The Pothole Report:

Bay Area Roads At Risk

September 2018

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Metropolitan Transportation Commission

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Table of Contents

Executive Summary

California voters' consideration this November of Proposition 6, which would shrink Bay Area cities' and counties' pavement management budgets by an average of 42 percent, provides a timely opportunity to re-examine the state of the region's streets and roads.

Building on the foundation established by MTC's original 2000 Pothole Report and then by a 2011 update, this report includes both a primer on the cost and life cycle of pavement and a comprehensive look at the current state of the Bay Area's local streets and roads network, featuring a jurisdiction-by-jurisdiction ranking of average pavement condition index (PCI) scores among the region's nine counties and 101 cities. This analysis spotlights the myriad pavement-management challenges facing Sonoma County and the vast network of roadways in unincorporated portions of the county. It also illuminates the impact voter approval of Proposition 6 would have on cities' and counties' pavement maintenance programs.

If approved by a majority of voters, Proposition 6 would repeal the $5.4 billion-a-year transportation funding package approved by the state Legislature in 2017 through Senate Bill 1 (SB 1). The measure also would subject any future taxes on motor vehicle fuels (and the vehicles themselves) to voter approval.

By far the largest recipient of SB 1 dollars is a newly-established Road Maintenance and Rehabilitation Program estimated to receive $3.7 billion annually, and through which half the funds are dedicated to city streets and county roads, with the other half going to state highway maintenance. In the nine-county Bay Area, SB 1 is expected to generate more than $200 million for city streets and county roads each year. The prospect that this revenue stream may soon run dry calls for an updated analysis of the Bay Area's local street and road network.

Marginal Improvement

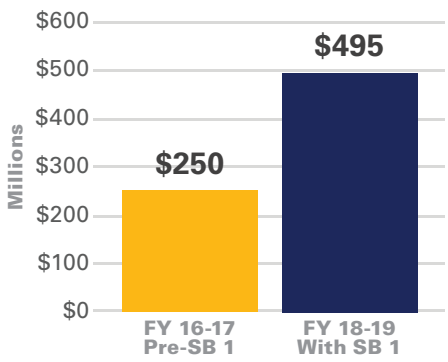
The condition of the Bay Area's local streets and roads has improved since the turn of the 21st century, primarily as a result of targeted local investment and continually-improving pavement maintenance practices. Yet the typical stretch of asphalt still shows serious wear and is likely to require rehabilitation soon. At 67 out of a possible 100 points, the region's average pavement condition index (PCI) score has climbed four points over the past 15 years,

Road Maintenance and Rehabilitation Account (Bay Area Local Streets and Roads)

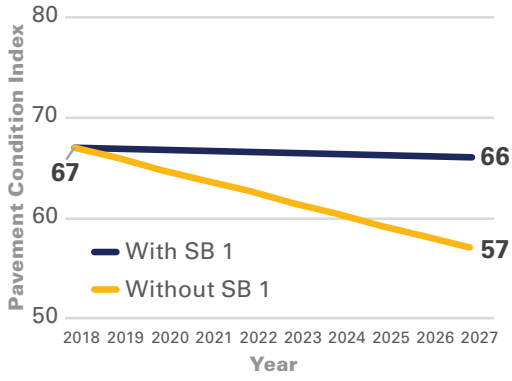
A wide array of projects are eligible, including:

- Safe driving conditions - road maintenance and rehabilitation
- Complete streets safety projects, such as sidewalks and bike lanes
- Traffic control safety devices such as traffic lights and crossings
- Storm water and clean water

Local Road Gas Tax Funding by Year
(in millions, estimate)



Projected Pavement Condition Over Time



though it remains much closer to the 60-point threshold at which deterioration accelerates rapidly and the need for major rehabilitation becomes more likely than it does to the 85-point mark used by MTC to indicate a state of good repair. While years of work by MTC and the region's local governments have forestalled a steep decline, overall conditions on our 43,374 lane-miles of city streets and county roads remain no better than "fair."

Fixing the Fiscal Pothole

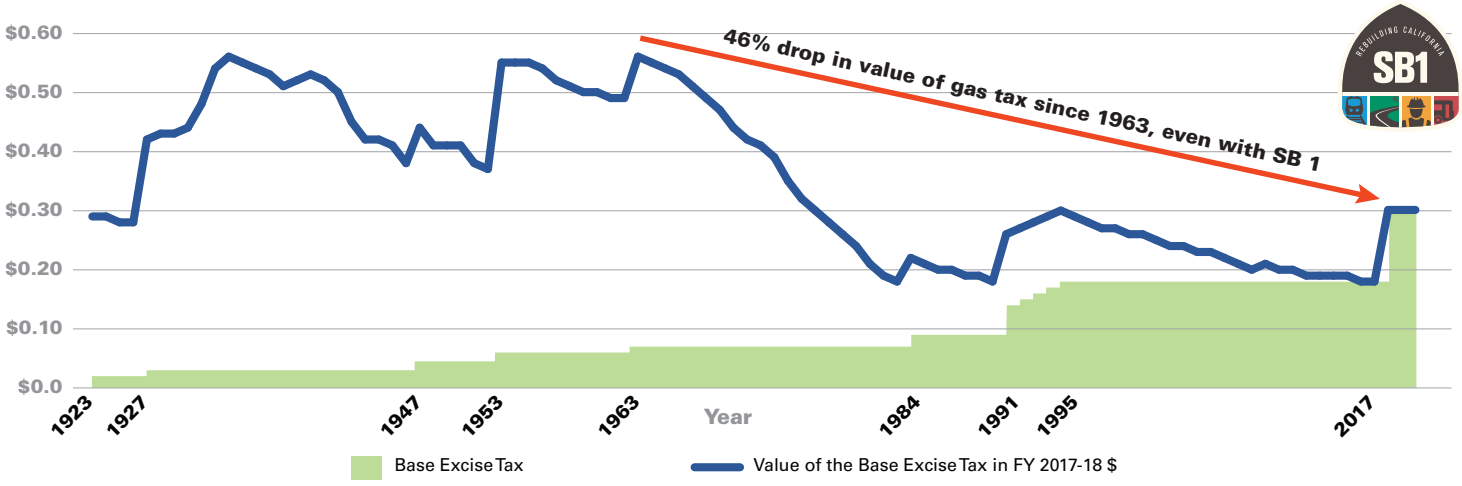
Questions about funding are at the heart of the streets and roads issue. Money for roadway maintenance typically comes from a range of sources, including not just the state gasoline tax but also county sales taxes, and local sources such as city or county general funds, bonds and traffic-impact fees. But as the need for maintenance has grown as the Bay Area roadway network ages, available funding in most cities and counties effectively had been shrinking — and maintenance backlogs swelling — until last year's enactment of SB 1.

