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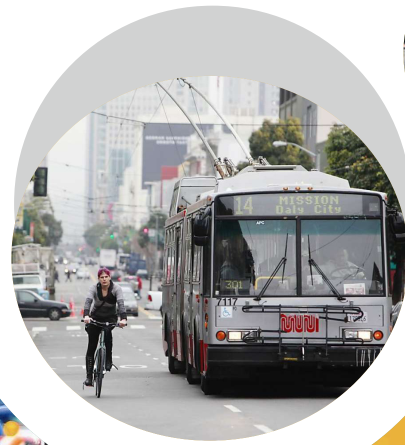
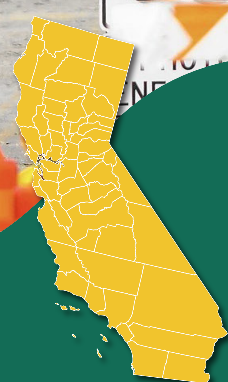
California Statewide Local Streets and Roads Needs Assessment

Final Report
October 2018





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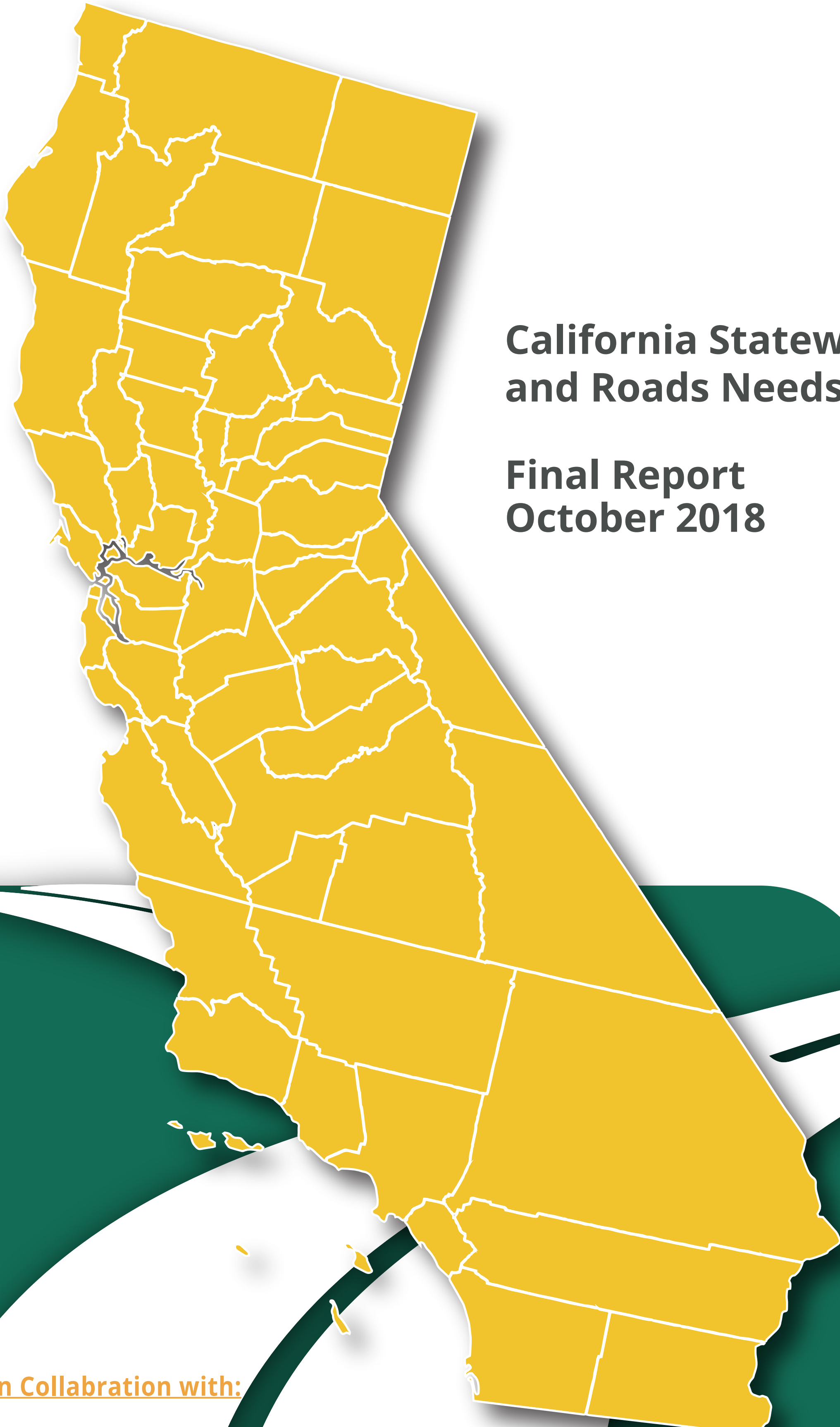

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In Collaboration with:

QUINCY ENGINEERING

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Executive Summary

Previous editions of this report cautioned that without an influx of new revenues, the local street and road system would continue to deteriorate and cost taxpayers nearly twice as much to repair this vital investment in the near future. In 2016, the combined funding shortfall for local streets and roads and the state highway system was $130 billion.

After years of careful consideration and study, the Legislature passed and Governor Jerry Brown signed the Road Repair and Accountability Act (also known as SB1), which provides over $5 billion annually for transportation. Of this, approximately $1.5 billion is allocated to the local street and road system owned and maintained by 539 cities and counties. The passage of SB1 was a significant success for municipal governments statewide, and injected a long awaited substantial infusion of funding to maintain the local street and road system.

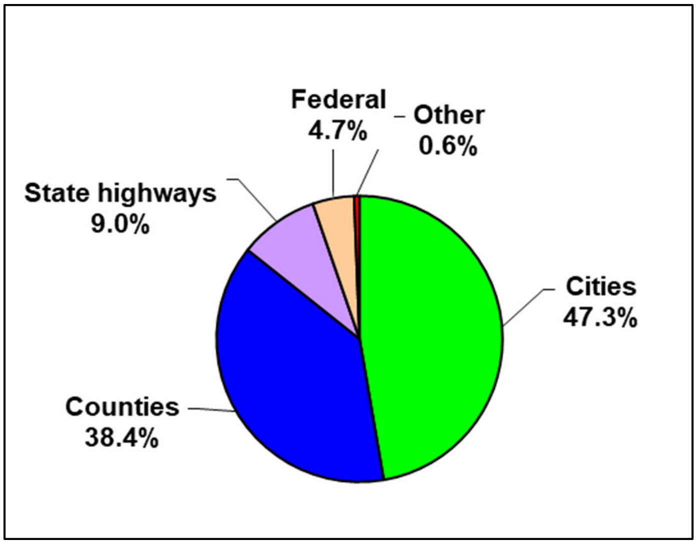
The importance of the local system cannot be over-emphasized. Nearly every trip begins on a city street or county road. Whether traveling by bicycle, bus, rail, truck or family automobile, Californians need a reliable and well-maintained local street and road system.

Every component of California's transportation system is critical to providing a seamless, interconnected system that supports the traveling public and economic vitality throughout the state. There is a significant focus on climate change and building sustainable communities, which cannot function without a well-maintained local street and road system.

Unfortunately, this continues to be a challenging time for California. SB1 may be repealed in November 2018, and if so, it would eliminate over $5 billion annually in existing transportation funding and jeopardize over 6,500 road and bridge projects on the local street and road system alone.

The first comprehensive statewide study of California's local street and road system in 2008 provided critical analysis and information on the local transportation network's condition and funding needs. Each subsequent report has monitored the changes biennially.

This study sought answers to important questions: What are the current pavement conditions of local streets and roads? What will it cost to repair all streets and roads? What are the safety needs for a functioning system? What is the impact of SB1 and its repeal on the condition of local streets and roads, bridges, and essential components?



Road Centerline Miles by Agency

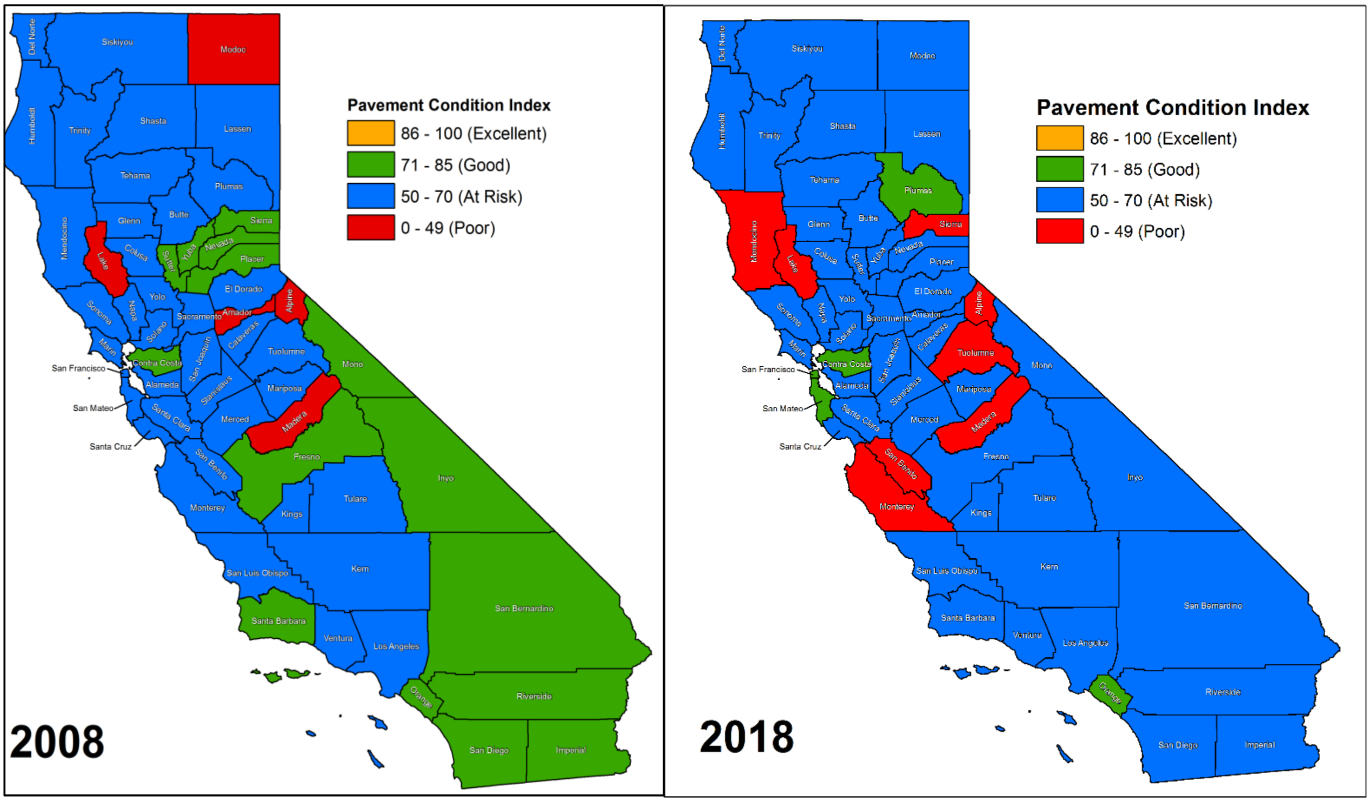
Responsible for over 85 percent of California's roads, cities and counties find this study to be of critical importance for several reasons. The goal is to use the results to continue to educate policymakers at all levels of government and the public about the infrastructure investments needed to provide California with a seamless, multi-modal transportation system. The findings provide a credible and defensible analysis to support a dedicated, stable funding source such as SB1 for maintaining the local system. It also provides the rationale for the most effective and efficient investment of public funds, potentially saving taxpayers from paying significantly more to fix local streets and roads into the future.

