Solano Transportation Authority



Solano Countywide Pothole Report

April 2019

Solano Transportation Authority

Streets and Roads Pavement
and Rehabilitation Report

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Executive Summary

From a transportation standpoint, a community's roads and network of streets, and the connections that they enable, are its lifeblood. A well-maintained road network can attract and support new residents, businesses, and investment, while a neglected network can lead to lost opportunities for growth and reduced quality of life for residents and local businesses. In order to allow Solano County to remain a competitive, attractive location for desirable development, our roads must be smooth and free of potholes.



Figure 1. Pothole Example

The first Solano County Pothole Report was released in October 2014. It provided locally specific Countywide roadway condition and maintenance budget information, bridging a key knowledge gap in pothole reports released by the Metropolitan Transportation Commission (MTC) and the California Department of Transportation (Caltrans). This report updates the information provided in 2014, including a comprehensive description of the current and projected condition of Solano County's local streets and roads, and an updated overview of funding sources for maintenance.

Since the last report, the outlook for the ongoing maintenance of Solano County's local streets and roads network has greatly improved. In 2017, California legislators passed Senate Bill (SB) 1, which raised the state gas tax for the first time since 1994 and increased vehicle registration fees. The revenue stagnation had caused significant funding shortfalls and contributed to a troubling maintenance backlog for local streets and roads networks throughout the state. The goal of these increases was to fund roadway improvement throughout the state. Moving forward, Solano County 's seven cities and the unincorporated county will use this new investment to address their maintenance backlogs and work to improve the overall quality of Solano County's local streets and roads network.

Executive Summary Continued

Timely investment in roadway preservation can save millions of tax dollars in long-term maintenance costs. For example, a municipality that spends $1 on timely maintenance to keep a section of roadway in good condition would have to spend $5 to restore or reconstruct the same road if the pavement were allowed to significantly deteriorate or fail (MTC, 2011). This report analyzes the current funding strategy in Solano County, demonstrating how revenue is being utilized and identifying critical financial shortfalls to assist local public works staff with project planning and future funding requests.

The roadways in Solano County, measured according to a standard 100-point Pavement Condition Index (PCI), are in "fair" condition with a countywide average PCI of 65. MTC's Regional Transportation Plan sets a regional average PCI goal of 75[1]; this goal was adopted in the current Solano Comprehensive Transportation Plan. The costs of roadway rehabilitation increase substantially when PCI drops below 60 (roads categorized as "at-risk").

In addition, a majority of state and federal funding is exclusively available to repair arterial and collector roads, leaving local communities responsible for maintaining residential streets. It is therefore no surprise that almost every Solano jurisdiction has significantly higher average scores across its arterials and collectors than for its residential streets. While arterials and collectors do carry far more traffic, declining residential streets can have a significant and negative impact on the quality of life for residents who begin and end every trip on those streets.

As of August 2018, Solano County and its seven cities were cumulatively investing approximately $22.4M annually to maintain pavement on local streets and roads. In order to maintain the current average PCI of 65, Solano County jurisdictions would need a total of $53.5M per year. Although SB 1 provides additional new funding and will continue to increase revenue over time, there is still a shortfall in the current budget strategy of approximately $10M per year. To reach the higher PCI goal of 75, an additional $25M would be needed annually over the next 10 years.

If current levels of funding are continued through 2027, the countywide average would drop from a PCI of 65 in 2018 to a PCI of 59 by 2027. Even with increased state investment in roadway maintenance, Solano County roadway infrastructure still needs additional investment to halt its downward trend in pavement quality and to ensure significant cost savings on future maintenance. Local residents deserve a well-maintained network of local streets and roads that meet all of their needs, both now and in the future.

1 MTC Pothole Report: https://www.pavementpreservation.org/wp-content/uploads/2011/06/2011-MTC-Pothole_Report.pdf

Roads: The Network of Our Neighborhoods

Everyone Uses Roads

Roads make up the network that connects us to our jobs, schools, shopping, and entertainment. Whether a commuter, a student, or retiree, nearly everyone benefits from the local streets and roads network. From sidewalks and crosswalks to neighborhood streets and four-lane boulevards, a well-maintained roadway network promotes mobility for Solano County residents. Every trip begins and ends with local streets and roads and nearly every mode of surface travel relies on quality infrastructure.

Maintaining this infrastructure shows residents and visitors that we care about Solano County. Just like the welcome mat for your home, the local streets and roads system provides visitors and potential business investors a first impression of a community that can last a lifetime. Ignoring these critical facilities can affect quality of life and cost a city more than its roadway system. Economic vitality depends on new businesses and residents moving into our county in the future. The look and quality of our roads will be a factor in their decision to invest in our communities.

Pavement Condition Index (PCI): What it Means

The PCI is a numerical index between 0 and 100 used by roadway engineers to measure the general condition of a pavement. The PCI measures two conditions: (1) the type, extent, and severity of pavement surface distresses, and (2) the smoothness and ride comfort of the road. A PCI rating of 0 represents the worst possible condition and a rating of 100 represents the best possible condition. Pavement condition categories are assigned according to PCI; these categories are described below in Table 1 (see next page).

