are reflected in the "miscellaneous" category in Figure 1(c).
- Contributions from Cities & Agencies- These funds are contributed by other jurisdictions for specific projects of mutual interest, and are generally used as a match for funds from other sources. Like air quality grants, these funds are highly variable and are reflected in the "miscellaneous" category in Figure 1(c).
- Contributions from the County General Fund- Prior to FY 09/10, the County of Sonoma contributed \$7.8 Million per year to the Roads Division, most of which was identified for maintenance activities. By FY 10/11 the contribution had been reduced to \$6.7 Million and in FY 11/12 it was further reduced to \$5.3 Million. The Board of Supervisors approved to provide an additional \$2.2 Million annually from the General Fund for Roads beginning in FY 12/13 for a total contribution of \$6.5 Million annually.

### **Property Taxes**

There is a common misconception that property taxes support local infrastructure. In fact as shown on Figure 1(d), of the property tax revenues (\$655 Million) collected for FY 11/12 distribution, 48% or \$313.7 Million is directed to schools (K-12 and community colleges) and only 29% or \$190.9 Million of property tax revenues can be used by the County General Fund. Currently, property taxes comprise over 75% of the General Fund revenue. The \$5.3 Million in County general fund contributions to roads in FY 11/12 is significant and important but nevertheless represents a small percentage of the general fund revenue (2.3%). The property tax component which contributes to roads is even smaller. For every property tax dollar paid in Sonoma County only about 1.5 cents goes to support County roads. The annual general fund contributions have historically been used to fund the Corrective Maintenance Program.

## Expenditures

Road maintenance is a top priority of the Department of Transportation and Public Works; sometimes however, other activities receive substantial financial support because the resources are to be used for specific purposes. The art of financing road work is to identify the resources that can be used for high priority, core activities, and maximize their effectiveness.

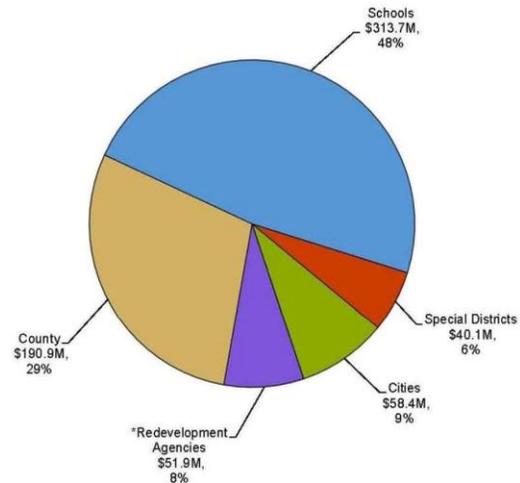
On average, over the past nine fiscal years, \$35.2 Million has been spent annually within the road budget. The differences between average annual revenues and average annual expenditures are due to fund balances retained for capital projects and other road needs that span multiple fiscal years. The use of the funds for activities related to maintaining the County's roads have been, on average about \$19 Million dollars, or about 53% of the road fund expenditures. Capital expenses are those spent on engineering design and construction of new road projects. General expenses include other operational activities, such as operation of a lab, maintenance of lighting districts and cable systems, and information technology.

Road maintenance expense has increased within the last six fiscal years, as shown in Figure 1(e). This increase was due to federal funding available for surface treatments and overlays. In several of these years (FY 05/06, FY 06/07, and FY 10/11), the total expenditures for road maintenance was over \$22 Million. Expenditures in FY 05/06 and FY 06/07 also included storm response from the storms that occurred at the end of 2005 and into early 2006.

Figure 1(d)

### WHERE DOES YOUR PROPERTY TAX DOLLAR GO?

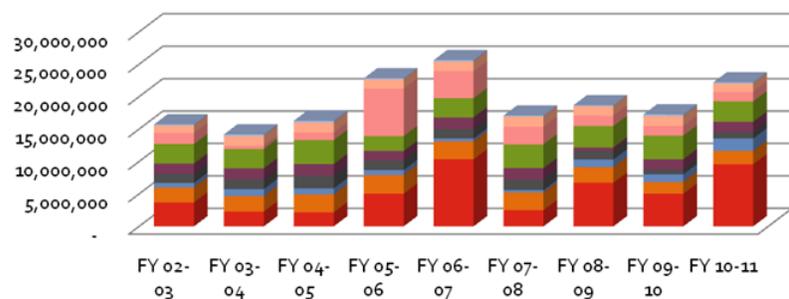
Distribution of the 2011-12 Property Tax Dollar  
Total Prop 13 Tax Levy: \$655.0 Million



\*Pursuant to California Law, redevelopment agencies are established for the purpose of eliminating blight that hinders private development and growth within a community.

Figure 1(e)

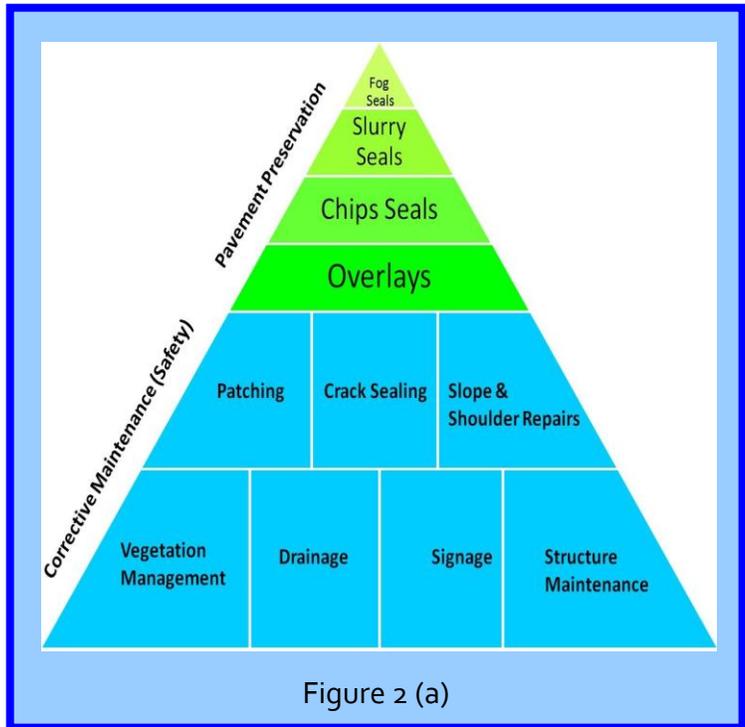
### Road Maintenance Costs: 9 Year Expenditure History



- Pvmnt Preserv. & Improve.
- Structure Maint. & Repair
- Traffic Control & Safety Inspection
- Storm Response
- Other
- Roadway Maintenance
- Drainage System Maint.
- Vegetation Management
- NPDES Implementation

## 2. What Has Happened to Our Road System?

Broadly speaking, there are two categories of pavement maintenance activities: preventive or pavement preservation and corrective or road safety maintenance. Pavement preservation Maintenance (PM) activities are required to extend the life of the pavement surface by averting damage compromising the road’s functionality. It is analogous to brushing, flossing, and getting your teeth cleaned regularly to prevent tooth decay. Unfortunately, as with regular visits to the dentist, it is tempting to delay **prevention** when budgets are tight. However, by the time the road shows obvious signs of damage the repairs are more expensive. Once the road is degraded it relies on limited resources to complete **corrective** maintenance activities just to keep the road safe. Corrective maintenance (CM) includes treatments that repair acute symptomatic damages and as has a negligible effect on the extension of pavement life. Details of all road maintenance activities are described in Appendix A.



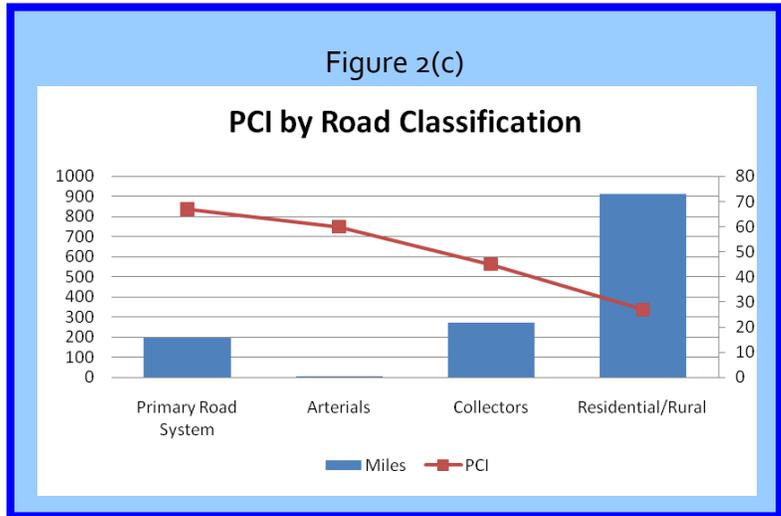
Keeping our transportation system safe continues to be one of the County’s highest priorities. Therefore, the most important road maintenance element is the CM Program by which all the activities shown in the blue shaded area of Figure 2(a) are conducted to keep the 1382.6 miles of roads safe as possible. It has been acknowledged that there has not been enough money annually allocated for the pavement preservation program for decades and as a result 53% of the roads need reconstruction. A goal of the County is to effectively utilize available financial resources to protect the public’s road infrastructure assets. With limited funding, the County adopted a Primary Road Network in October 2010 to preserve the most critical segments of a 1382.6 mile maintained road system. Additional road segments have been added since as supplemental funds were identified. Today, there are 197.2 miles designated as part of the Primary Road Network.

### Pavement Condition Index (PCI)

The PCI is a numerical rating system that uses a hundred-point scale, where 100 is the highest possible score. Ranges within the scale as shown on Figure 2(b) correspond to pavement conditions from “Excellent” down to “Failed” condition and are characterized by a defined set of criteria. The PCI is calculated from the observed pavement distress conditions. The inventory of County roads is maintained in a pavement management software system provided by the Metropolitan Transportation Commission (MTC) called [Streetsaver](#). The system uses computer algorithms. See standard degradation curve in Appendix B.