This update surveyed all of California's 539 cities and counties. Over 90 percent of the agencies responded – a level of participation that makes clear the local interest in addressing the growing problems of crumbling streets and roads.

Pavements

The condition of California's local streets and roads has continued to deteriorate significantly since the initial study. On a scale of zero (failed) to 100 (excellent), the statewide average Pavement Condition Index (PCI) is now 65 ("At Risk" category). Even more alarming, 53 of 58 counties are either at risk or have poor pavements (the maps on the next page illustrate the changes in condition since 2008).

In order to use taxpayer money wisely, it makes more sense to preserve and maintain roads in good condition than to wait and repair or replace them when they deteriorate or fail. The costs developed in this study are based on achieving a roadway pavement condition called Best Management Practices (BMP). At this condition level, preventive maintenance treatments (i.e., slurry seals, chip seals, thin overlays) are most cost-effective. In addition to costing less, preventive maintenance interferes less with commerce and the public's mobility and is more environmentally friendly than rehabilitation or reconstruction.



The importance of this approach is significant. As roadway pavement conditions deteriorate, the cost to repair them increases exponentially. For example, it costs as much as 13 times more to reconstruct a pavement than to preserve it when it is in good condition. Even modest resurfacing is four times more expensive than maintaining pavement in the BMP condition. To put it another way, 13 miles of roadway can be maintained in a BMP condition for the same cost as reconstructing one mile of failed pavement. By bringing the local roadway system to BMP conditions, cities and counties will be able to maintain streets and roads at the most cost-effective level. This goal is not only optimal, it is necessary.

Technological Cost Savings

For the first time, this report also examines the impact of sustainable technologies (e.g., cold-in-place recycling) that result in significant cost savings. Since 2012, the number of agencies that employ some form of recycling has more than doubled. This trend is expected to continue, and the cost savings are therefore included in the funding scenarios. The savings range, on average, from 26 to 29 percent over conventional treatments and result in a reduction of the 10-year paving needs. This is one example of how cities and counties have stretched the proverbial dollar.

Funding Scenarios

Three funding scenarios were analyzed, including one to determine the impacts of SB1 (RMRA) over the next decade. Approximately $1 billion is available for pavements, with the remainder for essential components. Note that these are in constant 2018 dollars.

1) **Existing funding levels ($3.083 billion/year)** – this is the current funding level and includes SB1 funds together with cost savings from paving technologies. The results are positive; for the first time in 10 years, cities and counties are able to essentially maintain pavements at their current levels. In addition, the percentage of good pavements will increase to 66.2 percent (see table). (Note that of the $1.5 billion available from SB1, approximately $1 billion was allocated to paving; the remainder was allocated for other transportation components.)
2) **Existing funding without SB1 ($2.090 billion/year)** – this is the funding level if SB1 were to be repealed. As expected, reduced funding would result in the PCI decreasing to 57 by 2028 and the percent of good pavements will decrease to less than half.
3) **Funding required to reach BMP ($6.824 billion/year)** – the optimal scenario is to bring all pavements into a state of good repair so that best management practices can prevail. To reach BMP levels (PCI = 87), $68.24 billion is needed over the next 10 years. *After that, it will only require $2.5 billion a year to maintain the pavements at that level.*

The table below summarizes the results of each scenario.

Scenarios	Annual Budget ($B)	PCI in 2028	Condition Category	% Pavements in Poor/Failed Condition	% Pavements in Good Condition
Current Condition (2018)	-	65	At Risk	24.9%	54.7%
1. Existing Funding with SB1	$3.083	64	At Risk	21.0%	66.2%
2. Existing Funding without SB1	$2.090	57	At Risk	28.4%	49.6%
3. Best Management Practices	$6.824	87	Excellent	0.0%	100.0%

Essential Components

The transportation network also includes essential safety and traffic components such as curb ramps, sidewalks, storm drains, streetlights and signals. These components will require $34.1 billion to maintain over the next 10 years, and there is an estimated funding shortfall of $21.1 billion.

Bridges

Local bridges are also an integral part of the local street and road infrastructure. There are 12,105 local bridges (approximately 48 percent of the total number of bridges) in California. There is an estimated shortfall of $2.6 billion to maintain the safety and integrity of the bridge infrastructure.

Total Funding Shortfall

The table below shows the total funding shortfall of $54.6 billion (2018 dollars) over the next 10 years. For comparison, the needs from the previous updates are also included. Note that the pavement needs in 2018 are markedly reduced due to the use of sustainable technologies.

Transportation Asset	Needs ($B)					2018 ($B)		
	2008	2010	2012	2014	2016	Needs	Funding	Shortfall
Pavement	$67.6	$70.5	$72.4	$72.7	$70.0	$61.7	$30.8	$(30.9)
Essential Components	$32.1	$29.0	$30.5	$31.0	$32.1	$34.1	$13.0	$(21.1)
Bridges		$3.3	$4.3	$4.3	$4.6	$5.5	$2.9	$(2.6)
Totals	**$99.7**	**$102.8**	**$107.2**	**$108.0**	**$106.7**	**$101.3**	**$46.7**	**$(54.6)**

Conclusions

The conclusions from this study are clear; SB1 is a critical funding source that will allow cities and counties to arrest the deterioration that has occurred to local transportation infrastructure during the past decade or more. Without this source of funding, California's local street and road system—along with California's entire interrelated transportation system—will be in crisis. The lack of transportation funding will not only hamper the ability of cities and counties to provide efficient local streets and roads, it will impact their ability to increase alternative modes, provide active bicycle and pedestrian options, meet transit needs, and comply with air quality, greenhouse gas reduction and other environmental policies.

1 Introduction

California's 58 counties and 482 cities[1] own and maintain over 144,000 centerline miles of local streets and roads[2]. This is an impressive 85.7 percent of the state's total publicly maintained centerline miles (see Figure 1.1 below). Conservatively, this network is valued at over $220 billion.

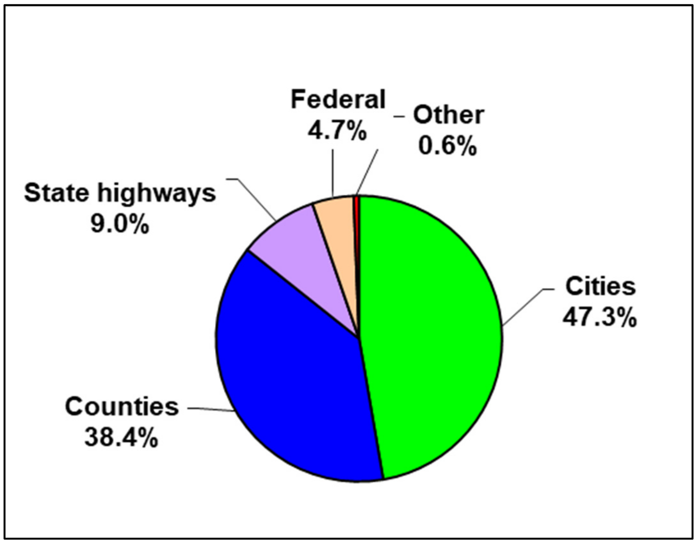


Figure 1.1 Breakdown of Maintained Road Centerline Miles by Agency[2]

Because lane-miles are more commonly used in pavement management analyses (the costs derived are based on areas, and lane-miles are a more accurate indicator of pavement areas), Table 1.1 shows the breakdown of lane-miles for local streets and roads by functional classification, as well as for unpaved roads. Major streets or roads are those that are classified as arterials or collectors, and local streets or roads are those that are classified as residentials and alleys. Unpaved roads are defined as those that have either dirt or gravel surfaces.

In addition, streets and roads are separated into urban and rural classifications. The distinction between urban and rural roads is defined by the U.S. Census Bureau: rural areas have population centers less than 5,000, or have a population density below 1,000 persons per square mile. Urban areas have population centers with more than 5,000 people. However, an urbanized or rural area may or may not contain an incorporated city and the urban boundary does not necessarily follow city corporation lines. Ultimately, however, the decision to determine the miles in either category was left to the individual city or county.

[1] Four new cities (Wildomar, Menifee, Eastvale and Jurupa Valley) were incorporated after the original 2008 study. The first two were included in the 2010 updates, and all were included in 2018. Note that San Francisco is traditionally counted as both a city and a county, but for purposes of this analysis, their data have been included as a city only.

[2] *2016 California Public Road Data – Statistical Information Derived from the Highway Performance Monitoring System* (HPMS), State of California Department of Transportation (Caltrans), Division of Transportation System Information, March 2018. The total miles come from a combination of this reference and survey results. Note that the HPMS reports that there are a total of 156,780 miles belonging to cities and counties; this is a significant difference from that reported on the online survey and is due to an on-going review by Caltrans. For this study, the online survey results were used.

Table 1.1 Breakdowns of Functional Classification & Unpaved Roads

	Lane Miles by Functional Class				Unpaved	Total
	Urban		Rural			
	Major	Local	Major	Local		
Cities	82,376	111,142	1,751	2,852	1,170	199,291
Counties	13,614	23,131	32,032	44,585	15,888	129,250
Totals	**95,990**	**134,273**	**33,783**	**47,437**	**17,058**	**328,541**

Note: San Francisco is included as a city.

Almost 74 percent of the total paved lane miles are in urban areas (Table 1.1). It should also come as no surprise that more than 94 percent of rural roads belong to the counties, and 84 percent of urban roads belong to the cities. Finally, unpaved roads comprise approximately 5.2 percent of the total network, and counties own more than 93 percent of these unpaved roads.

1.1 Study Objectives

In 2008, a study was conducted to assess the statewide needs for the local streets and roads network[3]. The intent of the 2008 study was to determine the funding required to maintain the local streets and roads system for the next 10 years, so that the information could be reported to the Governor, the State Legislature, the California Transportation Commission (CTC), and Caltrans, as well as other stakeholders.

The specific objectives of the 2008 study were summarized as a series of questions:

- What are the conditions of local streets and roads?
- What will it cost to bring them up to an acceptable condition?
- How much will it cost to maintain them in an acceptable condition for the next 10 years?
- Similarly, what are the needs for other essential components, such as safety, traffic and regulatory items?
- Is there a funding shortfall? If so, how much is it?
- What are the impacts of different funding scenarios?

Since then, updates have been performed every two years, and the objectives have been essentially the same. Bridges were added to the scope in 2014. The reports also highlight the consequences of inaction.

[3] *California Statewide Local Streets & Roads Needs Assessment*, Nichols Consulting Engineers, Chtd., October 2009.

In April 2017, Governor Jerry Brown signed the Road Repair and Accountability Act (also known as SB1) which provides approximately $1.5 billion to the local street and road system. The passage of SB1 was a significant success for municipal governments statewide and injected a substantial infusion of funding to maintain this system.

Unfortunately, if SB1 is repealed, funding for over 6,500 road and bridge projects the local street and road system alone will be jeopardized.

Therefore, this report analyzes the impacts of the loss of SB1, so that the consequences are quantified and understood for both policymakers and the public.

Copies of all previous reports dating back to 2008 are available at www.SaveCaliforniaStreets.org.