Roads: The Network of Our Neighborhoods Continued

Pavement Condition Index (PCI): What it Means

Table 1. Pavement Condition Categories*

Very Good-Excellent (PCI = 80-100)	Pavements are newly constructed or resurfaced and have few if any signs of distress.
Good (PCI = 70-79)	Pavements require mostly preventive maintenance and have only low levels of distress, such as minor cracks or spalling, which occurs when the top layer of asphalt begins to peel or flake off as a result of water permeation.
Fair (PCI = 60-69)	Pavements at the low end of this range have significant levels of distress and may require a combination of rehabilitation and preventive maintenance to keep them from deteriorating rapidly.
At Risk (PCI = 50-59)	Pavements are deteriorated and require immediate attention including rehabilitative work. Ride quality is significantly inferior to better pavement categories.
Poor (PCI = 25-49)	Pavements have extensive amounts of distress and require major rehabilitation or reconstruction. Pavements in this category affect the speed and flow of traffic significantly.
Failed (PCI = 0-24)	Pavements need reconstruction and are extremely rough and difficult to drive.

* Source: MTC September 2018 *The Pothole Report: Bay Area Roads at Risk*

Current Pavement Status in Solano County

MTC's Regional Transportation Plan sets a goal of 75 for the regional average PCI. As of 2017, the average PCI was 67 for the Bay Area's local streets and roads network, which includes nearly 43,374 lane miles. This PCI rating places the region's roadway network in the "fair" category. The average condition of Solano County's local streets and roads network, which includes approximately 3,724 lane miles of roadway, is also in the "fair" category, with a 3-year moving average of 64.

Table 2. Three-Year Moving Average PCI for Solano County (2015-2017)

	2015	2016	2017
Benicia	57	56	55
Dixon	72	69	68
Fairfield	71	72	71
Rio Vista	57	56	60
Solano County	79	80	81
Suisun City	55	58	60
Vacaville	69	69	69
Vallejo	49	51	53
Countywide	**66**	**64**	**65**

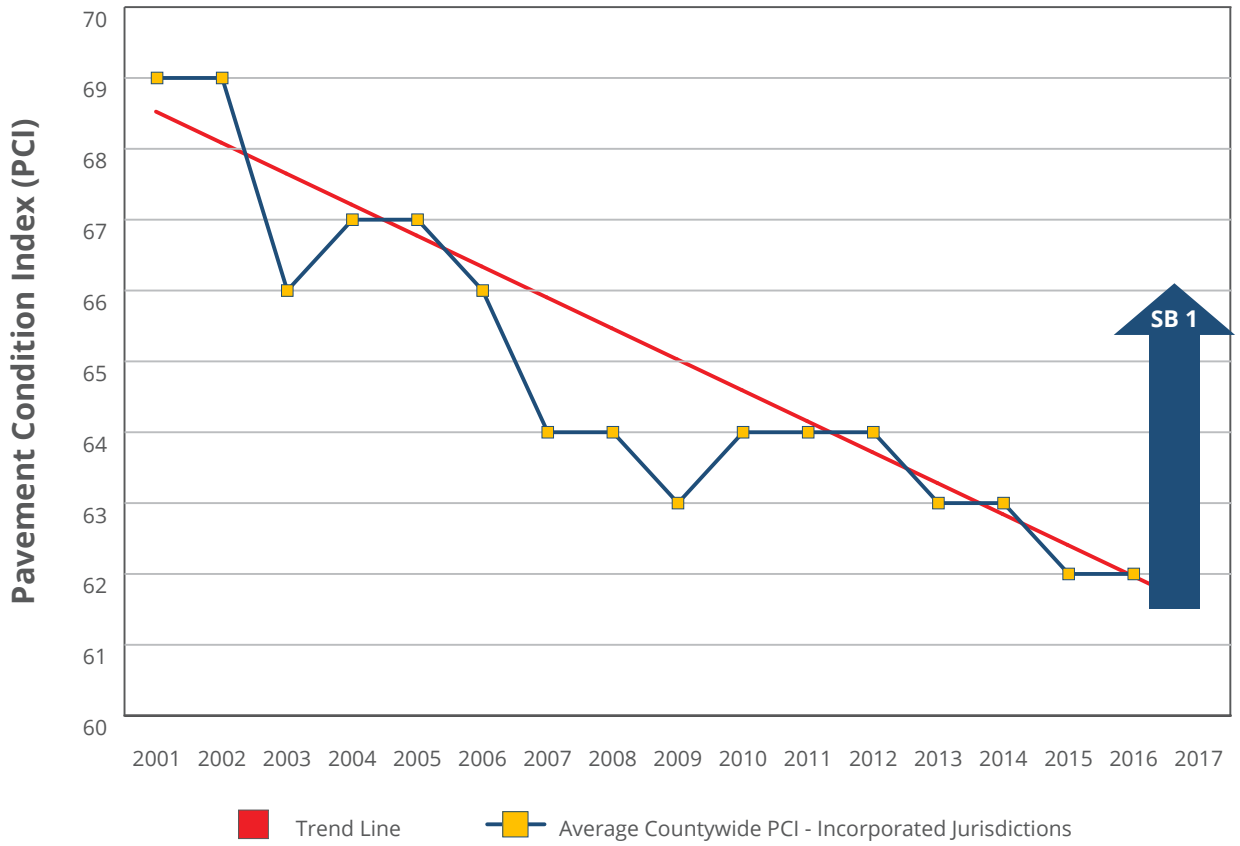
Roads: The Network of Our Neighborhoods Continued

Current Pavement Status in Solano County Continued

Using a 3-year average provides a more accurate picture, since not all jurisdictions submit their streets and roads data at the same time, and a single project can cause a significant jump in the annual PCI score for a small city with just a few miles of streets.

Figure 2 shows that over the past 10 years, most Solano County jurisdictions experienced a slow decline in pavement condition until the passage of SB 1, which is anticipated to improve conditions.