Figure 2(b)		
90 - 100	Excellent	PREVENTION
80 - 89	Very Good	
70 - 79	Good	
60 - 69	Fair	REHABILITATION
50 - 59	At Risk	RECONSTRUCTION
25 - 49	Poor	

County road segments are inspected every two to three years for visual signs of distress. In 2002, the average PCI rating for roads in Sonoma County's unincorporated areas was 50, which was considered an "At Risk" road quality but by 2006 the average PCI rating had dropped to 43 - "Poor" road quality. Since 2006, thanks to renewed maintenance planning efforts, increase pavement inspection data points, and infusion of American Recovery & Reinvestment Act funding the average PCI has increased slightly and maintained at an average PCI rating of 45 "At Risk" the last three years.



It is also useful to consider roads by type (or classification) when evaluating their condition. Figure 2(c) shows the PCI rating of County roads broken down into categories by road classification. The height of the columns indicates the number of lane miles in that category, and the line shows the average PCI rating for that category. As a classification, the Primary Road Network has the highest average PCI rating of 67 (Fair) with the remaining Arterial roads having a PCI of 60 (Fair), the remaining collector roads with a PCI of 45 (Poor) and the residential/rural roads with a PCI of 27 (Poor).

An overview of lifecycle projections for each of road type is included as Appendix C. And, a list of California cities and counties PCI can be referenced in Appendix 3.

### Road Condition and Improvement Cost Matrix

The matrix shown in Figure 2(c) represents a system assessment of our county roads. The top chart shows the number of

Figure 2(c)  
**Road Network Matrix**

	Excellent PCI 90-100	Very Good PCI 80-89	Good PCI 70-79	Fair PCI 60-69	At Risk PCI 50-59	Poor PCI 25-49	Failed PCI 0-24	Total
Primary Road Network	63.38	25.17	26.80	33.70	24.16	24.03	-	197.24
Arterials	-	0.42	-	0.59	-	1.20	-	2.21
Collectors	9.27	13.56	35.77	38.40	64.83	90.70	18.69	271.20
Residential/Rural	16.44	24.13	57.15	96.89	101.21	381.60	234.55	911.97
	89.09	63.28	119.72	169.57	190.19	497.53	253.23	1382.62

	Excellent PCI 90-100	Very Good PCI 80-89	Good PCI 70-79	Fair PCI 60-69	At Risk PCI 50-59	Poor PCI 25-49	Failed PCI 0-24	Total
Primary Road Network	\$ -	\$ 282,316	\$ 813,956	\$ 2,262,580	\$ 1,819,395	\$ 1,607,464	\$ 6,534	\$ 6,792,245
Arterials	\$ -	\$ 33,248	\$ -	\$ 5,096	\$ -	\$ 121,021	\$ -	\$ 159,365
Collectors	\$ 227,571	\$ 451,782	\$ 1,544,586	\$ 2,631,304	\$ 5,308,429	\$ 13,560,961	\$ 2,484,882	\$ 26,209,515
Residential/Rural	\$ -	\$ -	\$ 2,027,065	\$ 5,082,723	\$ 8,483,099	\$ 48,513,051	\$ 27,930,815	\$ 92,036,753
	\$ 227,571	\$ 485,030	\$ 3,571,651	\$ 7,719,123	\$ 13,791,528	\$ 62,195,033	\$ 30,415,697	\$ 118,405,633

road miles by classification (Primary Road Network, Arterials, Collectors and Residential/Rural) and PCI range. The bottom chart shows the corresponding annual costs for each classification of road miles to obtain and maintain an average PCI target of 68 (Fair) within 10 years. These costs are derived from unconstrained financial modeling that optimizes the investments over the 10 year-period considering construction inflation but which assumes that the investment capital is readily available. Therefore, in this financial scenario it would be more cost-effective to reconstruct the "Poor" and "Failed" roads quickly and once in good condition, maintain with lower-cost treatments long-term. However, given the reality of funding limitations, investments have been focused on the Primary Road Network and keeping the good roads good to avoid costly reconstruction.

The Primary Road Network is currently comprised of 197.2 miles of roads and the annualized cost for keeping these roads at a PCI of 68 is estimated to be \$6.8 Million which equates to an average of \$34,000/mile. These roads already have an identified funding source.

Outside the current Primary Road Network there are 2.2 miles of Arterial Roads that which require an additional \$159,000 at an average of \$72,000/mile annually; 271.2 miles of Collector Roads in need of an additional \$26.2 Million at an average of \$97,000/mile or nearly three times that of the current Primary Roads; and 912.0 miles of Residential and Rural Roads with a \$92 Million annual need at an average of over \$100,000/mile.

Another way to compare the matrix data is based on existing PCI range. Excluding the Primary Road Network, there are 156.7 miles of Arterial, Collector and Residential/Rural roads in "Good" to "Excellent" condition, which need an additional \$4.3 Million at an average of \$27,300/mile. The "Fair" and "At Risk" condition roads are comprised mainly of the Collector and Residential/Rural roads and require more extensive treatments. These 301.9 miles of roads would cost an additional \$21.5 Million annually at an average of \$71,300/mile. The "Poor" and "Failed" condition roads require reconstruction and as such are the most expensive to repair. There are 726.7 miles or 53% of the County Road System that fall within these conditions. The annualized cost to maintain these roads is \$92.6 Million and at an average of \$127,000/mile

## 3. Funding of Opportunities

On October 25, 2011 the Board reviewed the following Cost Cutting and Revenue Enhancing options to expand and/or enhance the current level of road pavement preservation investment:

### **Cost Cutting**

- a) Remove 105 miles of low volume roads with alternate access; Savings \$850K/Yr

The Streets and Highway Code allows jurisdictions to terminate road maintenance based upon traffic requirements and available revenues. Staff identified approximately 105 miles of low volume (<400 vehicles/day) road segments in which residents had an identified secondary access. The historical costs associated with the corrective maintenance of these roads were calculated by the Department to be \$881K annually.

- b) Abandonment of 109 miles of "Dead End" roads; Savings \$200K/Yr -\$795K/Yr

There are approximately 109 miles of "dead end" road segments the county. Maintenance of these road segments benefit only the few residents that live on the adjacent parcels. The historical costs associated with the corrective maintenance of these roads were calculated by the Department to be \$795K annually. The procedure for abandoning county interest in these road segments could be a long and detailed process involving planning commission procedures as well as a prescriptive public hearing process that considers past, current and future use of the road segments. The Department estimates that approximately 30 miles of these roads may currently have willing residents and as such would be easier to implement. Abandoning 30 miles of roads would provide an estimated savings of \$200K/Yr.

- c) Eliminate Vegetation Management Services; Savings \$2.5M/Yr

As part of the corrective maintenance program, each year the Department removes brush and trees within the rights-of-way that obstruct roadside drainage ditches, visually impairs traffic signage or encroaches within the travel ways. The lands on which the rights-of way are maintained for public use are by and large owned by private parties. Shifting the responsibility of vegetation management to the property owners could save the Department significant cost. Such a program would have costs associated with noticing and enforcement, with the net overall savings estimated to be \$2.5M annually. Although cities have enacted similar ordinances for residence responsibilities for vegetation management as well as sidewalk repairs, staff is not aware of any other Counties in California that have enacted such ordinances.

### **Revenue Enhancing**

- a) Allocate Available Fund Balance from the General Fund Tax Loss Reserve Fund (AKA Teeter) - \$8 Million (estimated balance as of fiscal year end 11-12) for Road priorities.

These funds are generated when payments are made to reimburse the County for forwarding full tax revenues each year to schools, cities, special districts, and other taxing agencies on delinquent properties. State law requires the County to retain penalty and interest monies from these delinquent collections equal to at least 1% of the tax levy in order to protect for uncollectible delinquencies. Since adoption of the enabling legislation in the 1993 the County has very conservatively budgeted an annual amount of revenue from this source to offset program costs and allowed the remainder to accumulate in the Tax Loss Reserve above the 1% tax levy requirement. In 2008, the Board recognized the increase of activity in this fund and directed that staff develop a policy for its potential use. The subsequent policy increased the set aside to 2% of the tax levy for additional protection against failure to collect against delinquent properties and authorized increased reliance on on-going annual funds (\$6.8 Million) to cover the costs of the property tax system. Accumulated funds in the past have been used as part of the financing for Board priorities such as the Community Youth Partnership and to assist with one-time property tax system related purchases. Delinquency rates have leveled off and begun to

decline so annual income levels will reduce over the next few years. The anticipated fund balance at the end of FY 11-12 including all estimated revenues and uses is \$22.9 Million. Subtracting a 2% of the levy set aside leaves the Board with \$8 Million available in this fund. Current Board adopted policy with respect to these funds reads: "The Tax Loss Reserve Fund (TLRF) shall maintain as a restricted reserve an amount equal to 2% of the levy. The County Administrator in conjunction with the Auditor-Controller-Treasurer-Tax Collector may recommend the use of funds in excess of the established reserve to the Board of Supervisors for the purpose of balancing the budget."

b) Transient Occupancy Tax (TOT) Increase; Additional Revenue -\$2.5 Million/Yr.