1.2 Study Assumptions

As in the previous studies, some important assumptions were made during the analyses of the data received from cities and counties. Most are consistent with those used in the Caltrans 2018 State Highway Operation and Protection Program (SHOPP)[4]. The assumptions include (see Table 1.2):

- The analysis period used in this study is 10 years.
- All costs reported in this study are in constant 2018 dollars.
- The pavement condition goal was to reach a condition where best management practices (BMP) can occur. This translates to a PCI in the 80s (on a scale of 0 to 100, where zero is failed and 100 is excellent) and where there are no failed pavements. Caltrans SHOPP defines performance goals quite differently; e.g., at least 98 percent of pavements in good or fair condition by 2027, or at least 98.5 percent of bridge area in good or fair condition by 2027.
- It is assumed that no new streets or roads are added within the analysis period. In addition, capital improvement or expansion projects are not included; e.g., realignments, widenings, grade separations.
- The inclusion of essential components (safety, traffic and regulatory) of the roadway system, such as sidewalks, curb ramps, and storm drains, is consistent with the SHOPP. Bicycle and pedestrian facilities are also included.
- The bridge needs assessment was updated, including the needs and the results of various funding scenarios.

[4] *2018 SHOPP – State Highway Operation & Protection Program (SHOPP Plan)*, Caltrans, March 2018.

Table 1.2 Summary of Assumptions Used in 2018 Statewide Study and SHOPP

Assumptions	2018 Statewide Study	Caltrans SHOPP
Analysis Period	10 years	10 years
Cost Basis	2018 dollars	2018 dollars
Goals	Best management practices (PCI at mid-80s & no failed pavements)	At least 98% in good or fair condition by 2027
Total Scenarios Evaluated	3	1
Capital Improvement Projects	No	Only related to operational improvement
Essential Components	Yes	Yes
Bridges	Yes	Yes

1.3 Study Sponsors

This study was sponsored by the cities and counties of California and has been managed by a coalition of cities, counties and Regional Transportation Planning Agencies (RTPAs). The Oversight Committee is composed of representatives from the following:

- League of California Cities (League)
- California State Association of Counties (CSAC)
- County Engineers Association of California (CEAC)
- Regional Transportation Planning Agencies (RTPA)
- Rural Counties Task Force (RCTF)

The Oversight Committee members include:

- Charles Herbertson, City of Culver City, (Project Manager)
- Keith Cooke, City of San Leandro
- Greg Kelley, Los Angeles County
- Panos Kokkas, Yolo County
- Dave Leamon, Stanislaus County
- Damon Leitz, City of Santa Clarita
- William Ridder, Los Angeles County Metropolitan Transportation Authority
- Theresa Romell, Metropolitan Transportation Commission
- Brad Eggleston, City of Palo Alto
- Dawn Vettese, San Diego Association of Governments
- Ron Vicari, Sacramento County

- Mike Woodman, Nevada County Transportation Commission (representing the Rural Counties Task Force)

Staff members include:

- Rony Berdugo, League
- Meghan McKelvey, League
- Derek Dolfie, League
- Kiana Valentine, CSAC
- Chris Lee, CSAC
- Merrin Gerety, CEAC

Appendix A includes a list of all the agencies that made a financial contribution to this study.

2 Pavement Needs Assessment

This chapter discusses the methodology and assumptions used for the pavement needs assessment and presents the results of the analysis. The data collection efforts are described in more detail in Appendix B, but briefly, an online survey was made available on the www.SaveCaliforniaStreets.org website between January 15 and March 30, 2018. All cities and counties were contacted and asked to participate in the survey. A total of 484 agencies responded to the survey and either updated or confirmed the data that were provided in previous surveys. This is a response rate of almost 90 percent!

2.1 Methodology and Assumptions

Because not all 539 cities and counties responded to the survey, a methodology was developed to estimate the pavement needs of the missing agencies. The following paragraphs describe this methodology, which was consistent with previous updates.

2.1.1 Filling in the Gaps

Inventory Data

In order to estimate an agency's pavement needs, it is crucial to determine the total miles (both centerline and lane-miles) and pavement areas in the jurisdiction. Missing inventory data were populated based on the following rules:

- If no updated inventory data were provided, then previous survey data were used.
- If the inventory data provided were incomplete, Table 2.1 was used to populate the missing information. The average number of lanes and average lane width are summarized from agencies who submitted complete inventory data in the previous surveys.

Pavement Condition Data

To assist those agencies that had no pavement condition data, the online survey provided a table with the average pavement condition index (PCI) collected in the 2016 study. The agencies were encouraged to look at the data from neighboring cities or counties to make their best estimate of the pavement condition in their jurisdiction. For those agencies that have never provided any condition data, the average condition of the associated county was used.

Table 2.1 Assumptions for Populating Missing Inventory Data

Functional Class	Average Number of Lanes	Average Lane Width (feet)
Urban Major Roads	3.02	14.6
Urban Local Roads	2.17	14.8
Rural Major Roads	2.02	13.2
Rural Local Roads	1.96	11.2
Unpaved Roads	1.76	13.9

The surveys also asked for condition data for different functional classifications, and additional rules were developed to populate the missing data:

- If the PCI is provided for one but not the other functional classes, the same PCI was used for all functional classes.
- If no pavement condition data were provided in 2018, the last PCI provided was used, but the number was extrapolated based on the statewide PCI trend; i.e., if the statewide average deteriorated one point, then the PCI used was also assumed to have deteriorated one point.
- The only exception was for San Francisco Bay area agencies, where the data were provided by the Metropolitan Transportation Commission (MTC).

2.1.2 Pavement Needs Assessment Goal

The same needs assessment goal from previous studies was used in the 2018 update. To reiterate, the goal is for pavements to reach a condition where best management practices (BMP) can occur, so that only the most cost-effective pavement preservation treatments are needed. Other benefits such as a reduced impact to the public in terms of delays and environment (dust, noise, energy usage) would also be realized.

Our goal is to bring streets and roads to a condition where best management practices (BMP) can occur.

In short, the BMP goal is to reach a PCI in the 80s and to eliminate the unfunded backlog. The deferred maintenance or "unfunded backlog" is defined as work that is needed, but is not funded. To perform these analyses, MTC's StreetSaver® pavement management system program was used. This program was selected because the analytical modules were able to perform the required analyses, and the default pavement performance curves were based on data from California cities and counties. This is described in detail in Appendix B of the 2008 report, which may be downloaded at www.SaveCaliforniaStreets.org.

2.1.3 Maintenance and Rehabilitation Treatment Types and Costs

Assigning the appropriate maintenance and rehabilitation (M&R) treatment is a critical component of the needs assessment. It is important to know both the ***type*** of treatment, as well as ***when*** to apply it. This is typically outlined in a decision tree. Pavement preservation concepts and their efficacy have been widely researched by the Federal Highway Administration[5] and the National Highway Institute has several training courses available. In addition, the National Center for Pavement Preservation[6] at Michigan State University maintains a technical library available to the public.

[5] http://www.fhwa.dot.gov/pavement/pres.cfm
[6] https://www.pavementpreservation.org/

Asphalt Pavements

Figure 2.1 summarizes the types of asphalt treatments assigned in this study. Briefly, good to excellent asphalt pavements (PCI>70) are best suited for pavement preservation techniques, (e.g., preventive maintenance treatments such as chip seals or slurry seals). These are usually applied at intervals of five to seven years depending on the type of road and the traffic volumes. Note that if a pavement section has a PCI between 90 and 100, no treatment is applied.

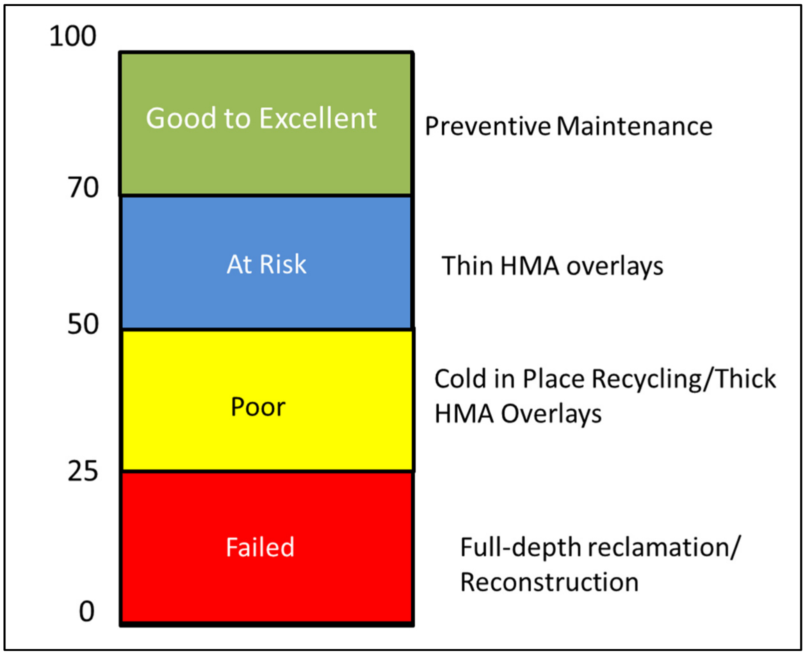


Figure 2.1 PCI Thresholds & Treatments Assigned for Asphalt Pavements

As pavements deteriorate, treatments that address structural adequacy are required. Between a PCI of 25 to 69, hot mix asphalt (HMA) overlays are usually applied at varying thicknesses. This may be combined with milling or recycling techniques.

Finally, when the pavement has failed (PCI<25), reconstruction is typically required. The descriptions used for each category are typical of most agencies, although there are many variations on this theme. For example, it is not unusual for local streets to have slightly lower thresholds indicating that they are held to lower standards. The PCI thresholds shown in Figure 2.1 are generally accepted industry standards.

Concrete Pavements

Similarly, numerous strategies are available to manage concrete pavements. Good to excellent concrete pavements (PCI>70) are also best suited for preventive maintenance, such as diamond grinding to remove a thin surface layer of concrete. This approach improves friction, smooths the pavement, and reduces noise. Partial and full depth slab repairs are also used as preventive maintenance to restore isolated panels that have cracked or failed.

Concrete overlays have two different options that cover a wide range of pavement repair conditions. Bonded concrete overlays of asphalt are applied on roadways in fair or better condition (PCI>70) to add structure or provide a more permanent maintenance solution to the road. Unbonded concrete overlays of asphalt are typically applied on roadways in fair to significantly deteriorated condition (PCI of 20 to 70) and will restore structural capacity while treating the existing roadway as a structural base layer.

When the pavement has failed (PCI<25), reconstruction with concrete pavement is an alternative. This may be accompanied by recycling techniques. Concrete pavements typically last 20 to 25 years prior to needing their first preventive maintenance treatment.

Cost Comparison

Unit cost data for asphalt treatments from 225 agencies were summarized and averaged for the analysis (see Table 2.2). There was a large range in costs, but for purposes of the analysis, the average was used. The costs for each treatment are separated by functional class; i.e., major roads have a higher cost than local roads. There were increases in the unit costs for all categories from 2016. *Anecdotal evidence from the spring and summer 2018 bids shows that prices have increased from 10 to 20 percent in many cases, but these results were not available at the time of the online survey and therefore were not considered.*

Table 2.2 Unit Costs Used for Different Treatments & Road Classifications

Classification	Unit Costs ($/sy)			
	Preventive Maintenance	Thin HMA Overlays	Thick HMA Overlays	Reconstruction
Major Roads	$5.46	$22.61	$35.35	$74.67
Local Roads	$4.94	$21.49	$32.80	$64.50

It should be noted that the costs for preventive maintenance treatments (e.g., seals) increased significantly from 2016 after a period of stability. The initial increase between 2008 and 2012 is attributed to the higher demand for seals:

- Financial constraints forced many agencies to use less expensive treatments such as seals compared to overlays or reconstruction; and/or
- More agencies understand the advantages and cost-effectiveness of seals, and therefore their use was more widespread.