Figure 2. Year-to-Year PCI Trends Countywide



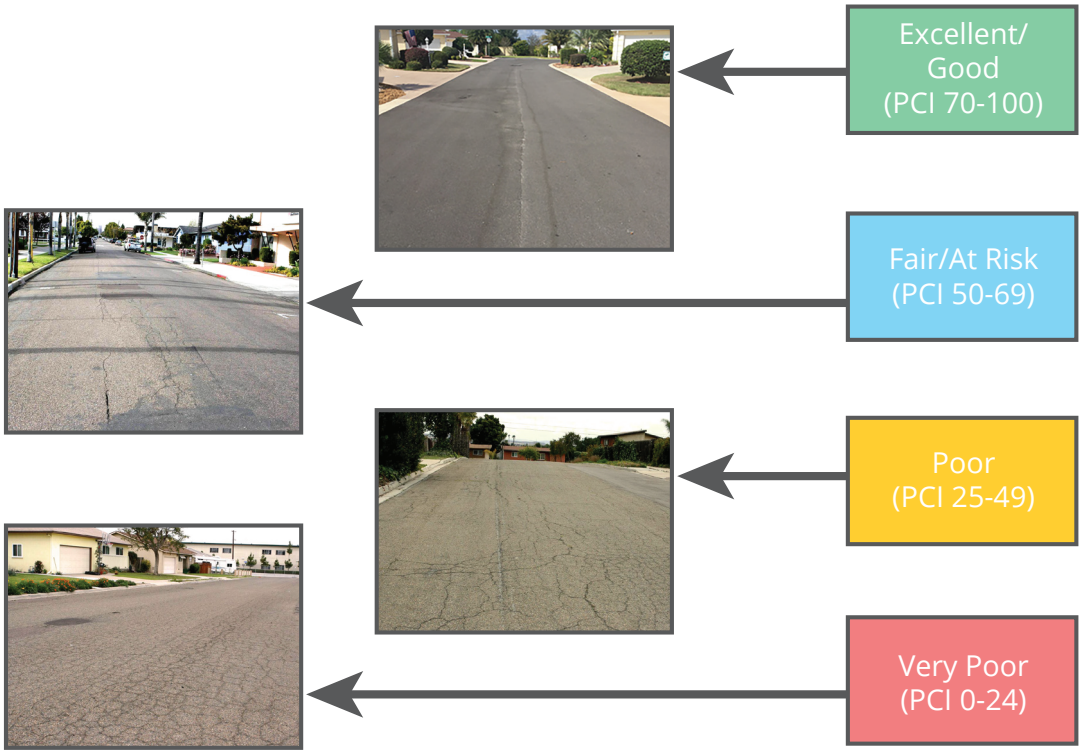
Roads: The Network of Our Neighborhoods Continued

What the PCI Looks Like

Local roads are inspected and assessed by certified inspectors approximately every 2 to 4 years. A PCI score is generated based on visual inspections of roadway sections, taking into account the prevalence, density, and severity of deficiencies such as cracking, crumbling, chipping, and potholes.

The photos displayed in Figure 3 show streets and roads that represent PCI ratings of Excellent/Good, Fair or At-Risk, and Poor/Failed. Most of the streets and roads in Solano County fall under the At-Risk (Fair) category. While this condition category may not look so bad on the surface, the costs associated with falling below this threshold can be significant.

Figure 3. PCI Rating and Visual Condition



Cost of Maintaining Our Roadways

The Cost of Doing Nothing

Of all the infrastructure investments a city must make, road maintenance is among the most expensive. The more money a city can put into maintaining good pavements and preventing roadways from degrading, the more money it will save in expensive pavement reconstruction in the long run.

A typical pavement section consists of a surface layer (course), a base course, and a subbase course (Figure 4). As cracks and potholes form in pavement, water can seep from the surface layer into those beneath, undermining the base and subbase courses. The deeper the damage occurs, the more expensive the road becomes to repair and maintain. For maximum cost-effectiveness, the surface course must remain sealed to prevent water from intruding into the lower levels. If these small issues are not addressed in a timely manner, they can cause much larger problems that will result in the roadway degrading at a rapid pace.

Solano County's average PCI is 65, which is considered to be in the "fair" category (PCI 60-69). This PCI score indicates a critical need for maintenance. Once a pavement's condition rating reaches 60 , it begins to deteriorate rapidly and repair costs also increase quickly. As shown in Figure 5 (see next page), new pavement deteriorates slowly for the first 12 years of a standard 20-year life span. Without any intervention, the pavement condition drops from the fair category to the "failed" category in the next 5 years. This deterioration holds serious implications for the cost of system preservation. **Pavements that are still in good condition (a PCI of 70 or above) can be maintained at a low cost, whereas pavements that need significant rehabilitation or reconstruction require approximately 10 times the amount of funding.** Thus, a PCI of 65 should be viewed with caution. Although the roads may look serviceable and not exhibit major degradation, the PCI indicates that many of our local streets and roads are positioned on the edge of a maintenance cliff.