To help cities and counties get the biggest bang for their buck, MTC has long advocated pavement preservation. A municipality that spends $1 on timely maintenance to keep a section of roadway in good condition would have to spend $5 to restore the same road if the pavement is allowed to deteriorate to the point where major rehabilitation is necessary. All 109 Bay Area jurisdictions — and hundreds of other public agencies nationwide — now use MTC's StreetSaver® pavement management software to inventory their street networks, determine maintenance needs and devise maintenance programs based on available revenues.

MTC estimates that achieving a regional state of good repair for pavement would require an investment of more than $700 million each year, or a total of some $17 billion through 2040. This level of investment is 20 percent higher than the current $602 million spent annually by all sources on roadway maintenance.

Even if California voters vote down Proposition 6 and secure the future of SB 1, fixing this fiscal pothole will be an ongoing challenge for MTC and local governments alike as we move toward development and adoption of Plan Bay Area 2050, the comprehensive regional plan to guide Bay Area transportation investment through 2050.

Purchasing Power of California's Excise Gasoline Tax (¢ per gallon)



Pavement Preservation and Pavement Management

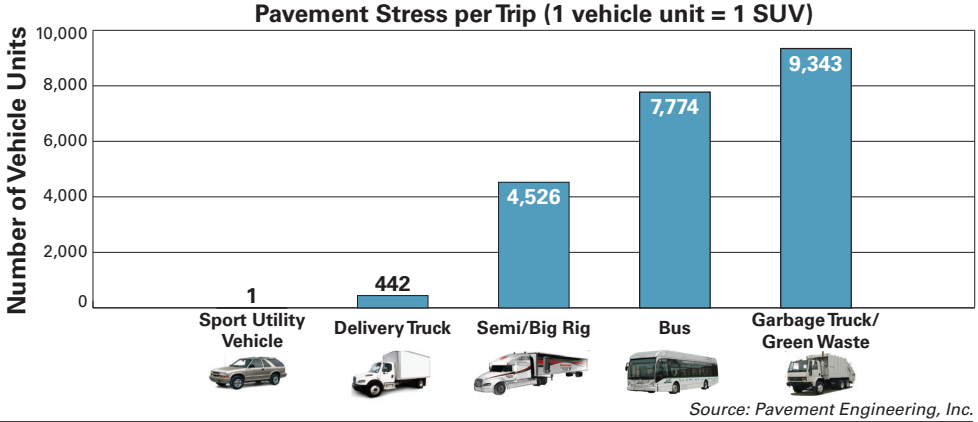
Streets and roads take a beating under the weight of traffic. The first sign of distress on surface pavement is usually cracking. While cracks may not immediately alter ride quality, they expose the sub-base of the roadway to water leaking through the surface layer. In time, water erodes pavement strength and cracks begin to lengthen and multiply, forming interconnected networks of cracks referred to as "alligator cracking." At this point, the pavement is no longer able to sustain the weight of traffic. It then disintegrates, forming depressions more familiarly known as potholes. Since potholes result from damage to the roadway's sub-base, once they appear — regardless of whether or not they are patched — the roadway will continue to deteriorate until it reaches a failed state.

Heavy vehicles such as trucks and buses put far more stress on pavement than does a car. A bus exerts more than 7,000 times the stress on pavement than does a typical sport utility vehicle. And a garbage truck exerts more than 9,000 times as much stress as an SUV. Not surprisingly, cracks appear more quickly on streets with large traffic volumes and/or heavy use by trucks and buses.

About 36 percent of the Bay Area's local road mileage consists of arterial and collector roadways, which are heavily used by both trucks and buses. The pounding that pavement receives from trucks and buses can be especially problematic in more rural parts of the Bay Area, where many roadways have not been designed to accommodate heavy vehicles but which are nonetheless used by growing numbers of trucks carrying goods between farms and cities.

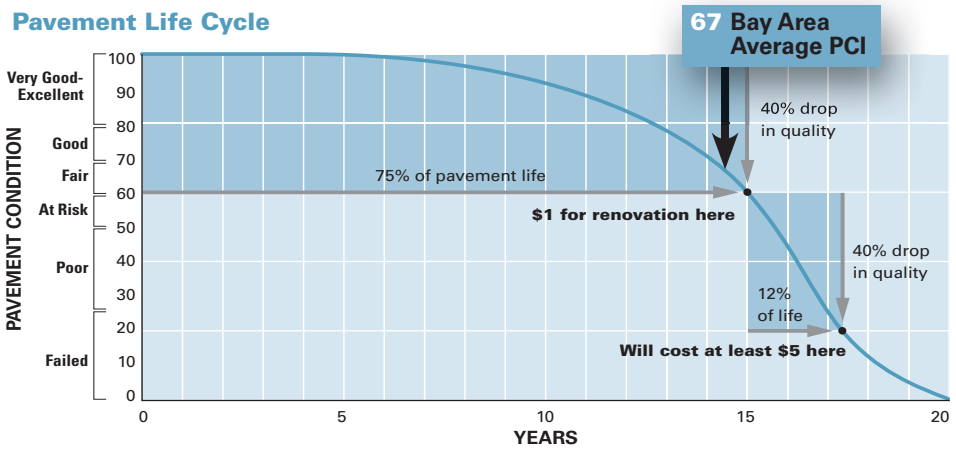
The most cost-effective way to maintain a roadway is to address cracks in the pavement as soon as they surface. Just as regular oil changes are far less expensive than a complete engine rebuild, it is five to 10 times cheaper to properly maintain streets

Relative Impact of Vehicle Types on Pavement Conditions



Source: Pavement Engineering, Inc.