Interestingly, the cost for overlays and reconstruction actually declined in 2010 by approximately 5 percent for overlays, and as much as 30 percent for reconstruction. However, the overlays have steadily increased since then and have now exceeded 2008 levels. For reconstruction, they have continued to be lower than 2008 levels, which may be attributable to using recycling technologies such as full depth reclamation. Figures 2.2 to 2.5 illustrate the trends in the unit costs for different maintenance strategies, respectively.

Finally, it should be noted that only asphalt concrete roads were considered in this analysis. The percentage of Portland cement concrete pavements was so small (approximately 1.7 percent of the total network) that it was deemed not significant for the funding analysis.

Technological Cost Savings

For the first time, this report includes the impact of sustainable paving technologies such as cold-in-place recycling that have cost savings of 26 to 29 percent compared to conventional treatments (see Section 2.3). Since 2012, the number of agencies that employ some form of recycling has more than doubled. This trend is expected to continue, and the cost savings were therefore included in the pavement needs analysis and funding scenarios. This is one example of how cities and counties have stretched the proverbial dollar.

2.1.4 Escalation Factors

As with the previous studies, no escalation factors were used in this analysis. All numbers are in constant 2018 dollars, and this is consistent with the SHOPP as well as many Regional Transportation Plans (RTPs).

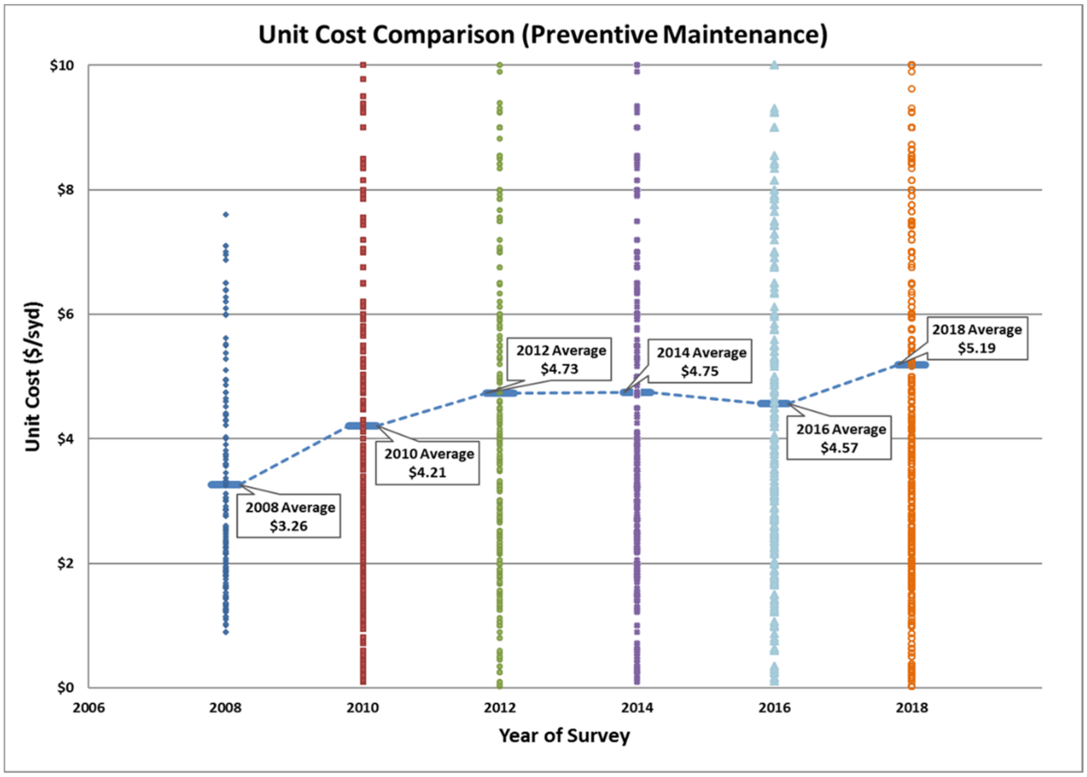


Figure 2.2 Unit Price Trends for Preventive Maintenance Treatments

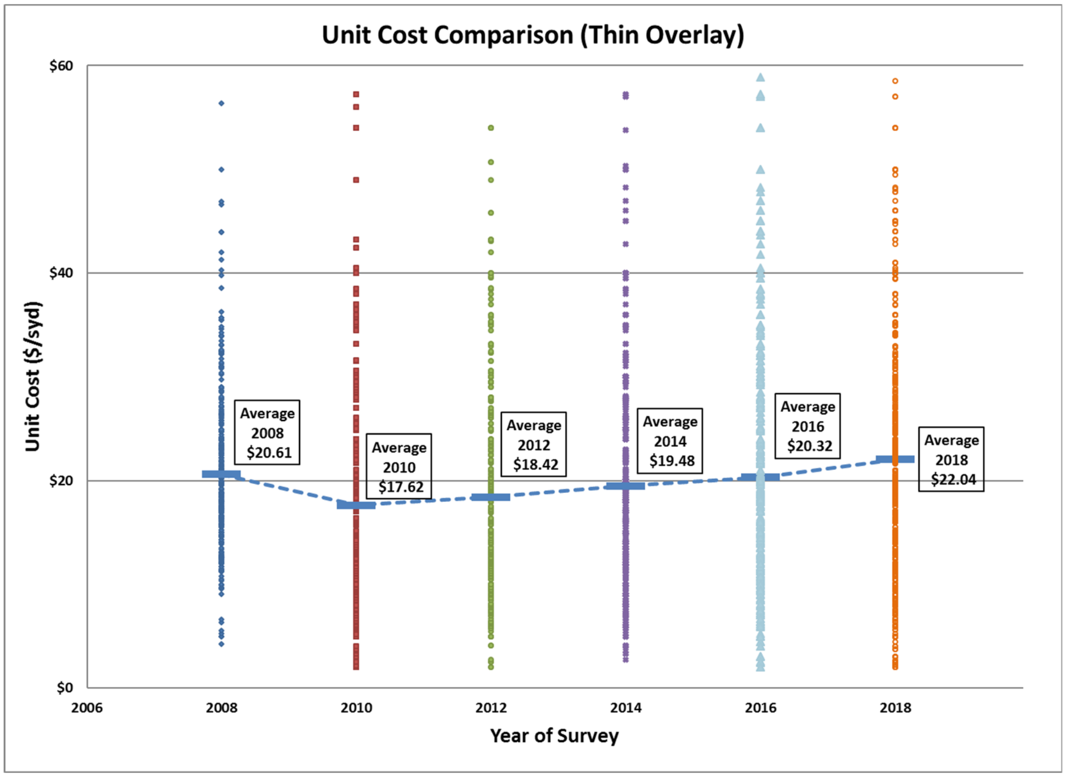


Figure 2.3 Unit Price Trends for Thin HMA Overlays

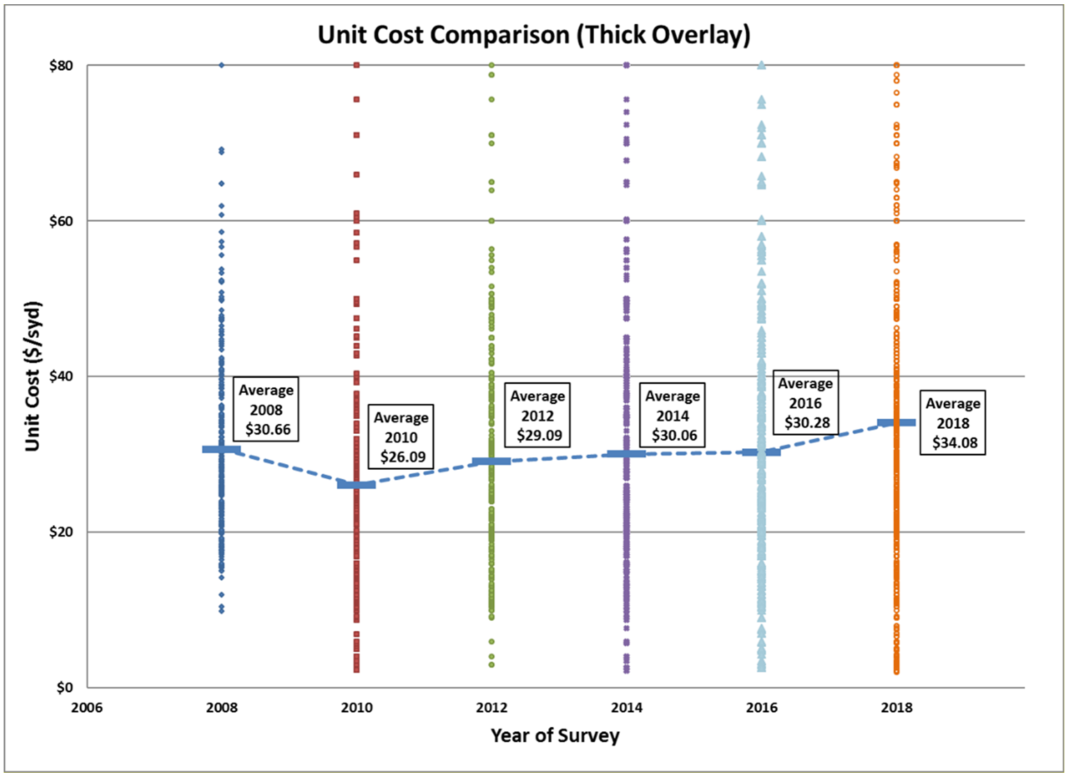


Figure 2.4 Unit Price Trends for Thick HMA Overlays

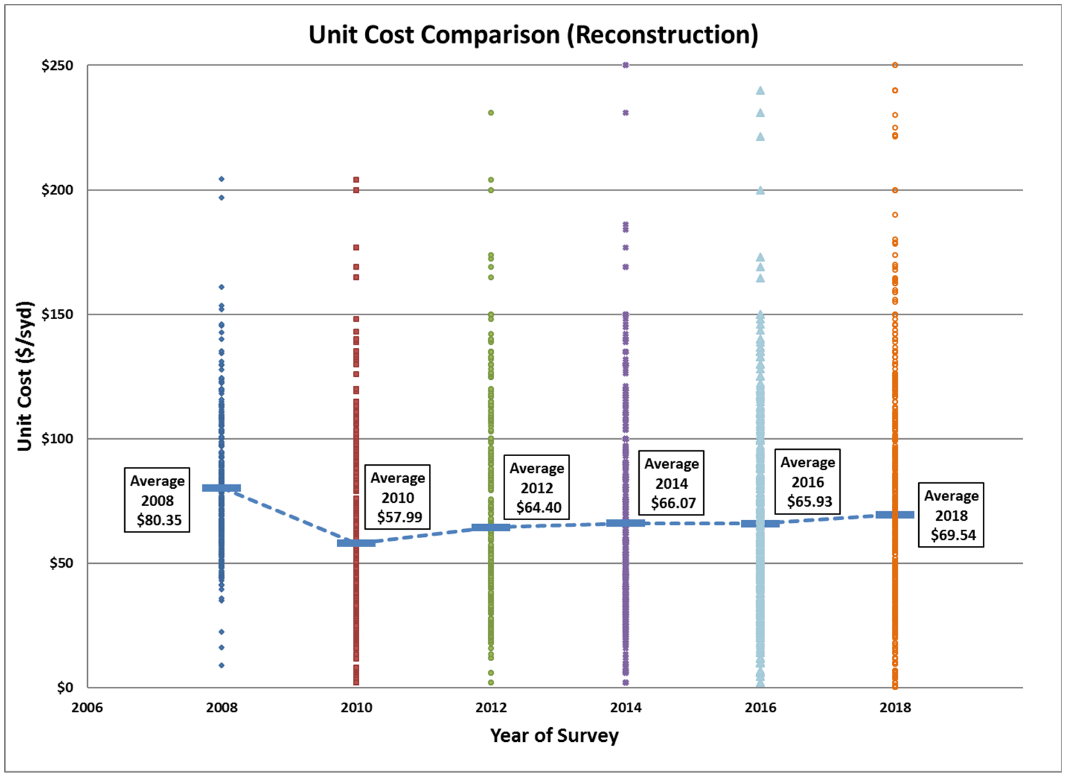


Figure 2.5 Unit Price Trends for Reconstruction

2.2 Average Network Condition

Based on the results of the surveys, the current (as of March 2018) pavement condition statewide is 65, a three-point drop from 2008, when it was estimated to be 68. This is a half-point drop since 2016 (65.4 to 64.7). The average for cities is 67.3 and that for counties is 60.2.