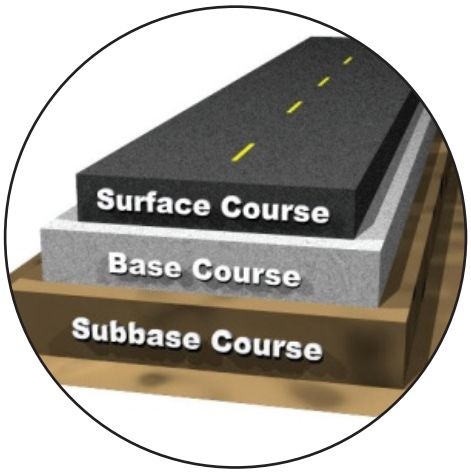
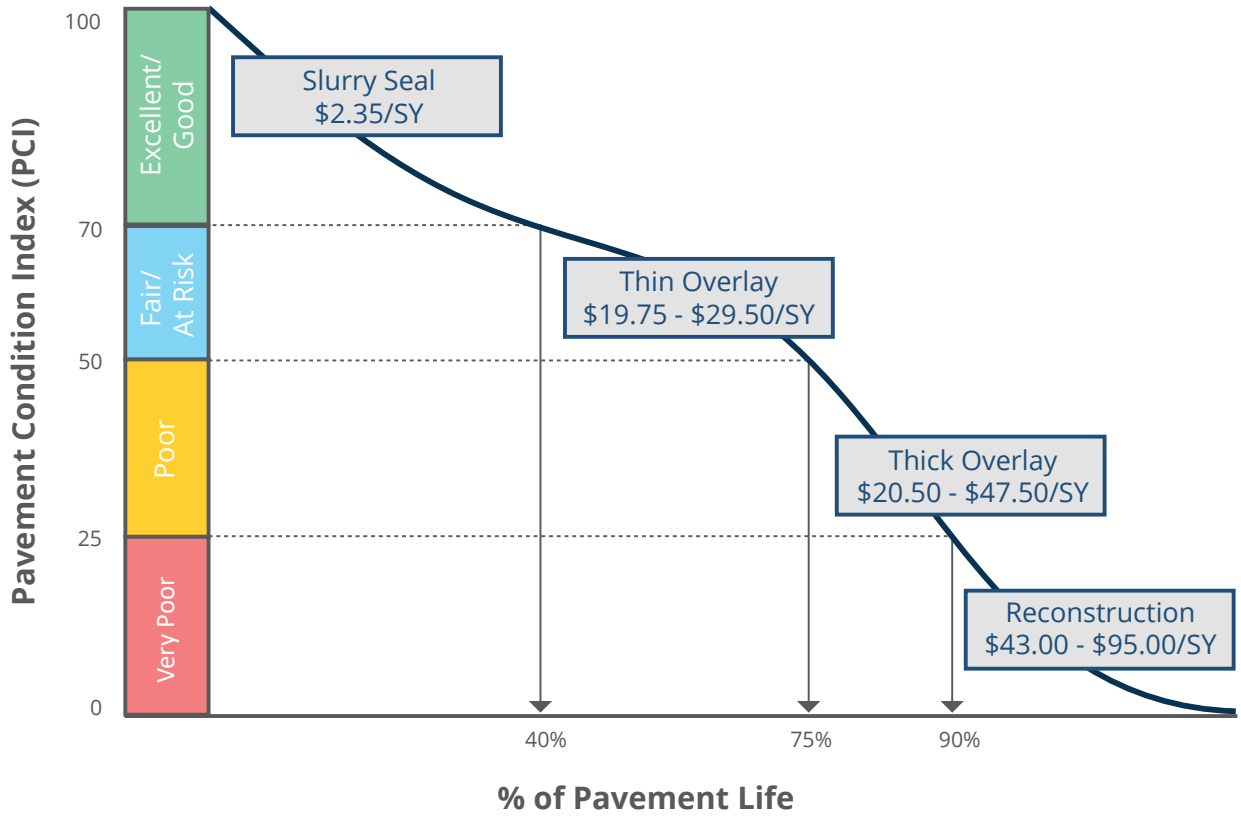


Figure 4. Typical Pavement Section

Cost of Maintaining Our Roadways Continued

The Cost of Doing Nothing Continued

Figure 5. PCI Condition and Cost of Rehabilitation



Cost of Maintaining Our Roadways Continued

The Cost of Doing Nothing Continued

Table 3 further illustrates the impact of deferring maintenance. As street rehabilitation costs increase, cities may have to face uncomfortable tradeoffs (e.g., building new community centers vs. repairing failed streets). When cities wait until streets reach critical and expensive maintenance needs, cities must pay for additional labor and materials to rebuild the road, potentially multiplying the cost.

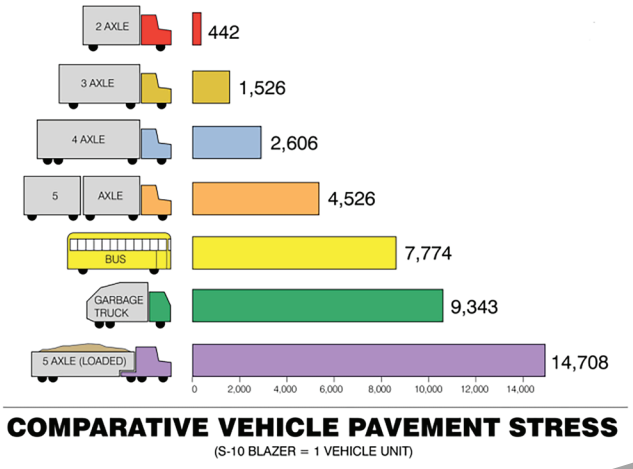
Table 3. Approximate Cost to Maintain/Repair Roads*

Rating	PCI Range	Treatment	Treatment Cost (per mile)
Excellent	80+	None	N/A
Good	70 - 79	Patch Work	$10,000
Fair	60 - 69	Slurry	$17,000 - $25,000
At Risk	50 - 59	Thin Overlay	$140,000 - $260,000
Poor	25 - 49	Thick Overlay	$150,000 - $350,000
Very Poor/ Failed	0 - 24	Reconstruction	$310,000 - $1M+

* Source: Federal Highway Administration: http://www.fhwa.dot.gov/pavement/preservation/pubs/perfeval/perfeval.pdf

Figure 6. Pavement Stress per Trip

(1 Vehicle Unit = 1 SUV)



Source: Pavement Engineering, Inc.