Pavement Life Cycle



Time varies depending on traffic, climate, pavement design, etc.

than to allow them to fail and then pay for the necessary rehabilitation (see chart above). Deteriorating pavement carries private costs as well. A 2018 report by TRIP, a nonprofit organization that researches, evaluates and distributes technical data on highway transportation issues, estimated that drivers in the San Francisco-Oakland area pay an extra $2,992 in annual operating costs for each vehicle as a result of roadway conditions[1].

The Importance of Early Intervention

The Bay Area has long emphasized the importance of early intervention through the adoption of proactive maintenance strategies, better education in pavement preservation concepts, and regional policies that give cities and counties incentives to practice pavement preservation on their street and road networks. MTC's Plan Bay Area 2040 reaffirms this overall approach by conditioning regional funds for local street and road maintenance not only on need and level of system usage but also on preventive-maintenance performance. By contrast, cities and counties that spend almost all of their paving budgets to fix only a handful of failed roadways, instead of proactively maintaining a much larger percentage of their network that is still in good condition, are practicing what is known as a "Worst First" strategy. With this approach, the good roads for which maintenance is deferred soon fall into disrepair and require more extensive and costly treatments.

Bay Area governments' support for the preventive-maintenance philosophy — and their shift away from the ineffective "Worst First" strategy — has helped cities and counties squeeze the most out of existing resources. Indeed, the quality of Bay Area pavement (on average) actually increased slightly from 2011 to 2017, despite the fact that growth in maintenance revenues failed to keep pace with increases in the cost of paving materials.

Best and Worst Bay Area Roads

Many factors affect a city's or county's pavement condition index, or PCI score. These include pavement age, climate and precipitation, traffic loads and available maintenance funding. A municipality with new housing developments and new streets may have a high overall PCI, while an older, urbanized jurisdiction may have a much lower PCI, even though both are practicing pavement preservation. Cities and counties that practice preventive maintenance will have lower long-term pavement costs and will safeguard their investment in local streets and roads. For a full listing of Bay Area jurisdictions' pavement conditions, please go to page 15.

Bay Area Jurisdictions With Best and Worst Pavement Conditions in 2017, Based on 3-Year Average PCI Scores

Best PCI Ratings	Worst PCI Ratings
Dublin – **85**	Larkspur – **42**
Clayton – **84**	Petaluma – **46**
El Cerrito – **84**	Sonoma County – **49***
Palo Alto – **83**	Napa County – **51***
Brentwood – **83**	Martinez – **51**

*Unincorporated area

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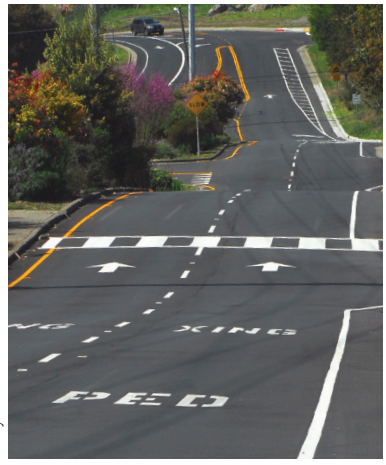
- Over 450 clients including Houston, Seattle, Portland, San Francisco, San Jose, Stanford University, US Forest Service
- Available online anytime, and anywhere with Internet access at **www.streetsaver.com**



Jerry Bradshaw

El Cerrito streets have had a major makeover, funded in part by revenues from a voter-approved sales tax.

El Cerrito: A Pavement Success Story

In 2006, the city of El Cerrito's local street network was in poor condition (single-year PCI score of 48) and the city had a backlog of more than $21 million in maintenance work. In less than five years, the city had boosted its single-year PCI score to 85 and had trimmed its maintenance backlog by more than 95 percent. By 2017, El Cerrito's PCI had stabilized in the mid-80s and its maintenance backlog had remained similarly manageable. How did El Cerrito improve pavement conditions so much and so quickly?

After launching a public outreach campaign that included citizens, city council members and public works staff, El Cerrito won passage of a half-cent sales tax measure in 2008 for a Street Improvement Program. With $2.1 million in sales tax revenues, augmented by $10.5 million in bond proceeds and $1.8 million in grant funds, the city improved pavement conditions and created a direct, local source of revenue for future maintenance. The biggest impact of the Street Improvement Program was El Cerrito's ability to reduce its maintenance backlog. The city also resurfaced 68 percent of its streets, built over 400 new curb ramps and replaced 50 storm drain crossings.

El Cerrito's Pavement Program and Conditions, 2006 vs. 2017

	2006	2017
Single-year PCI score	48 (Poor)	83 (Very Good)
PCI: 3-year moving average	53 (At Risk)	84 (Very Good)
Maintenance backlog	$21.2 million	$2.1 million
Annual budget needed to maintain PCI	$1.3 million	$1 million
Annual average funding level	$250,000	$1 million

Inspired in part by the success of the El Cerrito Street Improvement Program, two other Contra Costa County cities placed similar sales tax measures on the ballot in 2012, with 69 percent of voters in Orinda endorsing Measure L, a quarter-cent sales tax to finance the repair, rehabilitation and maintenance of local streets; and 70 percent of voters in neighboring Moraga approving Measure K, which provides a full cent on each dollar of taxable sales for pavement repair and rehabilitation, and for storm drain repair.

Measure K's impact was felt almost immediately, as Moraga used the new sales-tax revenue stream to support a successful bond issue that generated nearly $8 million for the town's pavement management program. The three-year moving average PCI score on Moraga's 110 lane-miles of local streets climbed 10 points from 58 in the 2012-14 period to 68 for 2015-17. Over the same period, Orinda's three-year PCI score has soared from 49 to 60.