The TOT (Hotel, Motel, Campground or Bed Tax) is authorized under State Revenue and Taxation Code Section 7280, as an additional source of non-property tax revenue to local government. This tax is levied in Sonoma County at a rate of 9% for accommodations at lodging and camping facilities in the unincorporated areas of the County. The County's TOT is a general tax and as such the use of the funds is discretionary, in that the Board of Supervisors may direct use of these funds for any legitimate county expense. Other jurisdictions such as Napa County, City of Healdsburg and the City of Rohnert Park have established a TOT of 12%. Each percentage increase in County TOT would raise about \$800K annually. A three percent increase would raise about \$2.4 Million annually. If the increased TOT revenues were to be specifically dedicated to roads, then the increment would be considered a special tax requiring a 2/3 voter approval.

c) Local Sales Tax Increase; Additional Revenue - \$3.5 Million/Yr

Sales taxes are imposed on the retail sale or the use of tangible personal property in this state. The State maximum allowable combined local sales tax imposed in a County can be no greater than 2%. The current combined sales tax rate in Sonoma County is 1.25% which allows for an additional 0.75% increase within the County which includes each of the jurisdictions therein. As with many of the other tax options, a sales tax for general government services would require a 50% voter-approval, whereas a tax specifically for road maintenance would require a 2/3 voter-approval. A Sales Tax increase of 0.25% would generate \$17 total revenue annually countywide to be split amongst all jurisdictions. It is estimated that the County could potentially receive up to \$3.5 Million per year.

d) Extension of SCTA's Measure M; Additional Revenue - \$600 Thousand/Yr

The voters in Sonoma County approved the Measure M local transportation sales tax of ¼ cent in November 2004. The sales tax was to be used for regional transportation projects, local transportation projects and local streets and roads maintenance over a 20 year period. The County received \$1.5 Million in FY10/11 for local road maintenance. Extending the ¼ cent sales tax an additional 20 years would provide an estimated \$600 Thousand annually that could be used for pavement preservation activities. This option would require action by SCTA and cooperation from the cities.

e) Utility Users Tax (UUT); Additional Revenue - \$ 3.4 Million/yr

A UUT is a tax that can be levied on gas, electric, telephone, water and cable TV. The UUT can be in the form of a General Tax, requiring a 50% voter-approval or a specific tax dedicating the funds specifically to roads which requires 2/3 voter –approval. A UUT has been enacted in many cities throughout California but has only been enacted within three counties – Alameda, Los Angeles and Sacramento. Assuming a 6.5% UUT, (this percentage is based upon the amount used by other government entities in the Bay Area) the annual revenue raised would be \$3.4 Million annually.

f) CSA Zones of Benefit; Additional Revenue - \$ Unknown

CSA 41 encompasses the entire unincorporated County. Road maintenance is an identified allowable service within the service area. Benefit zones may need to be developed within the CSA 41 boundaries for purposes of taxation or assessment rates. A special tax could be levied for road maintenance purposes which would require 2/3 voter approval within a benefit zone. Another CSA option could be to levy assessments on real property within the benefit zone based upon the special benefit each parcel would receive from the road maintenance services financed. Proposition 218 requires specific procedures which affect special assessments including a majority protest procedure for voting that requires more cast property ballots in favor than in protest.

Furthermore, the proposition requires that the ballots be weighted in proportion to the property assessments. As this option covers a specific geographic area, it would probably need to identify funds to be used for all roads within the area, or a subset of all roads which may exclude the Priority Road Network roads which a region wide benefits.

g) State Gas Tax Increase; Additional Revenue - \$ Unknown

The Metropolitan Transportation Commission has the authority to place a regional gas tax measure on the ballot in the nine Bay Area counties. The Commission has authorized polling to gauge voter support in each of the Counties for such a gas tax on the November 2012 ballot. The gas tax measure would require a 2/3 voter-approval. Preliminarily, the revenue would be used to rehabilitate streets and roads, stabilize or boost funding for transit agencies, and fund new projects or programs.

h) Special Road Maintenance District; Additional Revenue - \$ Unknown

The California Streets and Highways Code Section 1550 et seq. allows Counties to form special road maintenance districts in unincorporated areas of a county wholly outside of incorporated cities and levy special taxes for road and highway purposes when, in the opinion of the Board of Supervisors, additional road funds are necessary to properly maintain highways and roads in specific unincorporated areas of the county. This option requires formation of special districts and a 2/3 vote of qualified voters to establish a special tax. The advantage of Special Maintenance Districts, as compared to special assessment districts or CSA Zones of Benefits, is that no finding of special benefit is needed to levy a special tax in a Special Road Maintenance District. The funds raised from such a special tax may be used for broad purposes (road and highway purposes arguably includes purchase, constructions, expansion, improvement, maintenance, or rehabilitation), and, subject to the standard 2/3 voter-approval requirement, the special tax can be levied in an amount necessary to cover annual maintenance costs. However, this option does not permit bonding, thereby limiting revenue to that received in a given fiscal year. Additionally, it would be necessary to create multiple districts, and the revenue raised by any approved special tax could only be used within the district where the tax is levied

i) Remove 105 miles of low volume roads with alternate access; Savings \$850K/Yr

The Streets and Highway Code allows jurisdictions to terminate road maintenance based upon traffic requirements and available revenues. Staff identified approximately 105 miles of low volume (<400 vehicles/day) road segments in which residents had an identified secondary access. The historical costs associated with the corrective maintenance of these roads were calculated by the Department to be \$881K annually.

Due to the importance of road safety, the Board chose not to reduce corrective action activity on any of the roads under the county's responsibility or to transfer vegetation removal responsibilities to adjacent property owners. Yet, the Board provided staff direction to remove isolated sections of roads which serve as long driveways providing that the adjacent property owners desire their road to be vacated by the County.

Lastly, in terms of revenue enhancements, the Board agreed to supplement revenues annually with \$2.2 Million collected from Solid Waste Franchise Fees beginning in FY 12/13. The supplemental funding along with the state/federal excise gas sales tax of \$4.5 Million fund the annual pavement preservation need for the current 197.2 miles identified in the Primary Road Network.

## 4. Road Map to Continuous Improvement

Maintaining ALL of the county’s roads meeting basic safety requirements is the county’s primary responsibility, and the Road division budget through Board past and recent decisions has maintained crucial funding to address road safety for all miles within the system.

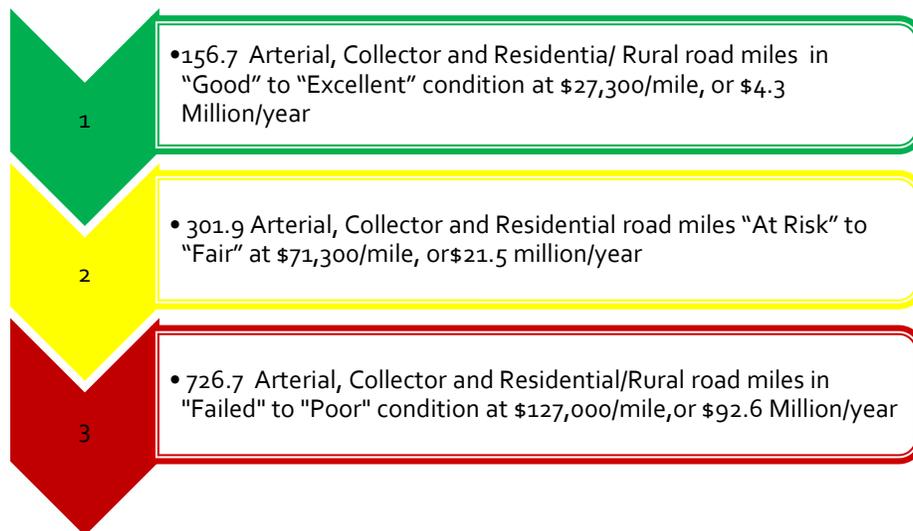
In addition, the Road Ad-Hoc Committee (Committee) is grateful the Board of Supervisors has identified funds to preserve 197.2 miles of critical roads which comprise the Primary Road Network. These roads have high volume traffic and provide important connectivity for our cities and county residents have already been included in the County’s **Pavement Preservation** efforts.

Unfortunately according to 2010 California Statewide Local Street and Roads Needs Assessment Report “every dollar of maintenance [prevention/rehabilitation/reconstruction] deferred today will cost \$1.53 in 2010. [Assuming] labor and constructions cost do not increase.”

This chapter presents the Road Ad-Hoc Committee’s recommendations to preserve and improve our residents’ \$2.5 Billion road infrastructure investment.

### Hierarchy of Cost-Effectiveness

Excluding the Primary Road Network, the following hierarchy of cost-effectiveness is submitted for reference:



The intent of the hierarchy is to illustrate comparable costs on a general basis. Adding 100 miles of roads “Good” to “Excellent” would cost approximately \$2.7 Million annually whereas adding 100 miles of roads that are “Failed” to “Poor” would cost \$12.7 Million annually. It should be recognized that these costs are of a general nature and in actuality the pavement preservation costs will be unique for each road segment.

### Recommendations

On October 26, 2011, the Board considered a variety of options to supplement the County’s Pavement Preservation Program. The options included savings from possible reductions in safety activities related to roadside vegetation removal, deletion of road segments from the maintained system and revenue enhancements.

Due to the importance of road safety, the Board has chosen not to reduce this activity budget or to transfer vegetation removal responsibilities to adjacent property owners. The Board was willing to remove isolated sections of roads which serve as long driveways providing that the adjacent property owners desire their road to be vacated by the County. In terms of revenue enhancements, the Board agreed to supplement revenues annually with \$2.2 Million collected from Solid Waste Franchise Fees beginning in FY 12/13. This supplemental funding has been incorporated as part of the current 197.2 Primary Road Network funding described above.

Other funding opportunities exist which provide more immediate short-term benefit and other options are more geared for the long-term due to the length of time to implement. The Roads Ad-Hoc Committee has reviewed these funding opportunities and makes the following recommendations:

### Short-Term

1. Reconfirm the county's commitment to provide at least \$5.3 Million in General Fund revenue for corrective road maintenance which provides needed safety activities on ALL road segments under the responsibility of the county.
2. Maintain the \$2.2 Million General Fund investment (Solid Waste Franchise Fees) to match federal/state funding sources to preserve pavement integrity on 197.2 miles of primary roads.
3. Support and lobby for legislation to protect and grow federal, state and regional resource allocation formulas that fund our road maintenance needs.