Table 2.3 indicates that major streets or roads continue to be in better condition than local roads. In fact, rural local roads have the lowest PCI of any category.

Table 2.3 Average 2018 PCI by Type of Road

Type	Average 2018 PCI	
	Major	Local
Urban Streets	69	66
Rural Roads	63	55

Table 2.4 includes the current pavement condition index (PCI) for each county (includes cities within the County) based on a scale of 0 (failed) to 100 (excellent). This is weighted by the pavement area; i.e., long roads have more weight than short roads when calculating the average PCI.

Table 2.4 Summary of PCI Data by County (includes Cities) for 2008-2018

County (Cities Included)	Centerline Miles	Lane Miles	Area (sy)	Average Weighted PCI* 2008	2010	2012	2014	2016	2018
Alameda	3,576	8,088	77,528,034	66	67	68	66	68	68
Alpine	135	270	1,900,800	40	45	45	44	44	41
Amador	477	945	5,908,703	31	34	33	33	56	51
Butte	1,839	3,698	29,321,289	70	67	65	66	65	60
Calaveras	717	1,333	8,937,332	55	53	51	51	51	50
Colusa	761	1,247	13,240,593	61	60	60	62	63	60
Contra Costa	3,426	7,159	70,805,960	72	70	71	68	69	71
Del Norte	323	646	4,414,995	70	68	64	63	63	60
El Dorado	1,399	2,684	21,459,847	62	58	63	63	62	63
Fresno	6,225	13,044	106,510,511	74	70	69	69	64	61
Glenn	910	1,822	13,917,626	68	68	68	68	68	68
Humboldt	1,464	2,921	24,247,391	61	56	64	64	63	56
Imperial	3,017	6,102	76,815,365	74	72	57	57	58	55
Inyo	1,133	1,832	13,681,682	75	57	60	62	62	61
Kern	5,507	12,184	110,236,890	66	63	64	64	63	63
Kings	1,363	2,858	21,107,430	63	62	62	62	59	60
Lake	753	1,493	10,860,623	33	31	40	40	40	38
Lassen	431	879	6,282,324	55	69	66	66	63	60
Los Angeles	21,001	63,009	461,254,896	68	67	66	66	67	67
Madera	1,809	3,604	25,503,864	48	48	47	47	46	44
Marin	1,033	2,054	16,610,103	61	61	61	63	64	67
Mariposa	362	719	5,334,893	53	44	44	53	65	65
Mendocino	1,125	2,256	15,527,236	51	49	37	35	35	46
Merced	2,335	4,881	38,705,388	57	58	58	58	56	56
Modoc	1,505	3,010	17,142,256	42	40	56	46	59	59
Mono	737	1,473	9,613,552	71	68	66	67	64	65
Monterey	1,824	3,854	34,172,191	63	45	50	50	50	49
Napa	745	1,518	13,153,110	53	60	59	59	59	59
Nevada	806	1,625	10,348,493	72	71	72	71	70	68

Table 2.4 Summary of PCI Data by County (includes Cities) for 2008-2018

County (Cities Included)	Centerline Miles	Lane Miles	Area (sy)	Average Weighted PCI*					
				2008	2010	2012	2014	2016	2018
Orange	6,592	16,493	151,894,951	78	76	77	77	79	79
Placer	2,068	4,282	34,279,854	79	77	71	69	68	64
Plumas	704	1,411	9,090,224	71	66	66	64	72	73
Riverside	7,929	17,916	158,743,818	71	72	70	70	71	68
Sacramento	5,059	11,041	96,283,230	68	66	64	62	62	60
San Benito	492	761	5,156,435	68	66	66	48	46	37
San Bernardino	8,898	22,161	180,402,259	72	70	70	71	71	70
San Diego	7,759	18,763	173,945,867	74	69	67	66	65	64
San Francisco	943	2,142	21,246,638	62	63	65	66	68	74
San Joaquin	3,218	6,773	59,200,181	70	70	67	73	70	70
San Luis Obispo	1,850	3,348	27,009,051	64	64	63	64	63	65
San Mateo	1,876	3,927	33,604,631	69	70	71	70	71	72
Santa Barbara	1,591	3,252	28,815,818	72	70	67	66	63	61
Santa Clara	4,477	9,996	97,851,778	70	69	73	68	67	70
Santa Cruz	867	1,764	14,021,795	52	48	48	57	50	55
Shasta	1,692	3,509	26,158,393	64	67	57	60	57	58
Sierra	399	800	5,566,517	73	71	71	45	44	44
Siskiyou	1,488	2,985	20,233,539	57	57	57	57	58	55
Solano	1,745	3,723	33,143,732	66	66	67	65	68	67
Sonoma	2,388	4,968	39,925,047	53	50	50	52	55	54
Stanislaus	2,913	5,989	51,918,449	60	51	52	55	55	63
Sutter	1,027	2,073	15,015,996	73	56	56	65	70	69
Tehama	1,203	2,408	15,512,649	69	65	65	62	53	54
Trinity	697	1,121	11,757,354	52	50	50	60	62	59
Tulare	4,105	8,286	31,738,980	66	68	68	68	60	62
Tuolumne	602	1,122	8,214,336	62	62	62	47	41	41
Ventura	2,520	6,117	54,295,141	64	66	69	70	71	69
Yolo	1,338	2,698	23,007,951	69	67	63	60	55	58
Yuba	1,066	1,504	19,557,588	74	56	56	60	60	66
Totals	**144,244**	**328,541**	**2,712,135,577**	**68**	**66**	**66**	**66**	**65**	**65**

* PCI is weighted by area.

It needs to be emphasized that the PCI reported is only the ***weighted average*** for each county and ***includes*** the cities within the county. For example, this means that Amador County and the cities within the county may well have pavement sections that have a PCI of 100, although the average is 51.

The average PCI trend since 2008 is slightly downward, although some counties do show improvements. This is attributed to better data collection (more agencies are updating their pavement data), better use of pavement preservation treatments, or the increased availability of additional funds such as local sales taxes or bonds.

The average pavement condition index for streets and roads statewide is 65. This rating is considered to be in the "at risk" category.

From Table 2.4, we can see that the statewide ***weighted average*** PCI for all local streets and roads is 65. Orange County maintains its position with the best pavements, at an average PCI of 79. Unfortunately, San Benito and Lake Counties are now the lowest ranked counties, with an average PCI of 37 and 38, respectively. Appendix C includes maps that illustrates the PCI for each city and county.

As was discussed in the 2016 study, an average pavement condition of 65 is not especially good news. While it seems just a few points shy of the "good/excellent" category, it has significant implications for the future. Figure 2.6 illustrates the rapid pavement deterioration at this point in the pavement life cycle; if repairs are delayed by just a few years, the costs of the proper treatment may increase significantly, as much as ten times. The financial advantages of maintaining pavements in good condition are many, including saving the taxpayers' dollars with less disruption to the traveling public, as well as environmental benefits.

Many factors contribute to this rapid deterioration in pavement condition, including:

- More traffic and heavier vehicles;
- More transit and more frequent bus trips, including heavier buses;
- Heavier and more garbage collection trucks (recycling and green waste trucks are new weekly additions to the traditional weekly garbage truck);
- More street sweeping for National Pollutant Discharge Elimination System (NPDES) requirements; and
- More freight and delivery trucks when the economy is thriving.

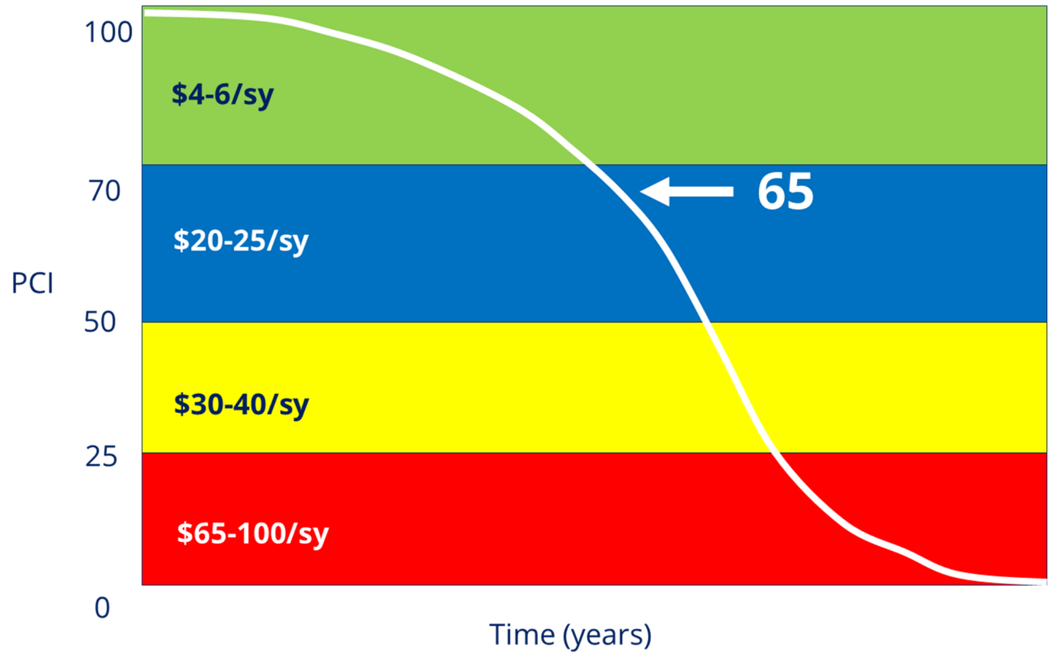


Figure 2.6 Generalized Pavement Life Cycle Curve

Therefore, a PCI of 65 should be viewed with caution – it indicates that the condition of our local streets and roads is, as it were, poised on the edge of a cliff. Figure 2.7 is an example of a local street with an average condition of 65.