Pavement Management Boosts Preservation Returns

Building on pavement preservation principles established by the Federal Highway Administration[2], MTC developed a software package called StreetSaver® to assist local agencies in

maintaining their roadways. StreetSaver® integrates the three main pavement preservation components: preventive maintenance, minor rehabilitation (non-structural) and routine maintenance activities, as well as pavement rehabilitation and reconstruction.

Today, all 109 Bay Area jurisdictions — and more than 350 additional public and private agencies nationwide and internationally — use StreetSaver®. The software allows cities and counties to inventory their street networks, determine their maintenance needs and devise maintenance programs based on available revenues. The software develops a list of recommended treatments and prioritizes treatments based on a weighted effectiveness ratio. Within the constraints of each jurisdiction's budget, the software selects the most cost-effective treatments for implementation and defers the remainder.

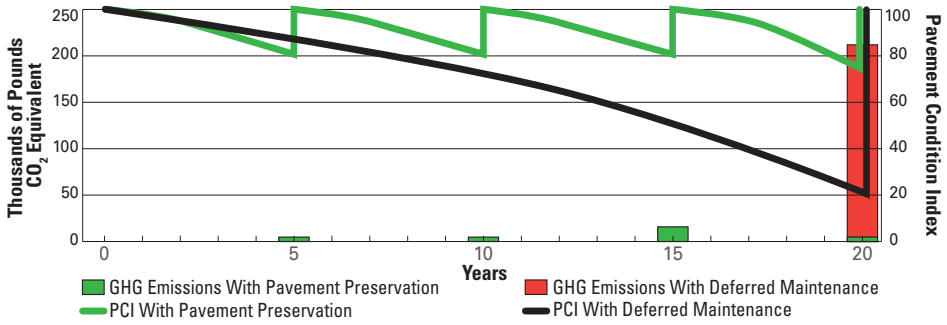
As with any other software package, StreetSaver®'s effectiveness depends on the input of reliable data. So for StreetSaver® to work, public works staff must promptly enter updated information about maintenance treatments once the treatments have been applied.

Reduced Greenhouse Gas Emissions

In addition to long-term cost savings, pavement preservation and pavement management strategies pay dividends by reducing greenhouse gas (GHG) emissions. Smooth pavement reduces GHG emissions by improving vehicles' fuel economy. More-frequent, low-cost treatments also produce fewer emissions than do major rehabilitation projects made necessary by deferred maintenance (see graph below). This is due to the need to produce less asphalt or other paving materials, and the need for fewer truck trips to transport materials to and from the worksite.

Pavement rehabilitation and reconstruction requires large amounts of energy to acquire and process raw materials, transport materials to the construction site, apply the materials, and remove, haul away and discard old materials. Over a 20-year period, these processes combined produce an estimated 212,000 pounds of GHG emissions per lane mile of roadway. Preservation treatments, by contrast, would emit about 30,100 pounds of GHGs over this time, even when done more frequently. This 20-year savings of more than 180,000 pounds of GHG emissions is equivalent to taking 15 cars off the road for a year for each lane mile properly maintained.

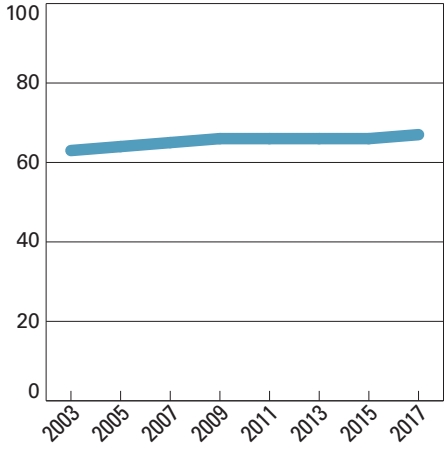
GHG Emissions With Pavement Preservation vs. Deferred Maintenance[3]



Benefits of a Pavement Management System

- Provide a systematic way of gauging pavement conditions, and present a series of steps for using this information to identify and schedule the most appropriate treatments.
- Help cities and counties make more efficient use of public funds by allowing them to immediately put any available new moneys to their most cost-effective use.
- Allow local governments to predict what conditions would be at different levels of funding, and to quantify the consequences of underfunded road maintenance.
- Allow local governments to establish performance-based funding allocation policies.
- Reduce governments' overall maintenance spending once the management system reaches its goal of getting all pavement segments to the condition where preservation is the primary strategy being applied.
- Build support for increased funding by systematically tracking pavement inventories, conditions and maintenance activities across multiple jurisdictions

Bay Area Pavement Condition Index (PCI) Scores, 2003–2017*



*PCI scores are 3-year moving averages.

Regional Pavement Condition Summary

The Bay Area's local street and road network comprises 43,374 lane miles of roadway, and includes not only paved surfaces but also the curbs and gutters, sidewalks, storm drains, traffic signs, signals and lights that are necessary for functioning roadways. To replace this network would cost at least $50 billion. The roadway network provides access to jobs, homes, schools, shopping and recreation, and is vital to the region's livability and economic health. As with any asset, regular maintenance is required in order to ensure serviceability.

Every year, local jurisdictions analyze pavement conditions to help gauge their success in maintaining their local street and road networks. MTC, in turn, collects this information to determine regional state of repair. MTC and local jurisdictions use a pavement condition index (PCI) score that rates segments of paved roadways on a scale from 0 to 100. MTC looks at the percentage of the region's roadways that fall into various condition categories, ranging from a low of "failed" to a high of "excellent." The classifications used in the regional pavement condition analysis are shown in the table below.

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.

The 2017 pavement condition analysis shows that Bay Area streets and roads have a three-year moving average PCI score of 67, which is unchanged from the same calculation for 2016. This score falls in the "fair" range, indicating that the typical city street or county road is becoming worn to the point where rehabilitation may be needed to prevent rapid deterioration. The stability of the Bay Area's average PCI score is mirrored in the percentage of lane miles included in the various pavement quality classifications in recent years. As the bar graph below shows, roadways in the "excellent" or "very good" ranges account for about one-third of the paved lane miles in the nine-county region. Another one-third falls in the "good" or "fair" ranges, while the final third is classified as "at-risk," "poor" or "failed."