In addition, freight trucks, buses, and garbage trucks use the same roads as cars, trucks, and bicycles. Unfortunately for a city's roadway repair budget, not all vehicles cause the same amount of damage to roadways. As shown in Figure 6, a simple delivery truck causes the equivalent of 442 sport utility vehicle (SUV) units of damage to a

Cost of Maintaining Our Roadways Continued

The Cost of Doing Nothing Continued

roadway. Buses, which run frequently on some streets, cause 7,774 SUV units of damage, while garbage trucks, which drive on a weekly basis on every street in an urbanized area, cause 9,343 SUV units. Larger vehicles cause even more damage. While these large trucks cause significant damage to city streets, there is no direct funding mechanism in Solano County to offset their impacts.

In addition to the cost of repairing roadways, the damage done to cars from roads in disrepair can quickly a dd up. A report published by the nonprofit group TRIP stated that poor roads in the Bay Area cost the average motorist about $1,049 a year in additional repairs, increased gas use, and tire wear. The MTC is in the process of quantifying this additional cost on a region-wide level and will use this metric as the basis for road quality in the future.

Funding Sources for Solano County Roadways

There are numerous possible funding sources for maintaining and building local streets and roads. Federal funds typically consist of one-time allocations that are provided to county congestion management agencies and then dispersed to local jurisdictions during a federal funding cycle of between 4 and 5 years. State funds, like the gas tax, are disbursed annually or semi-annually to local jurisdictions. The disbursement amounts vary depending on the gas taxes received in the previous year. Local funds, like general funds or local sales, are budgeted by each local jurisdiction annually.

Solano County's funding sources are discussed further below.

Federal (14% of total existing budgets)

- **Surface Transportation Program (STP)** – This funding source is packaged as part of the One Bay Area Grant program. This program has increased the level of regulation and limited the use of funds; in Solano County, at least 50% of STP funds must go to priority development areas or must be used on complete streets projects, with high non-pavement costs.

Cost of Maintaining Our Roadways Continued

Funding Sources for Solano County Roadways Continued

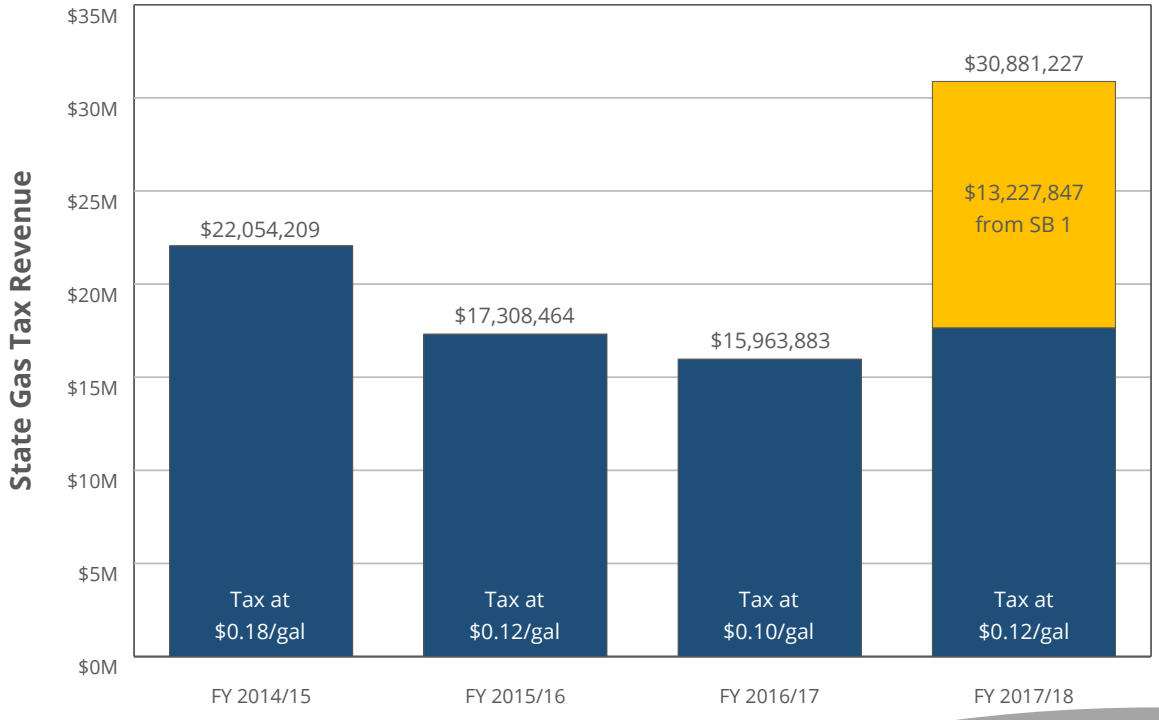
State (50%)

- **Gas Tax** – State gas tax revenues are collected by the state and distributed to local jurisdictions by formula. As shown in Figure 7, the amount dispersed annually depends on the amount of tax collected annually. A portion of the gas tax is based on the price of gas, so if the price of gas decreases, then the amount of tax collected will decrease, and the amount of tax revenue dispersed to cities will also decline.

Local (36%)

- City or County General Fund
- **Countywide or Local Sales Tax Measures** – Many local measures are set to expire before 2024.