(a) Designate one-time funds of \$6.5 Million from County General Fund Tax Loss Reserve Fund (Teeter) in FY 12/13 to fund repairs to roads that support or enhance the county's economy. As discussed within the introduction of this report, tourism and agriculture continue to be the major drivers of our economy. The map and table included as Appendix 4 identifies roads that serve many of our Tourist destinations and Agricultural areas. Although most of the identified roads (76.3 miles) have already been funded as part of the Primary Road Network; there are 43 miles of identified roads that are maintained for safety without sufficient funds to extend pavement life. The \$6.5 Million one-time reserve allocation would be used for rehabilitating 7.6 additional miles of roads which include: Adobe Canyon Road, Cannon Lane, West Dry Creek Road and Westshore Road. The rehabilitation efforts would improve these road segments to a "very good" to "excellent" pavement condition. Costs for sustaining this high quality condition would be provided from future long-term revenue options. The remaining 35.4 miles of Tourist destination and Agricultural area roads would also be funded upon implementation of a future long-term option.

b) Designate one-time funds of \$1.5 Million from the General Fund Teeter reserve to establish a county and community partnership program, and Direct Transportation & Public Works, County Counsel and Human Resources Risk Management to create a program, whereby citizen groups could participate in the cost of improving their roads. This participation could be in the form of funding or volunteer work efforts. The advantages of this county-community program would be to provide opportunities for citizens to get their roads improved, as currently with limited funding, there is no economic incentive for such investment

### Long-Term

1. Support placing a local funding measure on a future ballot for road maintenance. This could include but not be limited to options such as an increase in the Transient Occupancy Tax (TOT) or an increase in Sales Tax. A TOT increase in the unincorporated area of up to 3% would yield up to \$2.4 Million/year. A sales tax increase of ¼ cent within unincorporated areas could generate up to \$3 Million/year.
2. Support either the extension of Measure M, the ¼ cent regional Transportation Sales Tax or an additional ¼ cent regional Transportation Sales Tax. With most of our regional projects completed on the state highway system, an

extension of the sales tax could be focused on the road maintenance needs of local governments. The county's estimated apportionment would be less than \$1 Million annually for County Road maintenance. An additional ¼ cent Transportation Sales Tax focused on local road maintenance could provide \$5.5 to \$8 Million annually, depending on term and formula splits, for County road maintenance.

3. Further review and potential implementation of Road Maintenance Districts. There are three basic statutory mechanisms for forming a Road Maintenance District as follows:
  - a) Mello-Roos District; (Gov. Code 53311 et seq.) This option includes "maintenance of streets and roads" as one of the allowable and authorized purposes. It is probably the most broadly used mechanism, and the statutes authorize issuance of bonds. The special tax and the bonds both require 2/3 voter approval. There are notice and meeting requirements as well as recordation requirements if a district is established. Mello-Roos Districts have the advantage of being a well-established financing mechanism and have been used to fund projects throughout California.
  - b) Permanent Road Division; (Streets & Highways section 1160 et seq.) Similar to Mello-Roos Districts, this option requires a resolution of intention, published notice, a public hearing, a protest procedure, and then if not a majority protest, district and special tax can be established by 2/3 voter approval. There is a bonding mechanism in the statutes which also requires 2/3 voter approval.
  - c) Special Road Maintenance District; (Streets & Highways section 1550 et seq.) This option appears to be simplest to establish but still requires an order of hearing, and a public hearing with a majority protest procedure. A Special tax can be established with 2/3 voter approval. The disadvantage of this option is that there is no statutory mechanism that allows for bonding.
4. Support a statewide transportation system user fee. The revenue mechanism is being developed by Transportation California, a non-partisan, non-profit coalition representing a broad spectrum of business, labor, and planning agencies and supported by CSAC. Such a fee would be based upon 1% of the motor vehicle value and would be collected similarly to that of motor vehicle registrations. This fee will require a Constitutional Amendment and as such approval by the voters. The estimated revenue would be approximately \$3 Billion annually, equivalent to a 17 cent to 18 cent gas tax increase and would provide the County with an estimated \$4.5 Million more in additional road maintenance funds.

In addition, the California State Association of Counties (CSAC) Housing, Land Use & Transportation Policy Committee is supporting not only the aforementioned statewide transportation system user fee but also a statewide gas tax increase and/or indexing as well as a resumption of a statewide sales tax on gasoline if such legislative opportunities are created.

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## Conclusion

A road system should be in good physical condition and provide a high degree of connectivity and efficiency. The physical nature of a roadway constantly changes and as a result requires constant maintenance to protect the public's investment.

The road system in Sonoma County is two to three times the size of the other nine Bay Area Counties, but with a relatively small population and fewer registered vehicles, our County receives significantly less in formula allocations on a per mile basis.

Safety continues to be our foremost transportation priority. All 1382.6 miles of County roads are maintained to make them as safe as possible. Given the limited funding for extending the pavement life of our County roads, the Board has focused funding on a Primary Road Network of the most critical road segments to protect and preserve. By developing supplemental revenue sources such as a Solid Waste Franchise Fee allocations and using one-time County General Fund reserves will jump-start the Pavement Preservation Program in FY 12/13. Future local, regional and state revenue options

provide opportunities for greater expansion of the Primary Road Network, however none of these long-term options presented in this report will by themselves fund all the remaining road needs.

# 5. Appendix

## A - Pavement Maintenance and Preservation

### **Preventive Maintenance: Pavement Preservation**

Good preventive maintenance prolongs the life of the road, as well as lowering the cost of maintaining it. This proactive approach is called “pavement preservation”. The Federal Highway Administration defines “pavement preservation” as “a program employing a network level, long-term strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life.”<sup>1</sup> It involves careful planning and deployment of resources to make sure that the right technique is used on the right road at the right time. By applying lower cost and less disruptive techniques before significant damage occurs, pavement preservation maximizes limited resources. Perhaps more importantly, from the perspective of the motoring public, the ride quality remains at a high level and the intrusion of roadwork is minimal.

There is a defined window of opportunity for using pavement preservation techniques. Pavement preservation is most effective on roads that have not sustained damage to the road base – that is, roads in “Good” condition or better. The pavement preservation program therefore depends on complete and reliable information about the condition of the roads such as the Streetsaver®, a pavement management program used by the County. It also depends on a plan that includes an established PCI threshold for implementing preventive maintenance activities. Figure 4(b) shows how a pavement preservation program implements preventive measures to maintain the condition of the pavement in “Good” condition or better and in doing so extends the life of the pavement.

### **Pavement Preservation Techniques**

Pavement preservation is not a single action or technique. As a program, it relies on a menu of specialized techniques in response to the type of degradation observed in the pavement. Different types of degradation need different treatment techniques. Table 4(a) identifies different kinds of damage, the cause of the damage, and the appropriate pavement preservation technique(s) to respond to that damage<sup>2</sup>. A brief explanation follows describing key techniques used in Sonoma County. These techniques include various surface treatments, which tend to less costly, as well as full rehabilitation of the pavement.

Damage	Cause	Treatment
Cracks	Environment	Sealing/Filling
Oxidation	Environment	Slurry/Fog Seals
Rutting	Traffic	Milling/Microsurfacing
Ravelling	Surface Water flow	Sealing & Drainage Upgrade

#### Surface Treatments:

Surface treatments are techniques used to restore the aging pavement surface. They include various types of surface sealing (chip, fog, rejuvenating, and slurry), roadway leveling, and nonstructural overlays. Sealing is generally the least costly pavement preservation technique.

Fog Seals- Another relatively inexpensive sealing technique is fog sealing, where a very thin layer of asphalt emulsion is applied to the pavement (generally 0.10 gallon per square yard of surface). The emulsion is dilute and sets slowly. It prevents water penetration, extending pavement life by 1 to 2 years, at a cost of about \$4,000 per lane mile.

Rejuvenating Seals- A rejuvenating seal penetrates more deeply into the pavement surface than other sealing techniques (to a depth between 3/8 and 1/2 inch). These seals restore pavement oils that have been broken down by exposure to the

<sup>1</sup> FHWA Pavement Preservation Expert Task Group, <http://www.fhw.dot.gov/pavement/preservation/091205.cfm>

<sup>2</sup> O’Doherty, John, “At the Crossroads: Preserving Our Highway Investment,” National Center for Pavement Preservation, Okemos MI, 2007, p. 49.

sun, slow the oxidation of the surface, and reduce the formation of cracks. They can extend pavement life by up to 3 years, but can also increase the tendency of vehicles to skid on surface, so they are more appropriate for low-volume, low-speed roads or parking lots. Rejuvenating seals cost about \$5,300 per lane mile to apply.

Slurry Seals- Similar to a chip seal, a slurry seal includes uniform bits of aggregate. Unlike the chip seals, however, the slurry has the aggregates mixed in with the asphalt emulsion before application. The mixture includes asphalt, water, a mineral filler, and aggregate in one of three size ranges. Seals with the smallest aggregate are a Type I, or “fine” slurry seal and are used to fill small surface cracks and provide a thin protective layer on the existing pavement. They are generally used in low traffic areas or in preparation for another surface treatment. Type II slurries, also called “general” slurry seals have larger aggregate chips and provide greater skid resistance. They are used to treat moderate to severe raveling and are the most commonly used slurry seal. The coarsest of the seals is the Type III slurry seal, which is generally used on freeways and other high speed roads.

Any of these slurry seals can be modified by including a polymer (such as latex rubber, crumb rubber, or other polymer additives). When a slurry seal is modified to include a chemical agent that causes it to “set up” more quickly, it is referred to as “microsurfacing.” Slurry seals cost about \$18,000 per lane mile and about 5% more if a polymer is added. They extend pavement life between 3 and 5 years, with micro seals yielding the greater life extension. Picture 4(a) shows a residential street in Bodega with a fresh slurry seal.