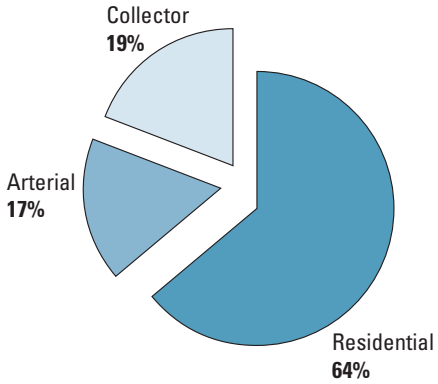
Functional Classifications

Just as there are different ranges of pavement quality, so too are there various classifications for local streets and roads. A roadway's "functional classification" is determined primarily by the number of vehicles that use it. About 65 percent of roadways are residential (see chart at right). These are the streets and roads that run through neighborhoods and carry few buses or trucks, other than waste management vehicles. Collector roadways serve to "collect" traffic from the residential streets and deposit them onto arterials, which carry the most car, truck and bus traffic, and which typically provide an outlet onto state highways or freeways. Arterials also function as alternatives to highways and freeways to relieve traffic congestion. Federal funding can be used only on roadways that have a functional classification of collector or arterial, or roughly 35 percent of the Bay Area street system.

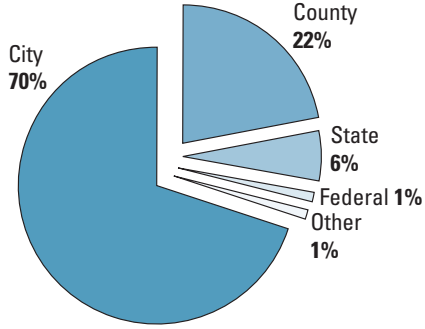
Local streets and roads, which are owned and maintained by cities or counties, account for 92 percent of the Bay Area's total lane mileage. State highways (including interstate highways) are maintained by Caltrans and comprise about 6 percent of total mileage. Roadways that fall under the responsibility of the federal government primarily include those in national parks, reserves, tribal lands and military installations. About 1 percent of roadways are either privately owned, or are owned and maintained by special districts such as the California Department of Parks and Recreation or the Golden Gate Bridge, Highway and Transportation District.

Bay Area Local Roadway Characteristics

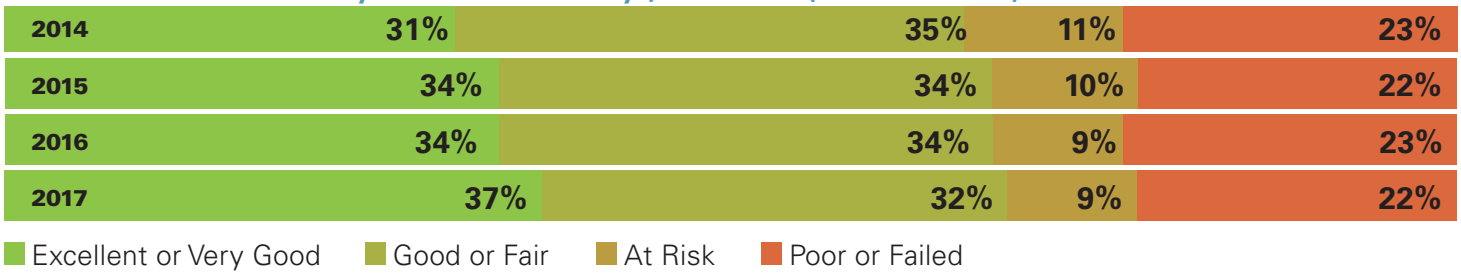
Functional Classification of Local Street and Road Network, by Percentage of Mileage



Ownership of Maintained Roads in Bay Area, by Percentage of Mileage



Pavement Conditions on Bay Area Local Roadways, 2014–2017 (% of lane miles)



Dispelling Political Myths

Just as the passage of SB 1 sparked an almost-immediate surge of pavement maintenance work around California, so too did it fuel the spread of various myths about transportation funding in the Golden State. Though easily disproven, these myths have gained currency in some quarters as voters prepare to decide on Proposition 6.

MYTH: SB 1 money goes to the state General Fund instead of roadways.

FACT: Not a penny of SB 1 money goes to the General Fund. Further, voters in June 2018 overwhelmingly approved Proposition 69, which enshrines protection of transportation funds in the state Constitution.

MYTH: Politicians have diverted gas tax money to fund state budget shortfalls and pay lavish salaries and pensions.

FACT: All money from the state gas tax goes to streets and roads, highways and other transportation investments. The origins of this myth go back to 1971 when Gov. Ronald Reagan signed the Transportation Development Act, which instituted a sales tax on gasoline to support the General Fund. In 1990, a year in which California enjoyed a large budget surplus, the Legislature actually began transferring General Fund revenues to transportation, rather than the other way around. These transfers continued until the early 2000s, when the end of the dot-com boom created deep shortfalls in the General Fund.

(continued next page)

SB 1: A Historic Commitment to Roadway Renewal

The California Legislature's passage last year of state Senate Bill 1, formally known as the Road Repair and Accountability Act of 2017, authorized the first increase in the base state excise tax on gasoline since 1994. This tax traditionally has been the largest single revenue source for most California cities' and counties' street and road systems. But 23 years of inaction in Sacramento eroded the purchasing power of the gas tax by 40 percent. Adjusted for inflation, the 18 cents per gallon drivers paid in 1994 was equal to 30 cents per gallon in 2017 — precisely the level to which SB 1 raised the excise tax.

In the decade ahead, the 12-cents-per-gallon gas tax hike and other SB 1 funding mechanisms are projected to generate more than $52 billion for transportation improvements statewide, with the funds split 50/50 between a "Fix Local Streets and Transportation Infrastructure" element and a "Fix State Highways and Transportation Infrastructure" component. Together, Bay Area cities and counties anticipate over $200 million in SB 1 funding for their streets and roads during the current 2018-19 fiscal year — a 73 percent jump in state gas tax revenue income from the pre-SB 1 baseline and a figure that accounts for more than 40 percent of all local roadway investment regionwide.