Figure 2.7 Example of Local Street with PCI of 65

Figure 2.8 shows the distribution of pavement conditions by county for both 2008 and 2018. A majority of the counties in the state have pavement conditions that are either “At Risk” (blue) or in “Poor” (red) condition. There has been an increase in the “blue” and “red” counties from 2008. Of the 58 counties, all but five are in either “At Risk” or in “Poor” condition.

Only 54.7% of California’s local streets and roads are in good condition.

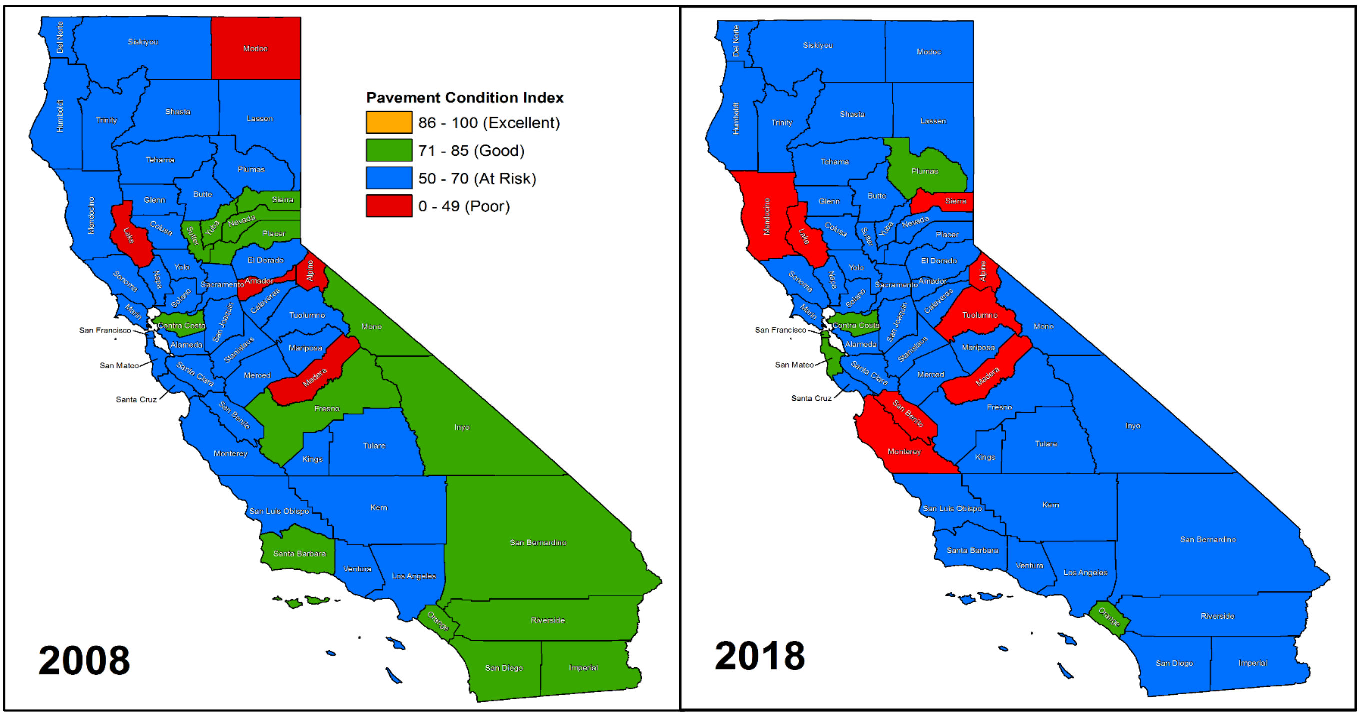


Figure 2.8 Average PCI by County for 2008 and 2018

2.3 Sustainable Pavement Practices

Sustainability continues to be a growing factor to be considered for many local agencies, particularly if it saves costs. Cities and counties were asked for information on any sustainable pavement practices employed and the estimated cost savings, if any. The types of sustainable practices that were mentioned included:

- Reclaimed asphalt pavement (RAP)
- Cold-in-place recycling (CIR)
- Hot-in-place recycling (HIR)
- Cold central plant recycling
- Full depth reclamation (FDR)
- Pavement preservation strategies
- Warm mix asphalt (WMA)
- Rubberized hot mix asphalt (RHMA)
- Permeable/pervious pavements
- Subgrade stabilization

Some sustainable pavement strategies may save up to 29%.

In general, the trends continue to be in the positive direction; over 472 agencies (88 percent of those surveyed) responded with some information on the types of sustainable practices used. Table 2.5 summarizes the pavement strategy, the number of agencies that listed that strategy, the number of agencies that reported either a savings or additional cost for a specific strategy, and the average percent savings or cost over conventional pavement practices.

Table 2.5 Summary of Responses on Sustainable Pavement Strategies

Sustainable Pavement Strategies	No. of Agencies			Average % Savings	Average % Additional costs
	No. of Responses	Savings	Add'l Costs		
Reclaimed AC Pavement (RAP)	182	49	12	9%	
Cold in place recycling (CIR)	112	48	9	27%	
Hot in place recycling (HIPR)	16	3	1	28%	
Cold central plant recycling	29	11	2	24%	
Warm mix asphalt	92	9	8	11%	21%
Permeable/Pervious	35	3	7		78%
Full depth reclamation (FDR)	180	42	19	29%	
Subgrade Stabilization	103	9	11		17%
Rubberized AC (RAC)	253	15	96		19%
Pavement Preservation	396	93	41	41%	

Recycling and pavement preservation strategies were reported to have the highest cost savings when compared with conventional treatments. Other sustainable treatments incurred additional costs, particularly rubber hot mix asphalt (RHMA), which had 19 percent higher costs. The responses for warm mix asphalt and porous/pervious pavements were insufficient to draw any conclusions. As a side note, the additional cost of porous/pervious pavements may be offset by savings in stormwater costs.

The most common reasons cited for using sustainable practices were:

- Cost savings or cost-effectiveness;
- Environmental benefits; e.g., produces fewer greenhouse gas emissions, reduces energy consumption, uses less natural resources, reduces landfills, reuses existing pavement materials, recycles tires, etc. (Note that every lane-mile that is recycled in-place is equivalent to removing approximately 11 cars from the road for a year)[7,8];
- Reduction in excavation depth;
- Extends pavement life;
- City Council policies support or requires sustainable pavements;
- Partnering with other agencies ensures bigger projects and lower unit prices; and
- Lower traffic impact (less construction traffic).

Every lane-mile that is recycled in-place is the equivalent of removing 11 cars off the road for a year.

The most common reasons cited for not using sustainable practices were:

- Higher construction costs (mostly related to RHMA) or higher up-front costs;
- Not enough technical information available – design, specifications, etc.;
- Lack of performance data;
- Poor performance from previous projects;
- Lack of experienced contractors to bid on projects; and
- Not all streets are good candidates for these treatments; e.g., limited right of way.

The fact that 88 percent of the cities and counties in California reported using some form of sustainable pavement practices was very encouraging, particularly when one considers the potential cost savings involved. This is clearly evidence of local agencies using newer technologies to "stretch the dollar". The overwhelming majority also indicated that they will continue to use some form of sustainable strategy in the future.

2.4 Complete Streets

A complete streets policy ensures that transportation planners and engineers consistently design and operate the entire roadway with all users in mind – including bicyclists, public transportation vehicles and riders, and pedestrians of all ages and abilities. California state law (adopted in 2008 and effective 2011)[9] requires that cities and counties *"… plan for a balanced, multimodal transportation network that meets the needs of all users of streets, roads, and highways, defined to include motorists, pedestrians,*

[7] *Sustainable Development: The Environmental Road of the Future*; Bilal, Julian; Chappat, Michael; COLAS Group; 2003

[8] www.epa.gov/otaq/climate/420f05004.htm

[9] ftp://www.leginfo.ca.gov/pub/07-08/bill/asm/ab_1351-1400/ab_1358_bill_20080930_chaptered.pdf

bicyclists, children, persons with disabilities, seniors, movers of commercial goods, and users of public transportation, in a manner that is suitable to the rural, suburban, or urban context of the general plan."

For purposes of this study, the focus is on bicycle and pedestrian facilities. Figure 2.9 is an example of a complete street that considers alternative modes of transportation; i.e., pedestrians, bicyclists, buses and drivers, as well as curb ramps that are in compliance with the Americans with Disabilities Act (ADA).

Figure 2.9 Elements of a Complete Street (Kings Beach, Placer County)

There were 469 responses in 2018, which is significantly higher than in previous surveys. Of these, 218 indicated that they had a complete streets policy, triple the number reported in 2012. Of the 217 who did not have a policy, 56 indicated that they had elements of a complete streets policy in place. Table 2.6 shows the different elements that are utilized by agencies.

Table 2.6 Elements of Complete Streets Policy

Element	No. of Agencies
Bicycle facilities	294
Pedestrian facilities	294
Curb ramps	284
Signs	262
Landscaping	241
Traffic calming (e.g., reducing lane widths)	241
Medians	234
Lighting	222
Transit elements	164
Roundabouts	146

Figure 2.10 illustrates the number of agencies (230) who have recently completed a complete streets project; they have been constructed across all agency sizes; i.e., small, medium and large agencies.

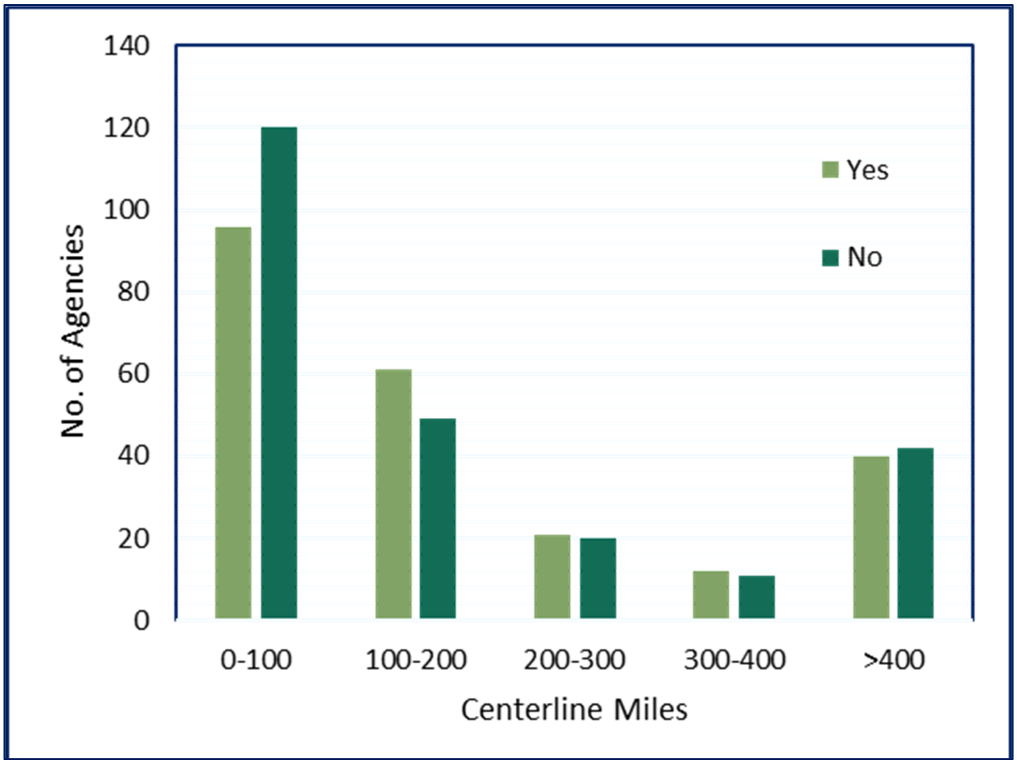


Figure 2.10 Number of Agencies with Complete Streets Projects

On average, the respondents also indicated that 31 percent of their street networks were eligible for including some of the above elements, and that the average additional costs were $113 per square yard. However, there was a large range in the cost data provided, from less than $1/square yard to over $700/square yard. This is largely due to the wide range of elements that can be considered part of a complete streets policy. For example, restriping a road to add bicycle lanes is relatively inexpensive, but purchasing right-of-way for widening projects to include pedestrians/bicyclists/transit is much more expensive.