Chip Seals- Chip sealing involves spraying liquid asphalt onto the pavement and immediately spreading a thin layer of uniformly sized aggregate chips. The new surface is rolled to embed the chips in the asphalt, and once the asphalt has cured (usually taking about 24 hours or less) any loose chips are swept up. Chip seals cost \$28,000 to \$52,000 per lane mile, depending on the type of chip seal used, and the amount of surface preparation needed before the seal is applied. They can extend pavement life by 5 to 7 years.

Roadway leveling- Roadway leveling includes one or both of two main activities. The surface is leveled through milling/grinding or by applying a “leveling course” of paving material, also called a “lift.” Both techniques can be used in combination. The cost of leveling depends on the thickness of the lift applied, but typically ranges from \$75,000 to \$120,000 per lane-mile. Leveling can also be done with micro seals in multiple lifts, at a cost of about \$25,000 per lane-mile, per lift. Picture 4(b) shows roadway leveling on Guerneville Road.



Nonstructural Overlays- A nonstructural overlay is a more comprehensive (and expensive) surface treatment than a seal. It involves applying a new, uniform pavement layer (between 2 and 3 inches thick) over the existing pavement, at a cost between \$330,000 to \$400,000 per lane-mile. The specific characteristics of the overlay vary depending on the volume and speed of traffic on the road. Overlays with smaller aggregate are more flexible but have lower skid resistance and are used on roads with lower traffic volumes and speeds. Overlays with larger aggregate are more resistant to rutting, and provide better skid resistance; they are used on high-volume, high-speed roads. Picture 4(c) shows the application of a



nonstructural overlay.

Full Rehabilitation:

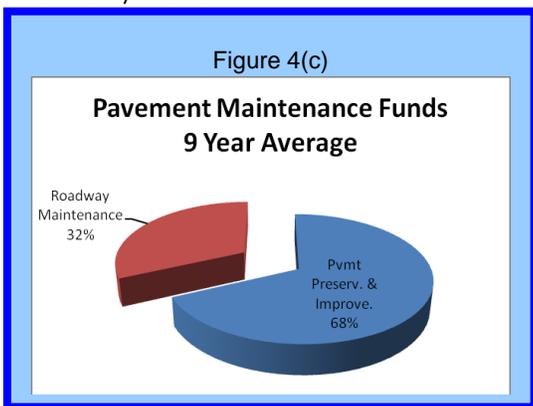
When there is more extensive damage to the pavement surface, **but the road base is still sound**, the pavement surface needs full rehabilitation. This may be done by placing a new structural overlay or cold-in-place recycling.

A structural overlay is a thicker layer of new asphalt (greater than 3 inches) applied over the existing pavement surface. A structural overlay can provide up to 30 years of additional life, but it does so at a cost between \$400,000 to \$600,000 per lane-mile. Picture 4(d) shows the application of a structural overlay.

A relatively new full rehabilitation method is Cold-in-Place Recycling (CIR). With CIR, three to four inches of the existing pavement is ground up, crushed and mixed on site with emulsifying agents before being laid and compacted back onto the roadway from which it was taken. Sonoma County has recently completed a successful demonstration project using CIR as shown in Picture 4(e). A CIR treatment can extend the life of the roadway by up to 30 years, at a cost of approximately \$315,000 per lane-mile.

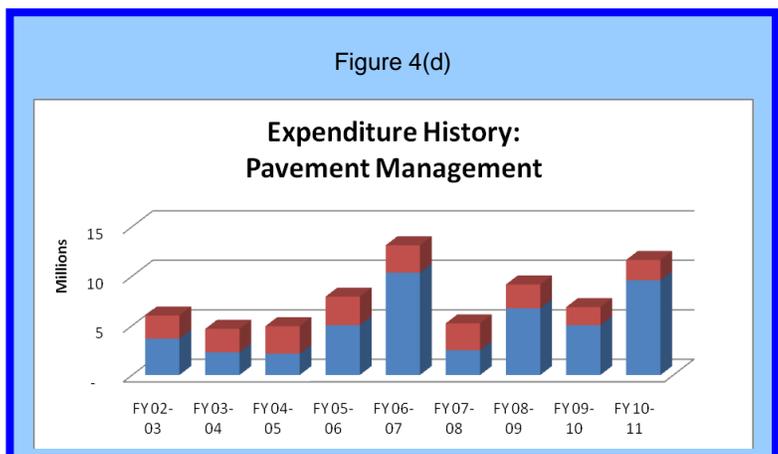
**Pavement Preservation in Sonoma County**

The total budget in Sonoma County for activities related to maintaining the County’s roads has been, on average, about \$19 Million dollars per year, of which 41% or about \$7.7 Million has spent on pavement maintenance. As shown in Figure 4(c), on average, nearly two thirds of that funding (about \$5.2 Million, which is 28% of all road maintenance expenditures) has been spent on pavement preservation. Figure 4(d) shows the history of pavement funds. In FY 06/07, nearly \$10 Million was spent on pavement preservation, almost 80% of the pavement maintenance budget. The County has dedicated an additional \$2.2 Million annually for pavement preservation efforts beginning in FY 12/13.



year, stretching scarce dollars even further. All of these factors have resulted in fewer resources for pavement preservation than is needed. Without enough resources to address all of the pavement needs, many of the County’s roads have slipped into the zone of more rapid deterioration. Increasing the resources for pavement preservation reverses that trend. Figure 4(d)

Compared to other Bay Area counties, Sonoma County has a large number of road miles relative to the County’s population. This fact, combined with the structure of funding formulas, results in relatively fewer dollars available per mile of road in Sonoma County than are available to counties with more people per mile of road. With a higher average rainfall, the County also sees more pavement damage each



shows the annual pavement maintenance expenditures over the past nine years.

**When the road has failed: Reconstruction**

Once the road base has been compromised, the entire road section needs to be constructed. Historically, this has meant removing and disposing of both the pavement and base material, then rebuilding the road at significant cost. Today, both the pavement and base material can be recycled either separately or as a Full Depth Reclamation (FDR). The old pavement and base materials are pulverized, mixed and treated with a stabilizing agent like cement or asphalt emulsion, and compacted to produce a strong, durable base. Once the FDR is completed the roadway is usually surfaced with an overlay of new asphalt designed to handle the traffic on the road. There’s no need to haul in aggregate or haul out old material for disposal. Truck traffic is reduced, and there is little or no waste. Although still costly, FDR can provide up to 30 years of additional life, at a cost of about \$500,000 per lane-mile as compared to the conventional approach that can cost over \$1 Million per lane-mile.

**Corrective Measures: Roadway Maintenance**

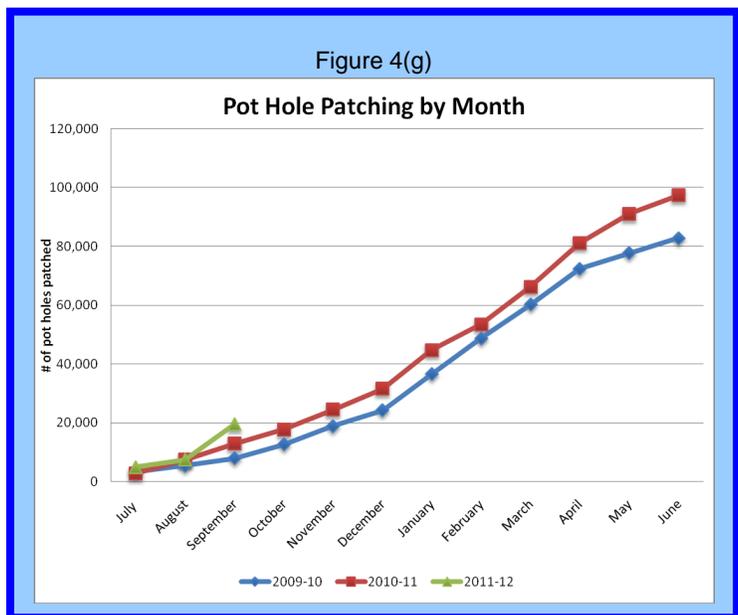
Treatments that repair damage but don’t appreciably extend the overall life of the pavement are considered corrective measures. Roadway maintenance programs are reactive in nature, rather than proactive; they respond to acute damage, often induced by events such as storms (which will covered more thoroughly in Section VI), earthquakes, or slides. Roadway maintenance generally falls into two categories: roadway surface preparation and roadway slope repair.

Roadway Surface Preparation:

Typical surface preparation activities include crack sealing and patching (both pothole repair and skin patching).

Crack sealing- Crack seal products fill individual pavement cracks to prevent entry of water, sand, dirt, rocks or weeds. Crack sealant is typically rubberized asphalt, and is used on early stage cracks of various types. Before applying the filler, cracks need to be routed out and cleaned. It is most effective if performed immediately after cracks develop. The seal will last between 3 and 8 years. Picture 4(f) shows crack sealing at Canon Manor.

Patching- Patching is a common method of treating localized damage, and makes up the bulk of routine surface preparation. Patches can be either full-depth (extending from the existing pavement surface to its substructure) or partial (pothole patches that do not extend through the full depth of existing pavement). The type used depends on the depth of the damage to the existing pavement. The underlying substructure may also be damaged, and may in fact be causing the surface to degrade, in which case it will also need repair. In a full-depth patch, the damaged pavement section is cut away and removed, any damage to the substructure is repaired, and then patching material is applied and compacted. As pavement continues to degrade as a result of deferred preventive maintenance, the amount of



patching required to make the road safe and in serviceable condition accelerates. Figure 4(g) indicates the increase in pothole patching in recent years.

Slope Repair - In addition to surface preparation, Roadway Maintenance also entails roadway slope repair activities. This primarily includes repairing and maintaining shoulders, removing slides, and repairing washouts.