Though SB 1 funds alone are not enough to restore all Bay Area streets and roads to good condition, it's hard to overstate the impact of this long-needed infusion. MTC projects that 10 years of SB 1 funding will allow the region to maintain an average overall PCI score of 66 through 2027. Without SB 1 dollars, the regional average PCI score would sink to 57 — squarely in the "at risk" category. Cities' and counties' roadway maintenance backlogs, meanwhile, would more than double without SB 1 to a combined $13.9 billion from the current total of $6.2 billion. This 10-year scenario is broken down by county in the charts opposite.

Local Street and Road Condition and Maintenance Backlog 10-Year Scenarios: With SB 1 Revenue and Without

Pavement Condition Index (PCI)

County	2017 PCI	2027 PCI With SB 1	2027 PCI Without SB 1
Alameda County	68	68	58
Contra Costa County	71	70	61
Marin County	66	66	55
Napa County	56	59	51
San Francisco	74	80	71
San Mateo County	72	71	63
Santa Clara County	70	70	60
Solano County	68	61	53
Sonoma County	53	48	41
Bay Area	**67**	**66**	**57**

Maintenance Backlog

County	2017 Backlog	2027 Maintenance Backlog With SB 1	2027 Maintenance Backlog Without SB 1
Alameda County	$1,025,233,000	$1,336,594,243	$2,030,816,935
Contra Costa County	$858,559,000	$1,133,180,981	$1,695,696,201
Marin County	$261,476,000	$488,182,105	$689,874,129
Napa County	$264,216,000	$416,501,410	$537,062,902
San Francisco	$250,684,000	$242,542,445	$650,749,959
San Mateo County	$362,166,000	$681,428,521	$997,168,674
Santa Clara County	$1,204,079,000	$2,013,334,487	$2,984,851,072
Solano County	$574,506,000	$1,152,204,824	$1,462,117,714
Sonoma County	$1,433,128,000	$2,357,020,549	$2,810,537,142
Bay Area	**$6,234,047,000**	**$9,820,989,565**	**$13,858,874,728**
Increase		**58%**	**122%**

Dispelling Political Myths (continued)

MYTH: California can tap other funds to finance street, road and highway repairs.

FACT: There is no Plan B. Voter approval of Proposition 6 would eliminate more than $5 billion in SB 1 revenues each year. Because the combined statewide maintenance backlog for streets, roads and highways totals more than $130 billion over the next 10 years, transferring this money from the state General Fund would mean taking $130 billion away from education, healthcare, public safety and other state programs.

MYTH: The state gas tax produces more revenue each year because Californians are driving more.

FACT: Because vehicles get far better mileage than they did in 1994, the typical driver now pays less in fuel taxes each year than she did a generation ago—even if she racks up more road miles. Due to increased fuel efficiency, the per-mile revenues generated by the state gas tax have been falling for decades.

Sonoma County: A Convergence of Challenges

Many factors affect a city's or county's pavement condition index (PCI) score. These include the size of the street or road network, the age of the pavement, climate and precipitation, traffic loads and available maintenance funding. One place where older pavement, higher rainfall, heavier traffic loads, and a chronic shortage of money all come together is in Sonoma County, where PCI scores on a vast network of roads in the unincorporated portions of the county consistently have ranked among the very lowest of any Bay Area jurisdiction.

Sonoma County's road network, which includes more than 1,300 centerline miles and over 2,700 lane miles, is the second largest of all Bay Area municipalities, trailing only the city of San Jose's. On top of the usual pavement preservation challenges cities and counties constantly confront, Sonoma County also shoulders much of the cost of recovery from October 2017 wildfires that burned over 100,000 acres and destroyed more than 5,000 homes in the county. "The last two years we've been hit really hard with disasters — first slides and then fires," commented Sonoma County Public Works Director Johannes Hoevertsz. "Resiliency and recovery from the fires is a priority that requires a lot of vegetation maintenance. So that's made it even more difficult to budget for road repairs."

"The number one complaint in Sonoma County is the condition of our roads," acknowledged Janice Thompson, who manages the county's engineering division.

It's a complaint Sonoma County leaders take seriously. The Board of Supervisors directed $12 million to $14 million from the county's General Fund to the Transportation and Public Works Department in each of the last four years and, despite the extraordinary expenses created by fire-recovery efforts, boosted this contribution to just over $20 million for the 2018-19 fiscal year.

Sonoma County's commitment has paid off in steadily-improving PCI scores, with the three-year moving average rising from just 45 in 2014 to 49 by 2017, and the one-year score climbing to 48 in 2017 from 46 in 2014. Yet despite the positive movement, Sonoma County's roadway maintenance backlog totals over $900 million and more than half the network remains in "poor" or "failed" condition, with just 19 percent of county-owned pavement rated "excellent" or "very good." Less-traveled Sonoma County roads carrying a residential classification registered a one-year PCI score of just 33 for 2017.

The steep climb needed to restore Sonoma County roadways to a state of good repair is magnified by uncertainty about the future of SB 1 funding. The county budget projects $9.8 million in roadway maintenance money from SB 1 for the 2018-19 fiscal year, with half the funds going to pavement preservation and the

other half set for rehabilitation projects. When added to nearly $4 million in other state gas tax funds and the $20 million infusion from the county General Fund, the public works team is now implementing a $34 million roadway work plan that calls for maintaining or rehabilitating 380 miles of county roads and 328 county-owned bridges.

Without the continued flow of SB 1 dollars, however, Sonoma County almost certainly will face an even steeper climb in its efforts to boost the quality of its roadway network. MTC projections forecast that, absent SB 1 revenue, the county's pavement maintenance backlog will soar by almost two-thirds, from about $924 million to more than $1.5 billion, and its average PCI score will plummet from the current 48 to 35 by 2027.

"We have one of the most aggressive years ever planned in terms of maintenance and road construction," said Hoevertsz. "Prop. 6 would reduce both maintenance and pavement preservation. Overlaying and slurry seals all would be reduced. And we would have to put on hold a lot of drainage improvements and culvert repairs as well as pothole patching."