The three examples shown in Figure 2.11 illustrate the range and type of complete streets projects possible, and also their incremental costs, which ranges from $45/sy to $230/sy. Clearly, it is difficult to assume one average unit cost for a "complete streets" project.

City of Glendale

Population: 191,719

Street network: 336 miles

Complete street elements:
- Bulb outs and traffic circles
- Traffic signals
- Street trees
- Interpretive signing

Incremental cost: $45/sy

City of Pleasant Hill

Population: 33,152

Street network: 109 miles

Complete street elements:
- ADA upgraded and sidewalks
- Bike lanes
- Landscaping
- LED lighting and signal

Incremental cost: $88/sy

City of Concord

Population: 122,067

Street network: 310 miles

Complete street elements:
- Bicycle lanes
- Curb & gutters
- Sidewalks

Incremental cost: $230/sy

Figure 2.11 Examples of Complete Streets Projects

There are challenges to implementing a complete streets policy, and the most common ones cited were (in order of frequency of responses):

1) Insufficient funding,
2) Insufficient right of way,
3) Existing structures, and
4) Trees or environmental features.

Finally, complete streets may have very different applications on a rural road compared to an urban street. Many rural roads are long, in remote areas and may have as few as 50 vehicles a day, with no pedestrians or bicyclists. Obviously, these will not be candidates for a complete streets approach. Typical examples tend to be focused on urban roads, where the population supports multiple modes of transportation.

2.5 Additional Regulatory Requirements

In addition to the many pavement and safety policies, cities and counties identified many additional regulatory requirements they have to comply with, including:

1) Americans with Disabilities Act of 1990 (ADA),
2) National Pollutant Discharge Elimination System (NPDES),
3) Traffic sign retroreflectivity requirements,
4) Complete streets, and
5) Others (e.g., Endangered Species Act, air emissions, sanitary/wastewater management plans).

As with previous surveys, the first three categories had the most responses, with 143 responses on ADA, 116 on NPDES and 97 on traffic sign retroreflectivity. This is an indicator of the improving quality of the data provided in this category.

Finally, the respondents identified $9.2 billion in needs and only $6.3 billion in funding, and a resulting shortfall of $2.9 billion (see Table 2.7).

Table 2.7 Additional Regulatory Requirements (10-Year Needs and Funding)

Regulatory Requirements	Needs ($M)	Funding ($M)	Shortfall ($M)
ADA	$2,275	$1,033	$ (1,242)
NPDES	$6,059	$5,072	$ (987)
Traffic Signs	$258	$126	$ (132)
Complete Streets	$501	$16	$ (485)
Other	$95	$36	$ (59)
Total	**$9,188**	**$6,283**	**$ (2,905)**

2.6 Unpaved Roads

Unpaved roads need $947 million over the next 10 years.

Unpaved roads (gravel or dirt surface) are not a large component of the local transportation network statewide, and only comprise 5.1 percent of the total area. Nonetheless, they are important in many rural counties, where unpaved roads can form a significant percentage. For example, in Mono County, unpaved roads comprise more than 60 percent of the road system.

The needs assessment for unpaved roads is not complicated – 103 agencies reported a total unpaved road network of 9,667 centerline miles. The average cost of maintenance is $9,800 per centerline mile per year. Since pavement management software like StreetSaver® only analyzes paved roads, the average cost for unpaved roads from the survey was used for those agencies that did not report any funding needs. This results in a total 10-year need of $947 million.


Figure 2.12 Examples of Unpaved Roads

2.7 Pavement Needs

The methodology to determine the pavement needs and unfunded backlog were described in detail in Appendix B of the 2008 report and is therefore not duplicated here, but to briefly summarize, it requires four main elements for the analysis:

- Existing condition (i.e., PCI),
- Appropriate treatment(s) to be applied from decision tree and unit costs,
- Performance models, and
- Funding available during analysis period.

Pavement needs are estimated to be $61.7 billion over the next ten years.

The calculation of the pavement needs is conceptually quite simple. Once the PCI of a pavement section is known, a treatment and unit cost can be applied. This is performed for all sections within the 10-year analysis period. A section may receive multiple treatments within this time period; e.g., Walnut Avenue may be overlaid in Year 1, and then sealed in Year 5 and again in Year 10.

As before, the deferred maintenance or "unfunded backlog" is defined as work that is needed, but is not funded. It is possible to fully fund ***all*** the needs in the first year, thereby reducing the backlog to zero. However, the funding constraint for the scenario is to achieve our BMP goal within 10 years. Assuming a constant annual funding level for each scenario, the backlog will gradually decrease to zero by the end of the analysis period.

The results are summarized in Table 2.8 and indicate that $61.7 billion is required to achieve the BMP goals in 10 years. Again, this is in constant 2018 dollars. Detailed results by county are included in Appendix C. Again, note that this analysis includes, for the first time, the impact of sustainable technologies. The savings range, on average, from 26 to 29 percent over conventional treatments and result in a reduction of the 10-year paving needs when compared to 2016 (pavement needs were $70 billion in 2016).

Table 2.8 Cumulative Pavement Needs

Cumulative Needs (2018 dollars)		
Year No.	**Year**	**Reach BMP Goal in 10 Years ($ Billion)**
1	2019	$6.2
2	2020	$12.3
3	2021	$18.5
4	2022	$24.7
5	2023	$30.9
6	2024	$37.0
7	2025	$43.2
8	2026	$49.4
9	2027	$55.5
10	2028	$61.7

In 2016, the total 10-year need was $70 billion, so this is a reduction of $8.3 billion. This is partly due to our assumption that cities and counties will use paving technologies such as recycling and full-depth reclamation on all applicable pavements.

As a side note, similar needs analyses for local streets and roads that are part of the National Highway System (NHS) were also conducted. In California, 360 cities and counties own approximately 5,100 centerline miles that are designated part of the NHS. Appendix D analyzes their condition and funding needs.

Finally, Figure 2.13 illustrates a map of California with the 10-year pavement needs by county. From this, we can see that the preponderance of the needs are in Southern California, the San Francisco Bay area and portions of the Central Valley.

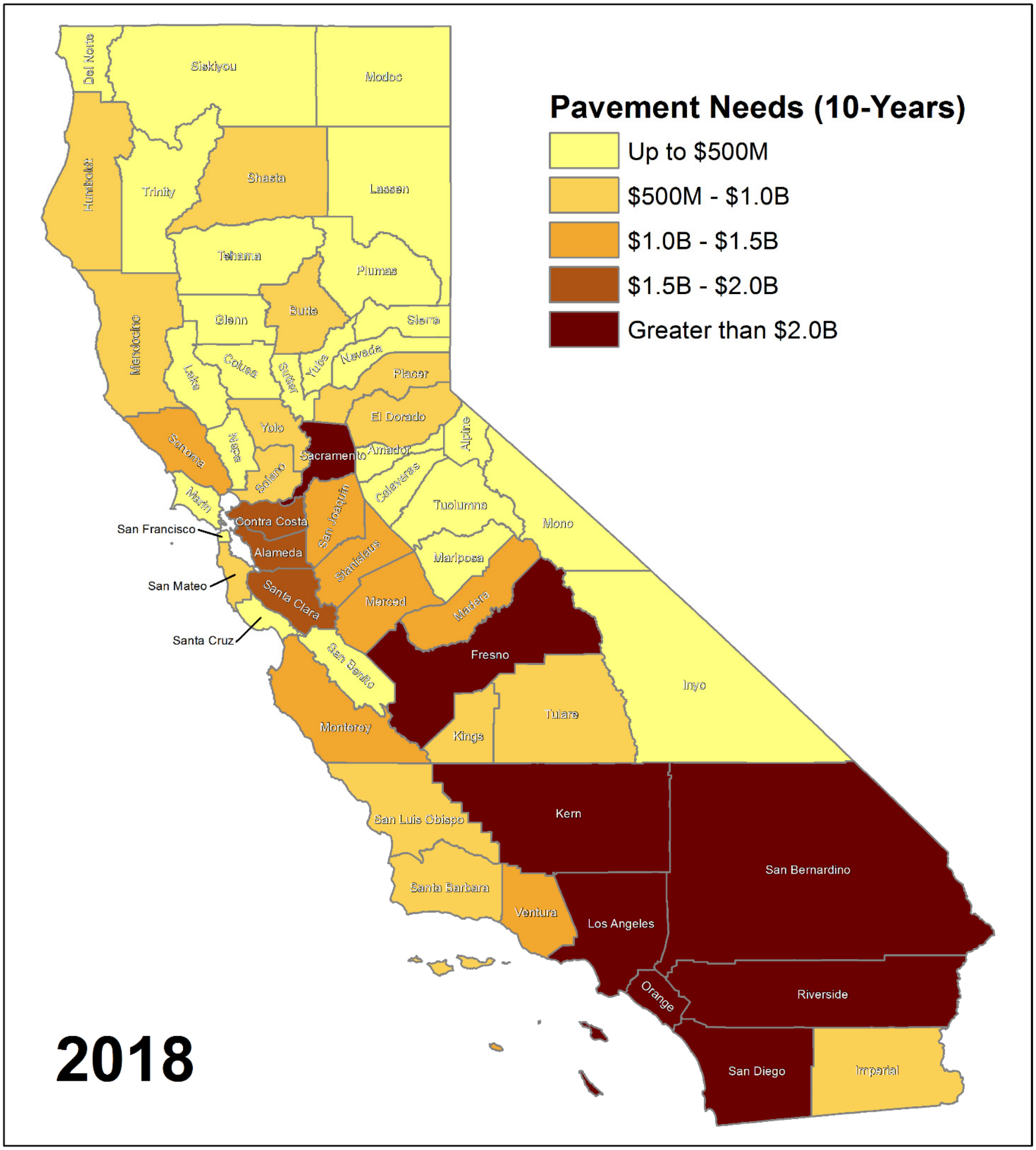


Figure 2.13 Pavement Needs (10 Years) by County

3 Essential Components Needs Assessment

The transportation system includes other essential components (i.e., safety, traffic and regulatory elements) in addition to pavements and bridges. The safety of the traveling public is the highest priority for local agencies, so components such as traffic signals, street lights and signs, while not the most expensive, are critical. Since the transportation system is intended to serve all modes of travel (pedestrians, bicyclists, buses, people with disabilities, etc.) and not just vehicles, local streets and roads must consider their needs as well.

Storm drains, which are mostly invisible since they tend to be underground, are also needed to remove excess water from the surface to facilitate both pavement structural integrity as well as safety. In removing water, trash and other pollutants inevitably drain into creeks, rivers, lakes, bays and the ocean, so environmental considerations come into play. Cities and counties have the responsibility of removing these pollutants as part of the maintenance costs of the transportation system.