Repairing and maintaining shoulders-

This maintenance activity consists of reshaping continuous sections of road shoulder using a grader or a truck-mounted material conveyor to restore the shoulder to its original condition. This same activity is used for shoulder restoration following resurfacing projects. Picture 4(h) shows shoulder repair at Canon Manor.



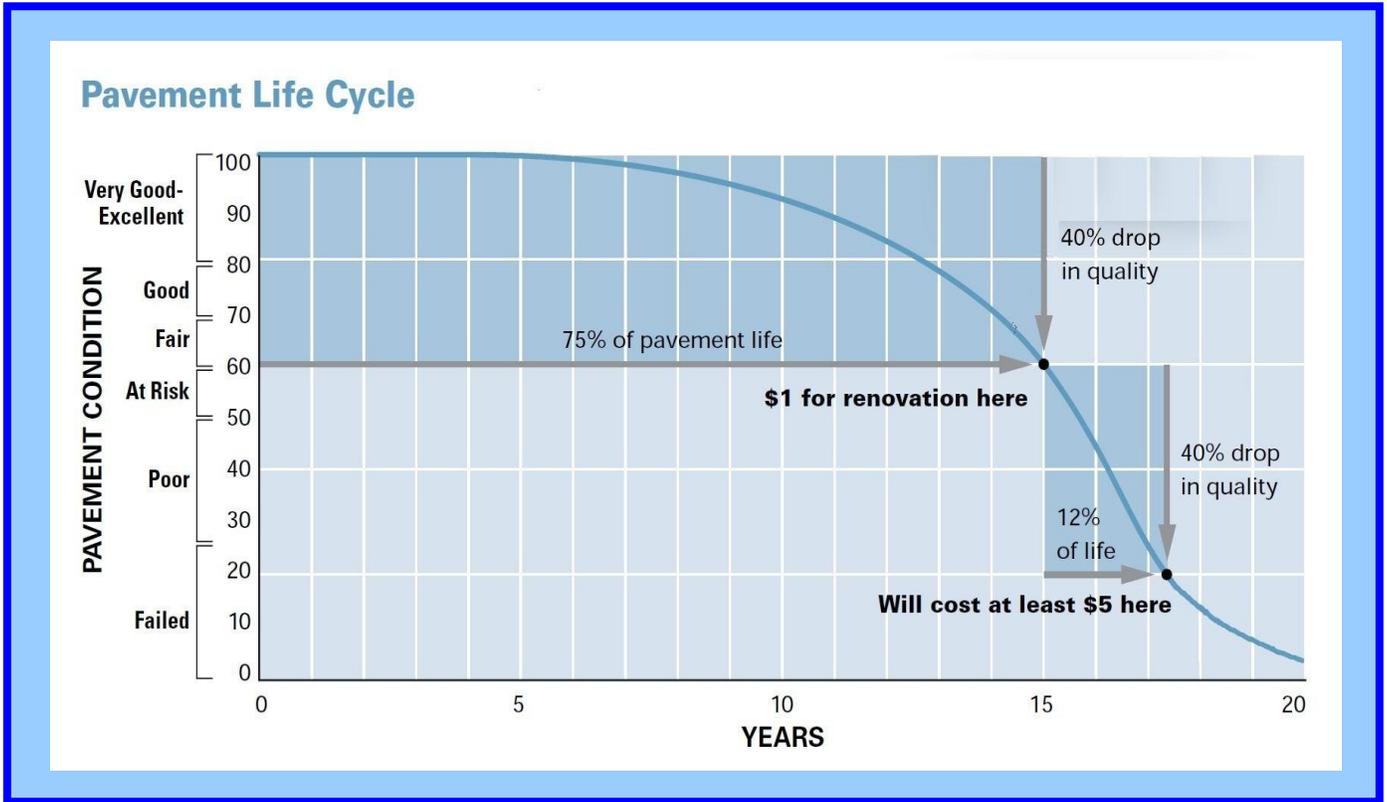
Removing slides- Slide removal is a complex and difficult process. First, debris must be cleared from the slide area. Damaged sections of pavement, substructure, and guardrail (where applicable) must also be removed. The subsoil must be stabilized to prevent further movement; this usually includes drainage behind rock buttresses, or with temporary walls and other stabilizing devices, while a permanent solution is engineered and installed. Picture 4(i) shows a slide on Geysers Road, which is a geologically unstable area that receives considerable rainfall.

Drainage - Proper drainage is critical for maintaining the integrity of the road system. The County installs, inspects, repairs, and maintains drainage system components, including culverts, ditches, drains, and catch basins among others. There are over 7,000 culverts in the County's drainage system. Many of these have reached or are nearing the end of their design life and require replacement. The high annual rainfall in the County makes this a priority activity. The County devotes about 7.3% or approximately 1.4 Million of its maintenance budget to maintaining the drainage system.



Repairing washouts- As with slides, the first step is debris removal. Then the toe of the embankment is excavated, and the embankment is reconstructed. Proper drainage must be installed, or existing drainage repaired, to prevent future washouts. Damaged roadway features, including pavement and base/sub-base, guardrail, and signs or markers, are repaired or replaced. The area may also be re-vegetated or buttressed with rock or walls to protect steep natural slopes.

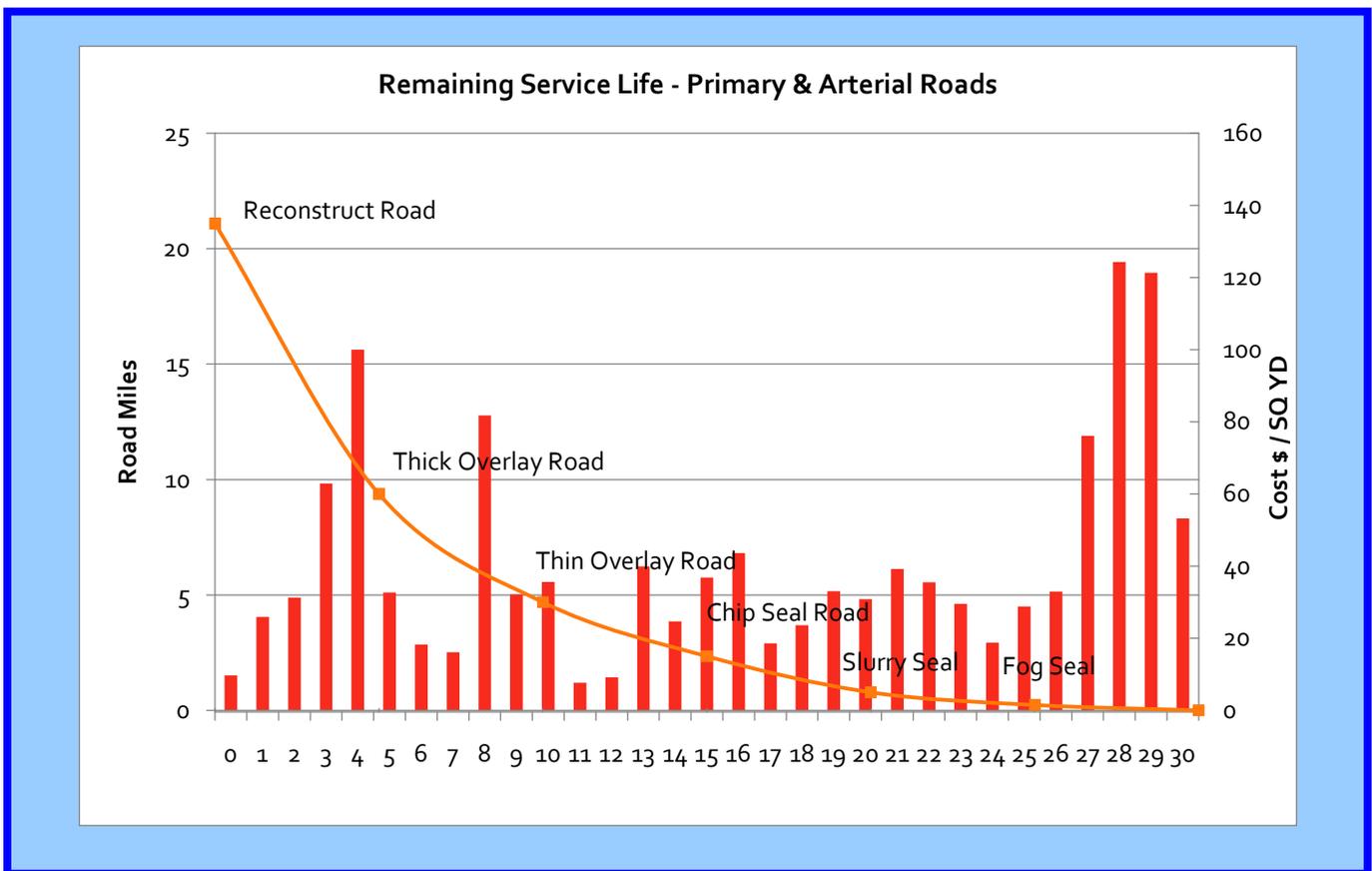
B - Standard Pavement Degradation Curve



## C - Remaining Service Life of County Roads

Another way to evaluate the road network is to consider the “remaining service life” of the roadways. The remaining service life of a road is related to the condition (and therefore the PCI), but it shifts the focus of the evaluation. Categorizing roads by their remaining service life is an approach to support prioritizing the roads in a system for treatment, and matching the proper treatment to the road. By examining the remaining life of our roads, we can improve our ability to predict the magnitude and timing of expenditures on these roads. When a road has 0 remaining years of service life, it is in a state of advanced deterioration, and requires full reconstruction. While the road can still be used, the ride would be similar to driving on an unpaved or gravel road. A road with 30 years of remaining service life is essentially a newly constructed or newly reconstructed road at the beginning of its service life.