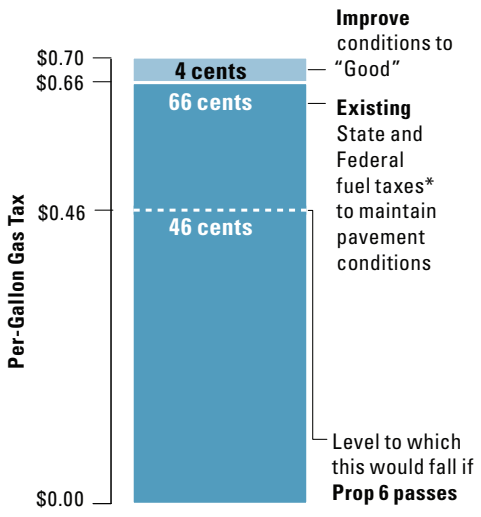
Noting that streets and roads in Sonoma County and elsewhere will continue to need preservation, maintenance and repair regardless of the outcome of the Proposition 6 vote, Hoevertsz observed, "At some point we're going to have to come to terms with having to spend more on our roads."

(Army National Guard photo by Capt. Will Martin/Released)

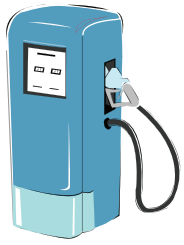
Costs associated with recovery from the 2017 wildfires have added to the pressure on Sonoma County's pavement maintenance budget.

What Will It Take?

Even with the additional revenues generated by SB 1, the Bay Area's streets and roads lack sufficient funding to reach a "state of good repair" (regional average PCI of 85). New revenues roughly equal to a 4-cent increase in the gas tax would be needed to reach this goal. The figure below illustrates the level to which per-gallon gas taxes would need to rise in order to generate the funds necessary to bring the region's current "fair" pavement conditions up to a "good" level. To also improve the region's non-pavement assets to a "good" condition, an extra 18 cents per gallon or more would likely be required.



* Revenues from the existing state and federal fuel taxes are dedicated to many purposes — streets and roads are only one of these.



Looking Forward: The Funding Picture

With a regionwide average PCI score of 67, the Bay Area's city streets and county roads are not far from the tipping point on the pavement life-cycle curve, after which pavement may decline rapidly and repair costs increase (see illustration on page 5).

Predictable, long-term funding is imperative if cities and counties are to travel toward a pothole-free future. The Bay Area currently invests about $602 million annually in maintaining local streets and roads — a figure that includes $354 million from SB 1. If investment continues at this level, local streets and roads will, on average, maintain a 66-point PCI score through 2027, though the region's total maintenance backlog will climb 58 percent to more than $9.8 billion from the current $6.2 billion level. If investment does not continue at this level, local streets and roads will, on average, deteriorate to at-risk condition (PCI of 57) by 2027. In order to bring the region's pavement conditions up to very good condition (PCI of 85), the region would need to almost double current maintenance expenditures to nearly $1 billion annually. The chart below details the average pavement conditions that are projected at each investment level.

Projected Pavement Conditions in 2027 Based on Annual Expenditure Level Scenarios

	Existing Funding	With Prop 6	Maintain Current Pavement Condition	Desirable Funding
Average Regional PCI* in 2027	67	57	66	85
Maintenance Backlog	$6.23 billion	$13.86 billion	$9.82 billion	$0
Pavement Condition	Fair	At Risk	Fair	Very Good
Average Annual Expenditure Level**	$602 million	$226 million	$602 million	$967 million
Annual Expenditure/Lane Mile	$13,900	$5,200	$13,900	$22,300
Change from Existing Funding (%)	0%	–58%	0%	61%

*PCI is the Pavement Condition Index (Scale of 0 to 100, with 100 being the highest PCI).
**Average Annual Expenditure Level assumes a 2.2 percent inflation rate.

Currently, revenue sources typically used to pay for roadway maintenance include state gas taxes, federal highway funds, county sales taxes, city and county general funds, bonds and traffic fees. As the various levels of government look to renew and/or reauthorize funding measures and long-range plans, attention to the cost of maintaining streets and roads at a good state of repair should remain a high priority.

Pavement Condition Index (PCI) for Bay Area Jurisdictions, 2014–2017

Jurisdiction	County	Total Lane Miles	3-Year Moving Average 2014	2015	2016	2017
Very Good (PCI=80–89)						
Dublin	Alameda	277	86	85	85	85
Clayton	Contra Costa	94	80	81	83	84
El Cerrito	Contra Costa	145	84	84	84	84
Palo Alto	Santa Clara	415	78	79	81	83
Brentwood	Contra Costa	421	86	85	84	83
Colma	San Mateo	24	78	83	84	83
Foster City	San Mateo	120	81	82	82	82
Daly City	San Mateo	255	77	77	79	81
Union City	Alameda	329	81	81	82	81
Solano County	Solano	924	77	79	80	81
San Ramon	Contra Costa	498	78	80	80	80
Good (PCI=70–79)						
Los Altos Hills	Santa Clara	123	75	77	78	79
Portola Valley	San Mateo	70	80	79	79	79
Lafayette	Contra Costa	199	76	77	79	79
Pleasanton	Alameda	513	78	79	78	79
Windsor	Sonoma	171	70	73	75	78
Livermore	Alameda	719	76	77	76	78
Brisbane	San Mateo	67	77	76	77	77
Danville	Contra Costa	323	73	74	75	77
Oakley	Contra Costa	289	75	75	76	77
Emeryville	Alameda	47	76	78	79	77
Atherton	San Mateo	106	79	78	77	77
Sunnyvale	Santa Clara	639	77	77	76	76
Cupertino	Santa Clara	298	65	67	72	76
Redwood City	San Mateo	354	77	78	78	76
San Mateo	San Mateo	424	73	75	76	76
Burlingame	San Mateo	162	75	77	76	76
Tiburon	Marin	68	74	74	75	76
Hillsborough	San Mateo	166	72	71	73	76