Figure 7. Solano Countywide State Gas Tax Revenues

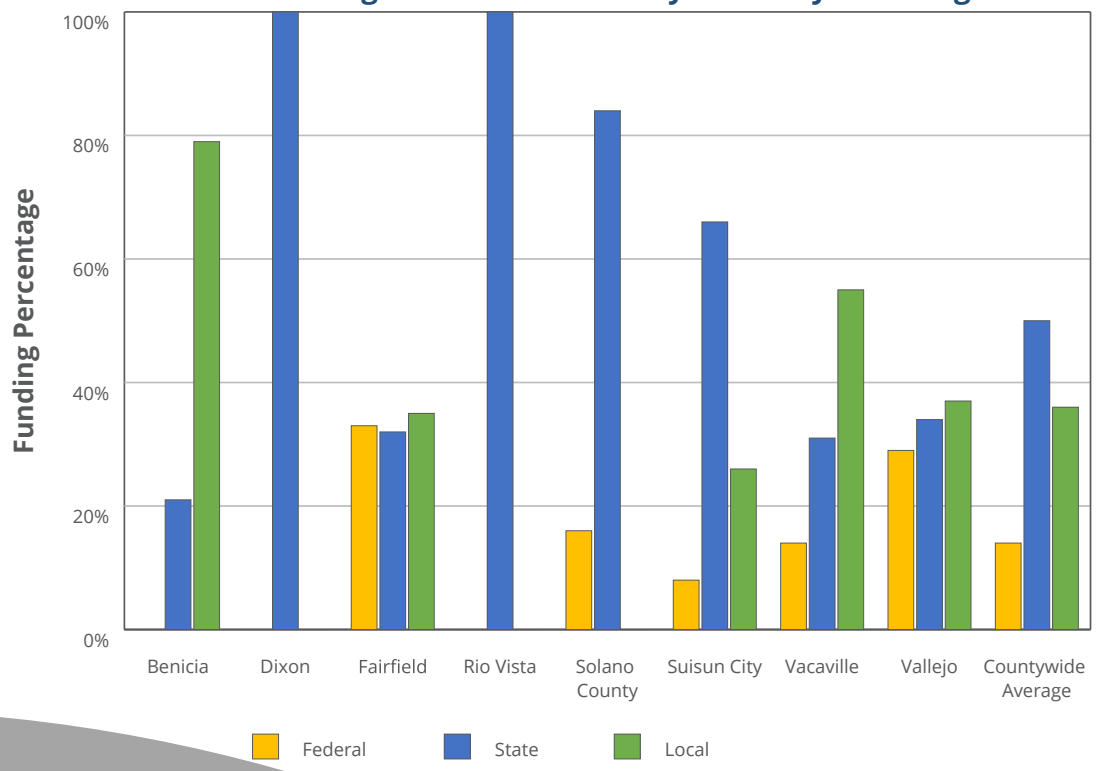


Cost of Maintaining Our Roadways Continued

Funding Sources for Solano County **Roadways** Continued

The majority of funds invested in local streets and roads comes from state sources (Figure 8). Over the past decade, the percentage of funds coming from the federal government has declined and the percentage coming from local sources has increased. With the passage of SB 1 in 2017, the state gas tax was raised by twelve cents, the first increase since 1994. According to the Federal Highway Administration, the purchasing power of the gas tax dropped approximately 30 percent between 1997 and 2017. While SB1 does not fully bridge the gap between road repair needs and local revenues, it provides millions of dollars toward addressing the maintenance backlog created by years of declining revenues and increasing costs. Moreover, the gas tax is indexed to inflation, preventing another steep shortfall from accumulating. Going forward, local agencies may consider seeking additional funding sources such as local funding measures to meet their remaining roadway needs.

Figure 8. Solano County Roadways Funding Sources



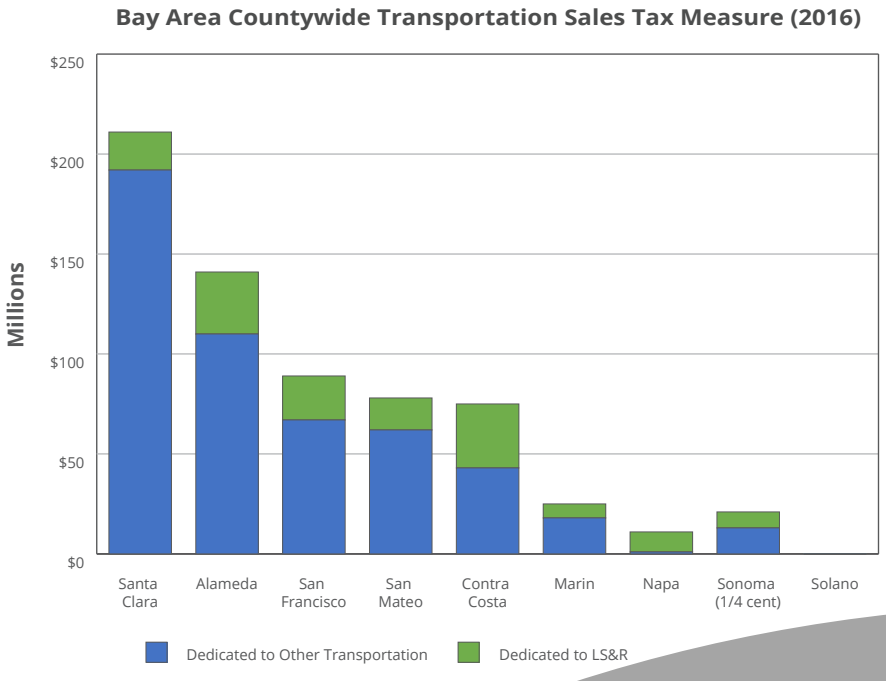
Cost of Maintaining Our Roadways Continued

Funding Sources for Solano County **Roadways** Continued

A countywide transportation funding source would help to alleviate some local funding shortfalls and would provide a reliable and steady source of revenue for roadway maintenance needs. In fact, Solano County is the only county within the nine-county San Francisco Bay Area that does not have a local countywide funding source dedicated to transportation improvements and roadway maintenance. Some Bay Area counties have also adopted a fee based on vehicle licensing through the Department of Motor Vehicles that directly funds transportation projects.