Primary Road Network- The Primary roads are comprised of the vast majority (94%) of the arterial roads and 37% of the collector roads. These roads have been identified as the most critical for traffic circulation and as such carry high volumes of traffic between major centers, generally at high rates of speed. Approximately 14%, or 197.2 miles, of the County Road System have been identified as a Primary road. Examples of roads within the Primary Road Network include River Road, Dry Creek Road, Adobe Road, Bodega Highway, Lakeville Road and Petaluma Hill Road.

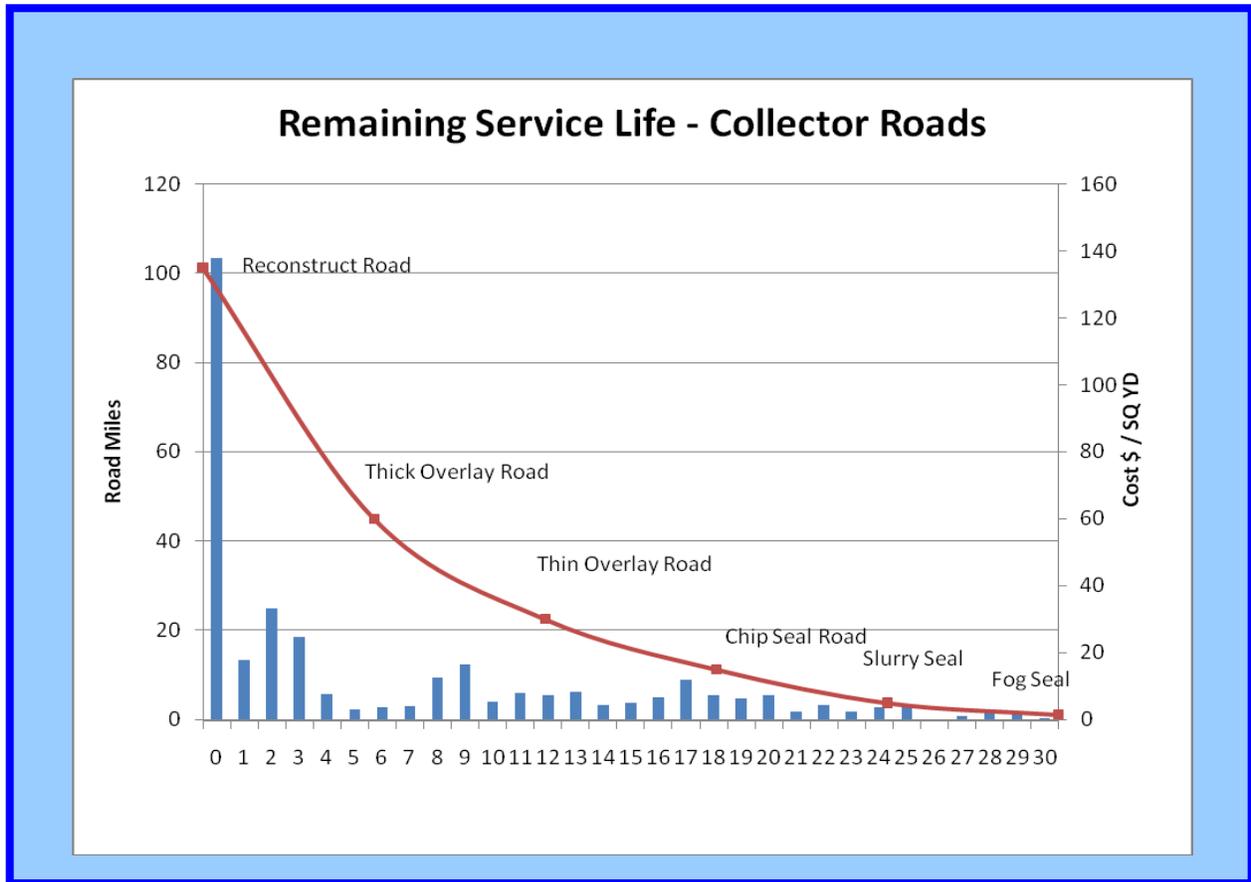


Arterial Roads- The remaining 2.2 miles of Arterial roads that are not identified on the Primary Road Network include portions of Eighth Street East and Warm Springs Road in the Sonoma Valley as well as a short section of Brush Creek Road located in a small county island within the City of Santa Rosa. These roads also carry high volumes of traffic generally at high rates of speed.

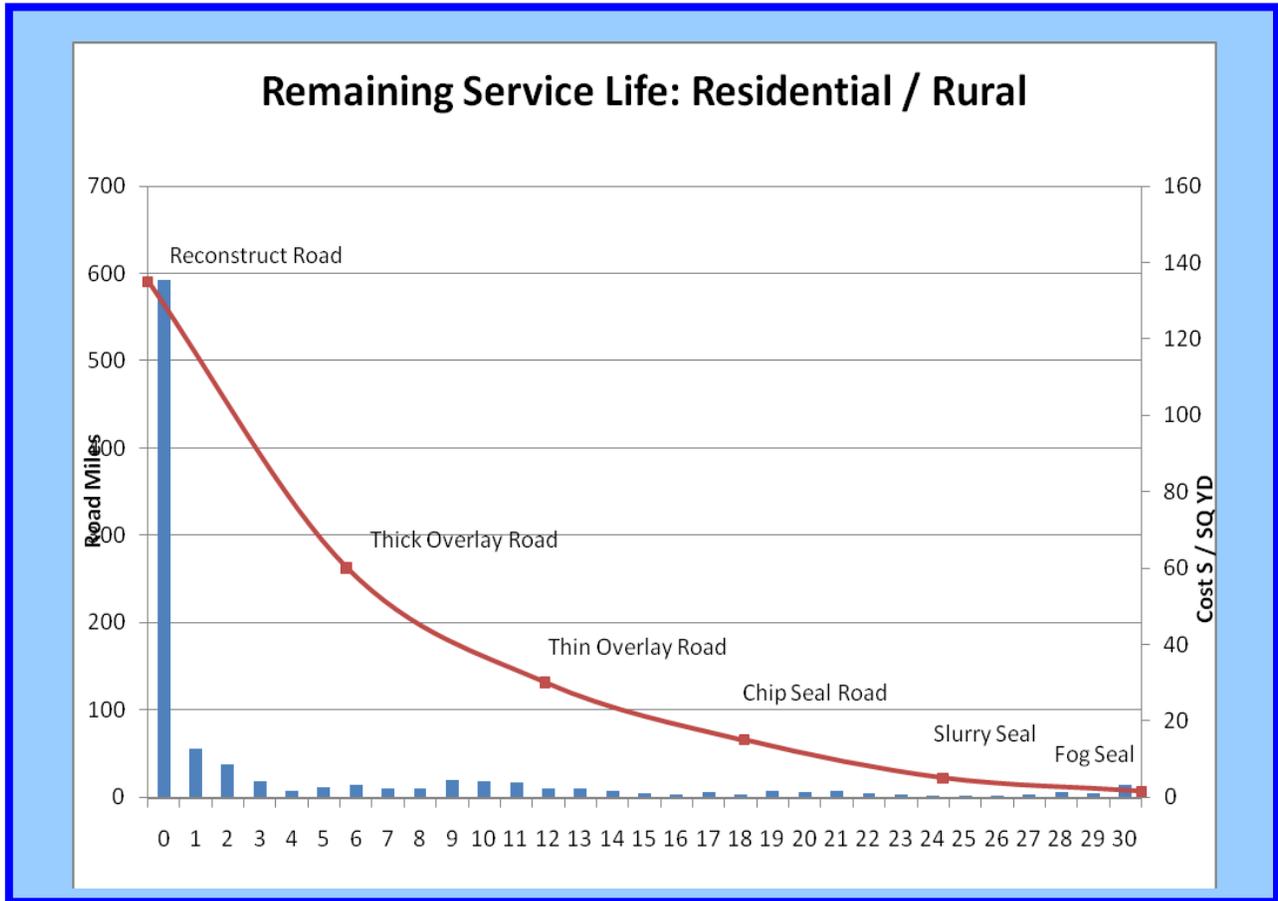
Figure above shows the remaining service life of the County’s Primary Road Network and the remaining 2.2 miles of Arterials not within the Primary Road Network. Each column represents the number of miles that have a remaining life of a certain number of years. About 41 miles or 21% of the County’s most highly travelled roads have 5 years or less of service life. However, about 68 miles or 34% of these roads have at least twenty five years of service life. This is because the identified funding for pavement preservation over the last few years has been dedicated toward preserving the Priority Road Network.

The chart also shows (with a red line) the treatment options that are appropriate for roads with the corresponding years of remaining life, and the cost of those treatment options, per square yard, is charted on the second y-axis. Treatment options for roads with 25 to 30 years of remaining life are less than \$10/Sq. Yd. to keep in very good ride quality condition, while treatment options for roads with 5 or fewer years of remaining life are very expensive to repair costing more than 10 times that of roads that are in good condition. We will discuss these treatment options in more detail in Section IV of the report.

Collector Roads- Collector roads connect neighborhood streets to the Arterial roads. There are 431.8 miles of Collector roads within the County, with 160.6 miles included within the Primary Road Network. The remaining 271.2 miles of Collectors include roads such as Sonoma Mountain Road, Spring Hill Road, Mountain View, and Fort Ross Road. The figure below shows the remaining service life of the County’s Collector roads not included within the Primary Road Network. Approximately 60% of these roads have less than 5 years of remaining service life and less than 3% have a remaining service life greater than 25 years. The graph shows that very few miles of collector roads can be maintained with lower cost seals.



Residential & Rural Roads- These streets and roads serve residential neighborhoods and rural areas, and comprise about 65% of the County's road miles. As shown on chart below approximately 78% of these roads have a remaining service life of less than 5 years with only 6% having a remaining service life greater than 25 years. These roads are the roads in the worse condition and represent the largest cost to improve.