Pavement Condition Index (PCI) for Bay Area Jurisdictions, 2014–2017 (continued)

Jurisdiction	County	Total Lane Miles	3-Year Moving Average 2014	2015	2016	2017
Belvedere	Marin	23	80	79	77	76
Newark	Alameda	256	76	76	76	76
San Pablo	Contra Costa	104	77	77	76	75
South San Francisco	San Mateo	295	71	73	73	75
Woodside	San Mateo	96	71	72	73	74
Santa Clara	Santa Clara	593	74	73	73	74
Yountville	Napa	17	69	71	74	74
Sonoma	Sonoma	68	70	72	73	74
Ross	Marin	23	72	72	72	74
Milpitas	Santa Clara	299	72	72	73	74
Menlo Park	San Mateo	196	77	76	74	73
San Mateo County	San Mateo	623	70	70	72	73
Walnut Creek	Contra Costa	435	71	71	72	73
Mountain View	Santa Clara	332	71	70	71	72
Fremont	Alameda	1,073	66	69	71	72
Alameda	Alameda	277	67	69	71	72
Contra Costa County	Contra Costa	1,330	70	71	72	72
Alameda County	Alameda	994	71	71	71	71
Los Altos	Santa Clara	227	78	76	73	71
Fairfield	Solano	743	71	71	72	71
Rohnert Park	Sonoma	212	68	69	71	71
San Francisco	San Francisco	2,142	66	67	68	70
Novato	Marin	319	71	70	70	70
Hayward	Alameda	655	67	67	68	70
Fair (PCI = 60–69)						
Morgan Hill	Santa Clara	290	71	68	69	69
Hercules	Contra Costa	122	72	71	71	69
Saratoga	Santa Clara	283	70	67	68	69
Napa	Napa	471	64	66	67	69
Vacaville	Solano	616	69	69	69	69
Corte Madera	Marin	72	69	68	69	68
Moraga	Contra Costa	111	58	64	67	68

Pavement Condition Index (PCI) for Bay Area Jurisdictions, 2014–2017 (continued)

			3-Year Moving Average			
Jurisdiction	**County**	**Total Lane Miles**	**2014**	**2015**	**2016**	**2017**
Antioch	Contra Costa	683	67	66	67	68
Santa Clara County	Santa Clara	1,427	72	70	69	68
Pinole	Contra Costa	118	67	67	68	68
Dixon	Solano	139	75	72	69	68
Gilroy	Santa Clara	270	72	69	68	67
Campbell	Santa Clara	230	73	72	70	67
American Canyon	Napa	114	67	69	69	67
San Rafael	Marin	331	69	68	67	67
Pittsburg	Contra Costa	343	65	67	69	67
East Palo Alto	San Mateo	83	58	58	63	66
Pleasant Hill	Contra Costa	224	65	65	66	66
Los Gatos	Santa Clara	230	70	68	67	66
Half Moon Bay	San Mateo	55	63	67	66	65
Mill Valley	Marin	116	58	60	61	64
Sausalito	Marin	58	65	66	65	64
San Jose	Santa Clara	4,320	62	62	62	64
San Bruno	San Mateo	181	62	65	64	64
Marin County	Marin	851	59	60	62	63
San Anselmo	Marin	81	59	60	62	63
Fairfax	Marin	55	65	65	64	63
San Carlos	San Mateo	175	60	59	61	62
Richmond	Contra Costa	577	64	63	61	62
Healdsburg	Sonoma	93	60	61	61	62
Monte Sereno	Santa Clara	27	66	63	62	62
Piedmont	Alameda	78	67	65	62	61
Suisun City	Solano	153	59	55	58	60
Orinda	Contra Costa	193	49	49	54	60
Santa Rosa	Sonoma	1,122	62	61	60	60
Rio Vista	Solano	46	57	57	56	60
Concord	Contra Costa	717	62	61	60	60

Pavement Condition Index (PCI) for Bay Area Jurisdictions, 2014–2017 (continued)

Jurisdiction	County	Total Lane Miles	3-Year Moving Average 2014	2015	2016	2017
At-Risk (PCI=50–59)						
Cloverdale	Sonoma	65	63	62	61	59
Albany	Alameda	58	57	57	59	59
Berkeley	Alameda	454	58	58	58	57
San Leandro	Alameda	393	56	56	56	57
Sebastopol	Sonoma	48	62	60	58	56
St. Helena	Napa	52	45	50	55	55
Belmont	San Mateo	139	55	55	54	55
Oakland	Alameda	2,022	59	57	56	55
Benicia	Solano	198	59	57	56	55
Cotati	Sonoma	48	55	53	52	53
Vallejo	Solano	715	47	49	51	53
Pacifica	San Mateo	186	56	55	54	53
Millbrae	San Mateo	123	56	54	52	52
Calistoga	Napa	31	55	54	52	52
Martinez	Contra Costa	233	57	52	48	51
Napa County	Napa	838	56	53	52	51
Poor (PCI=25–49)						
Sonoma County	Sonoma	2,686	45	47	49	49
Petaluma	Sonoma	397	45	46	46	46
Larkspur	Marin	66	40	39	41	42
Regional		**43,374**	**66**	**66**	**67**	**67**

Footnotes/Citations

[1] (Page 5) Press release reference: www.tripnet.org/docs/CA_Statewide_Transportation_by_the_Numbers_TRIP_Release_08-15-2018.php

[2] (Page 6) Pavement Preservation includes work that is planned and performed to improve or sustain the condition of the transportation facility in a state of good repair. Preservation activities generally do not add capacity or structural value, but do restore the transportation facility's overall condition. (https://www.fhwa.dot.gov/pavement/preservation/pubs/16cai012.pdf)

[3] (Page 7) Jim Chehovits and Larry Galehouse, "Energy Usage and Greenhouse Gas Emissions of Pavement Preservation Processes for Asphalt Concrete Pavements," Proceedings of the International Conference for Pavement Preservation, 2010

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The Pothole Report: Bay Area Roads At Risk was produced by MTC's Programming and Allocations Section.

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