How much revenue can a countywide funding source provide? Figure 9 below shows that tens, or even hundreds of millions of dollars are generated annually for transportation projects through local, voter-approved sales tax measures. Many of these local measures dedicate a significant amount of funding to local streets and roads maintenance. In Solano County, the lack of revenue from a transportation sales tax measure has contributed to a higher backlog of roadway maintenance needs that will have to be addressed in future years, at an increased cost.

Figure 9. Bay Area Transportation Measures and Annual Revenue Estimates



Cost of Maintaining Our Roadways Continued

Long-Term Funding Shortfall for Local Streets and Roads

Local streets and roads may be the most visible of the many services that a local jurisdiction must fund and maintain. Whenever a jurisdiction decides to invest in its roads, or defer maintenance, everyone can see it. Construction crews or potholes? Smooth streets or rough roads? The choice is up to us.

The dollar amount a jurisdiction must spend to attain a particular PCI by a certain year is called its "Needs." Solano Transportation Authority and its member agencies utilize a pavement management program named StreetSaver. This program takes inputs such as roadway maintenance records, roadway inspections, and roadway maintenance budgets to calculate future roadway conditions. At the end of every year, staff or hired consultants enter new ratings for roads that have undergone improvement. Every 2 to 4 years, every road in each jurisdiction is inspected by a certified PCI inspector and that PCI is entered into StreetSaver. Finally, a jurisdiction's budget helps to inform StreetSaver regarding how much maintenance work can be expected in the future.

For the purposes of this report, the investment required to maintain the current PCI of 65 and the investment required to reach the region-wide PCI goal of 75 are projected to 2027. **Using StreetSaver, the investment required to maintain the current PCI average of 65 (fair) for Solano County is $427.9M over the next 10 years. The current countywide budget supplies roughly 70% of this amount, which includes SB 1.** The financial investment needed to reach PCI of 75 is $578.8 M over the next 10 years. The current budget supplies approximately 30% of the amount needed annually. If current levels of funding continue through 2027, then the countywide average PCI will drop from 65 (current) to 59 by 2027.

Some local jurisdictions are doing better than others with regard to the amount of money needed to maintain or improve their PCI. For example, Figure 10 (see next page) illustrates that Vacaville and Vallejo have sufficient funding to maintain their current PCIs. Figure 11 (see next page) shows that unincorporated Solano County's budget will enable them to maintain their roads at a PCI of 75. On the other hand, some cities, including Dixon and Suisun City, have less than 20% of the amount required to reach a PCI of 75 by 2027 and less than 33% of the amount required to maintain their current PCI and halt further degradation.

Cost of Maintaining Our Roadways Continued

Long-Term Funding Shortfall for **Local Streets and Roads** Continued

Figure 10. Percent of Annual Needs Budgeted by 2027 to Maintain Current PCI

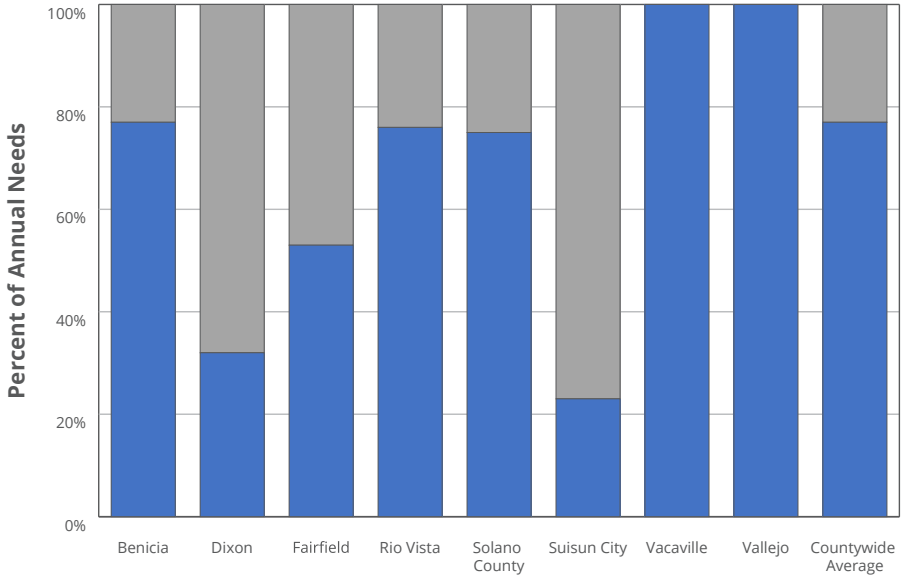
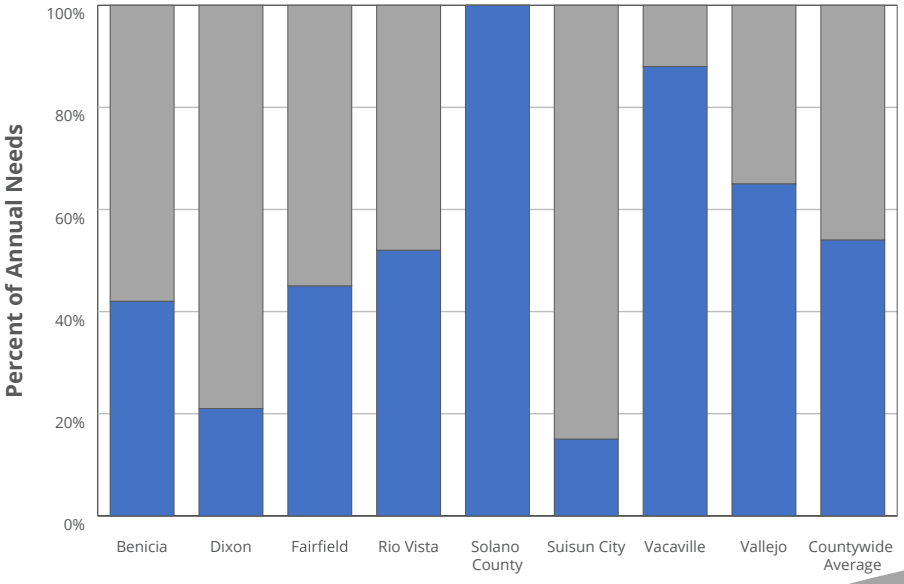