D - Road Map & List of Roads with Tourism Facilities

# Roads Vital for Tourism and Agriculture

Unincorporated Sonoma County

Road Name	Attraction	Length (mi)
<b>Primary Roads (Currently Funded)</b>		
Adobe Rd	Ranch Petaluma Adobe	9.57
Airport Blvd	Charles Shultz Sonoma County Airport / Museum	2.13
Alexander Valley Rd	Alexander Valley	3.36
Arnold Dr	Jack London State Park	0.96
Bodega Hwy	Bodega Bay, Town of Bodega	9.26
Dry Creek Rd	Lake Sonoma	10.42
Lakeville Rd	Tolay Lake Regional Park, Infineon Raceway	6.97
Mark West Springs Rd	Petrified Forest Museum, Safari West	5.54
Petaluma Hill Rd	Green Music Center, Sonoma State University	2.51
Petaluma Hill Rd	Green Music Center, Sonoma State University	5.84
Petrified Forest Rd	Petrified Forest Museum	2.36
Porter Creek Rd	Petrified Forest Museum	4.65
River Rd	Korbel Winery, Russian River	7.73
River Rd	Korbel Winery, Russian River	4.96
		<b>76.26</b>

<b>Roads to be Funded by One-Time Reserves</b>		
Adobe Canyon Rd	Hood Mountain Regional Park / Sugarloaf Ridge State	2.32
Cannon Ln	Tolay Lake Regional Park	1.16
West Dry Creek Rd	Wine Country	1.40
Westshore Rd	Bodega Harbor	2.69
		<b>7.57</b>

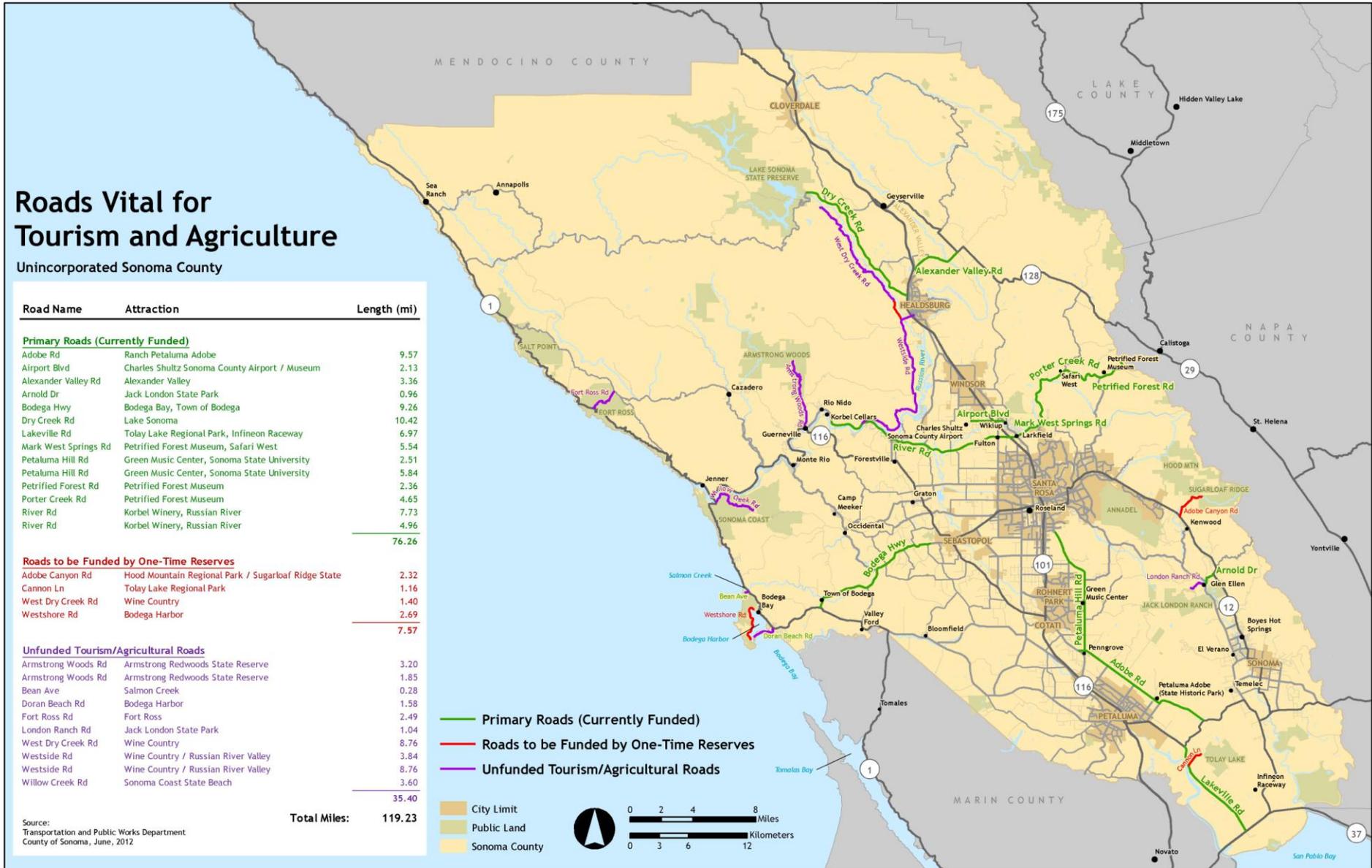
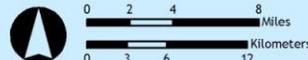
<b>Unfunded Tourism/Agricultural Roads</b>		
Armstrong Woods Rd	Armstrong Redwoods State Reserve	3.20
Armstrong Woods Rd	Armstrong Redwoods State Reserve	1.85
Bean Ave	Salmon Creek	0.28
Doran Beach Rd	Bodega Harbor	1.58
Fort Ross Rd	Fort Ross	2.49
London Ranch Rd	Jack London State Park	1.04
West Dry Creek Rd	Wine Country	8.76
Westside Rd	Wine Country / Russian River Valley	3.84
Westside Rd	Wine Country / Russian River Valley	8.76
Willow Creek Rd	Sonoma Coast State Beach	3.60
		<b>35.40</b>

Total Miles: 119.23

Source:  
Transportation and Public Works Department  
County of Sonoma, June, 2012

- Primary Roads (Currently Funded)
- Roads to be Funded by One-Time Reserves
- Unfunded Tourism/Agricultural Roads

- City Limit
- Public Land
- Sonoma County



**Roads Vital for Tourism and Agriculture**

**Primary Roads (Currently Funded)**

Road Name	Attraction	Road ID	From PM	To PM	Length (mi)	Avg Annual Cost for PCI 68
Adobe Rd	Ranch Petaluma Adobe	5602	10.00	19.57	9.57	36,549.80
Airport Blvd	Charles Shultz Sonoma County Airport / Museum	8803A	10.20	12.33	2.13	433,110.10
Alexander Valley Rd	Alexander Valley	9902	10.07	13.43	3.36	-
Arnold Dr	Jack London State Park	5603	18.34	19.30	0.96	45,586.30
Bodega Hwy	Bodega Bay, Town of Bodega	6904	10.00	19.26	9.26	590,569.80
Dry Creek Rd	Lake Sonoma	9901	10.00	20.42	10.42	-
Lakeville Rd	Tolay Lake Regional Park, Infineon Raceway	3601	10.00	16.97	6.97	-
Mark West Springs Rd	Petrified Forest Museum, Safari West	8801A	10.00	15.54	5.54	33,000.00
Petaluma Hill Rd	Green Music Center, Sonoma State University	5710B	10.46	12.97	2.51	98,902.42
Petaluma Hill Rd	Green Music Center, Sonoma State University	5710B	12.97	18.81	5.84	230,115.59
Petrified Forest Rd	Petrified Forest Museum	8801C	20.19	22.55	2.36	-
Porter Creek Rd	Petrified Forest Museum	8801B	15.54	20.19	4.65	496,026.80
River Rd	Korbel Winery, Russian River	8802B	12.81	20.54	7.73	73,825.64
River Rd	Korbel Winery, Russian River	8802B	20.54	25.50	4.96	47,370.66
<b>Totals:</b>					<b>76.26</b>	<b>\$2,085,057.10</b>

Road Name	Attraction	Road ID	From PM	To PM	Length (mi)	FY 12/13 Cost (Millions)
<b><u>Roads to be Funded by One-Time Reserves</u></b>						
Adobe Canyon Rd	Hood Mountain Regional Park / Sugarloaf Ridge State Park	76021	10.00	12.32	2.32	1.2
Cannon Ln	Tolay Lake Regional Park	46003	10.00	11.16	1.16	1.9
West Dry Creek Rd	Wine Country	99017	10.00	11.40	1.40	1.6
Westshore Rd	Bodega Harbor	61024	10.00	12.69	2.69	1.8
<b>Totals:</b>					<b>7.57</b>	<b>6.5</b>

**Unfunded Tourism/Agriculture Roads**

Armstrong Woods Rd	Armstrong Redwoods State Reserve	80131	11.85	15.05	3.20	3.3
Armstrong Woods Rd	Armstrong Redwoods State Reserve	8902B	10.00	11.85	1.85	9.0
Bean Ave	Salmon Creek	61017	10.00	10.28	0.28	3.4
Doran Beach Rd	Bodega Harbor	61002	10.00	11.58	1.58	2.8
Fort Ross Rd	Fort Ross	8201	10.15	12.64	2.49	2.6
London Ranch Rd	Jack London State Park	66045	10.20	11.24	1.04	2.2
West Dry Creek Rd	Wine Country	99017	11.40	20.16	8.76	1.6
Westside Rd	Wine Country / Russian River Valley	8001	10.00	13.84	3.84	3.0
Westside Rd	Wine Country / Russian River Valley	8001	13.84	22.60	8.76	4.7
Willow Creek Rd	Sonoma Coast State Beach	70015	10.00	13.60	3.60	3.3
<b>Totals:</b>					<b>35.40</b>	<b>35.9</b>

**42.4 Million**