Figure 11. Percent of Annual Needs Budgeted by 2027 to Maintain PCI of 75



Cost of Maintaining Our Roadways Continued

Why Are Roads Failing Now?

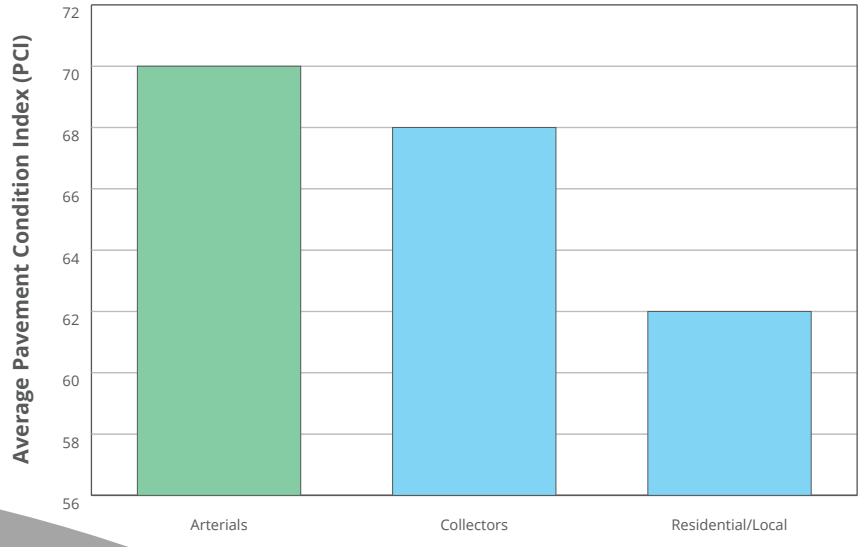
Many long-time residents of Solano County may be asking themselves, "Why are roads failing now, when they were fine before?"

To answer this question, it is important to remember that a road generally has a lifespan of 20 years if it does not receive regular maintenance. As has been stated previously in this report, investment in local streets and roads has been decreasing since 1994. The economic downturn that occurred between 2007 and 2011 also had a very serious impact on the quality of roads, with the amount of funding that local jurisdictions were able to budget for road maintenance decreasing significantly. While the federal government did provide some relief with stimulus funds, these were short-lived and did not bridge the funding shortfall facing local jurisdictions.

Arterials are federally funded and are generally kept in good condition because they carry the highest traffic volumes. However, residential roads, particularly in older neighborhoods, have lagged far behind arterials and collectors in maintenance, causing issues for neighborhoods. Although residential streets carry less traffic than collectors or arterials, they represent the beginning and end of every journey for most Solano County residents.

Figure 12 shows the average PCI countywide for each type of roadway.

Figure 12. Countywide Average PCI by Road Type



Cost of Maintaining Our Roadways Continued

Why Are Roads Failing Now? Continued

Although the average PCI for residential streets is 62, this is a skewed average. Many areas of Solano County experienced rapid growth as the economy recovered, with the construction of new subdivisions and associated roads. Such new construction can skew the average PCI upwards because the new roads are in excellent condition. **This masks the deteriorating condition of older neighborhood streets.**

It is crucial to maintain all types of streets and roads within the existing network in order to ensure a high quality of life for Solano County residents.

Summary and Conclusions

Whether commuting to work, dropping the kids off at school, or making a quick stop at the grocery store, nearly every trip begins and ends on local roadways. Street maintenance is arguably one of the most important infrastructure investments a jurisdiction can make. A quality roadway network also promotes the movement of goods and services, which has a positive effect on economic activity.

How and when we invest in our roads can have major implications on future budgets. Funding low-cost preventive maintenance now to keep roads in good condition can drastically reduce the amount of high-cost rehabilitation or reconstruction necessary if pavements are allowed to deteriorate or fail.

With increased funding available through SB 1, Solano County jurisdictions will be able to address longstanding maintenance backlogs and make greater strides toward bringing the local streets and roads network into a "state of good repair." However, this additional funding still does not fully meet the network's needs. **In order to maintain a countywide PCI goal of 65 over the next 10 years, the jurisdictions will need to spend an additional $10M annually.** And to reach and maintain the PCI goal of 75, which was approved in the Solano Comprehensive Transportation Plan, an additional $25M is needed annually for the next 10 years.

"Strategic investment in infrastructure produces a foundation for long-term growth."
-Roger McNamee

With a healthy investment in our roadway infrastructure, Solano County can halt and reverse its downward trend in pavement quality. Repairing the Solano County road network will help our cities attract new jobs, housing, tourism, and business investment. Money spent now on long-term roadway maintenance can save Solano County and its seven cities millions in the future and strengthen our local economy.

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