Underground pipes, since they are often invisible, are often overlooked when establishing priorities, yet their failure can have disastrous consequences. Other components of the infrastructure, although not part of the local streets and roads system (such as water mains) can have adverse impacts if not properly maintained. This was made evident by the failure of a 90-year old water main near UC Los Angeles in July 2014, which caused considerable damage to the roadway system and nearby facilities on the UCLA campus (see Figure 3.1).

**Figure 3.1 Water Main Break on Sunset Blvd, Los Angeles – July 2014
(Courtesy of Los Angeles Times)**

3.1 Data Collection

As with past surveys, agencies were asked to provide specific information on the inventory and replacement costs for the following twelve asset categories:

Asset Category	Essential Components
1	Storm drains – pipelines
2	Curb and gutter
3	Sidewalk (public)
4	Curb ramps
5	Traffic signals
6	Street Lights
7	Sound Walls/Retaining walls
8	Traffic signs
9	Other storm drain elements; e.g., manholes, inlets, culverts, pump stations, etc.
10	NPDES
11	Other ADA compliance needs
12	Other physical assets or expenditures

A total of 239 survey responses were received compared to 197 in 2016. Data from the previous surveys were also included in the analysis, which resulted in data points from 386 agencies. Table 3.1 illustrates the reliability of the data collected from the 2018 survey as determined by the city or county. That is to say, in the case of **street lights**, the survey responses indicate that:

1) 26.5% of agencies had accurate replacement costs.
2) 39.7% of agencies estimated the replacement costs.
3) 5% of agencies guessed the replacement cost.
4) 28.8% did not respond.

Overall, a little over 40 percent of the agencies indicate that they either have accurate data or were able to provide estimates of the replacement costs for these asset categories. In Table 3.1, three major essential components (storm drains, curb and gutters, and sidewalks) have reasonably "good" data; i.e., approximately three-quarters of the agencies have some data on their replacement costs, which is a key factor in estimating the needs.

Table 3.1 Percentage of Agencies Responding with Data on Essential Components

Category	Percentage of Agencies			
	Accurate	Informed Estimate	Guess	No Response
Storm Drains - pipelines	11.9%	43.8%	11.7%	32.7%
Other elements, e.g., manholes, inlets, culverts, pump stations, etc.	7.4%	42.5%	12.1%	38.0%
Curb and gutter	9.8%	48.2%	11.1%	30.8%
Pedestrian facilities: Sidewalk (public)	9.5%	48.1%	10.9%	31.5%
Other pedestrian facilities, e.g., over-crossings	5.9%	10.4%	5.4%	78.3%
* Bicycle facilities: Class I bicycle path	7.8%	23.6%	5.8%	62.9%
Other bicycle facilities, e.g. bike shelters/lockers, etc.	6.9%	7.1%	4.1%	82.0%
Curb ramps	3.3%	18.4%	13.4%	64.9%
Traffic signals	7.8%	37.5%	14.7%	40.1%
Street Lights	26.5%	39.7%	5.0%	28.8%
Sound Walls/Retaining walls	15.8%	43.0%	8.9%	32.3%
Traffic signs	8.2%	17.8%	13.5%	60.5%
Other physical assets or expenditures that constitute >5% of total non-pavement asset costs, e.g., heavy equipment, corporation yards, etc. Note: Do NOT include bridges (handled separately)	7.4%	40.8%	15.4%	36.4%

Data on essential components are especially challenging to obtain, mostly because very few agencies have the resources to implement and maintain an asset inventory or management system. For example, unincorporated Orange County, with a road network of 320 miles, has over 18,000 signs, over 6,200 drainage inlets and 2,500 miles of storm drains, over 2,400 traffic signals, almost 10,000 miles of curbs and more than 10,000 miles of paint striping. The cost of inventorying these components can be very high, and is not financially possible for many agencies.

3.2 Needs Methodology

The analyses for the essential components are the same as described in the 2016 report. At that time, a new model based on geography (Geographically Weighted Regression or GWR), was developed (see Appendix E of the 2016 report for a more detailed discussion). While previous models were reasonably accurate in the aggregate, large variations existed for individual agencies.

There are many factors that affect the replacement costs of these elements, most of which are caused by geography. For instance, most would agree that it is much more expensive to install a curb ramp in San Francisco than it is in Ceres, and the number of signs that exist in an urban city environment is significantly higher than in a rural county. The reasons that measured relationships vary spatially can also be attributed to sampling variation, relationships intrinsically different across space (for instance, different administrative or policies produce different responses), traffic patterns, road network attributes, or socio-demographic characteristics.

The 2016 model accounts for this variability and is reproduced here:

$$Ln\ Cost = C_{tm3} \times tm^{1/3} + C_{tm} \times tm + C_{isrural} \times isrural + C_{iscounty} \times iscounty + Intercept$$

Where:

Cost = total replacement cost, dollars;

Total miles (tm) = total centerline miles of roads or streets;

isrural = indicator variable and is equal to 1 if agency is rural, 0 otherwise; and

iscounty = indicator variable and is equal to 1 if agency is county, 0 otherwise

Typically, the model was used only for those agencies that did not provide any replacement costs. However, some agencies reported extremely low costs that were considered anomalies; in these cases, the model was used instead.

Table 3.2 indicates the percentage of needs predicted by the model for each county. For example, in El Dorado County, 67 percent of the agencies provided data; therefore, the model only estimated the costs for the remaining 33 percent of agencies. Overall, the model was used to estimate the replacement costs of approximately 26 percent of the agencies.

Table 3.2 Percentage of Agencies Using Model to Estimate Replacement Costs

County	% Agencies Using Model	County	% Agencies Using Model
Alameda	0%	Orange	20%
Alpine	0%	Placer	29%
Amador	33%	Plumas	50%
Butte	33%	Riverside	14%
Calaveras	50%	Sacramento	25%
Colusa	100%	San Benito	33%
Contra Costa	0%	San Bernardino	28%
Del Norte	50%	San Diego	21%
El Dorado	33%	San Francisco	0%
Fresno	31%	San Joaquin	25%
Glenn	33%	San Luis Obispo	50%
Humboldt	50%	San Mateo	5%
Imperial	75%	Santa Barbara	11%
Inyo	0%	Santa Clara	6%
Kern	33%	Santa Cruz	40%
Kings	40%	Shasta	25%
Lake	67%	Sierra	100%
Lassen	50%	Siskiyou	60%
Los Angeles	28%	Solano	0%
Madera	33%	Sonoma	20%
Marin	8%	Stanislaus	50%
Mariposa	0%	Sutter	33%
Mendocino	40%	Tehama	0%
Merced	29%	Trinity	0%
Modoc	0%	Tulare	56%
Mono	50%	Tuolumne	50%
Monterey	54%	Ventura	18%
Napa	0%	Yolo	0%
Nevada	50%	Yuba	33%
		Total	**26%**

3.3 Determination of Essential Components' Needs

Similar to previous models, the 2016 regression model estimates the total replacement cost for only the first eight components. To estimate the needs, this cost needs to be converted to an annual amount based on the estimated service life of the different assets. The costs of the remaining four components (other storm drain elements, NPDES, ADA and other physical assets) are then added. This procedure was described in detail in Appendix E of the 2008 report and has not been duplicated here.

The funding needs for essential components is $34.1 billion.

The 10-year needs figure was estimated to be $34.1 billion, which is a 6% increase from the $32.1 billion reported in 2016. Figure 3.2 is a map illustrating the distribution of needs by county. It should not be any surprise that the bulk of the needs are in the urban regions of the state. Appendix E summarizes the essential components' needs for each county. A map to show the percent of needs met with existing funding is also included.

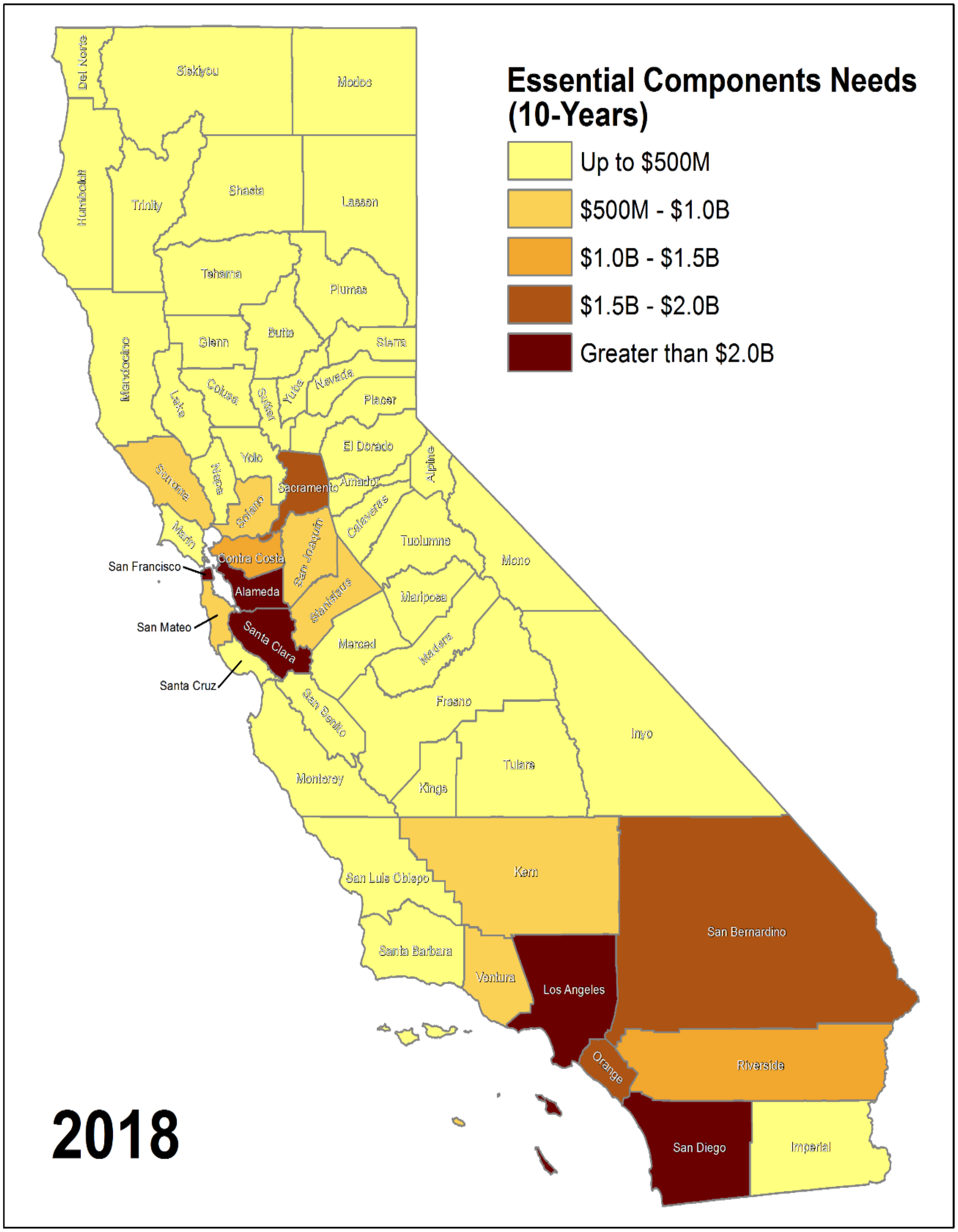


Figure 3.2 Essential Components' Needs by County

4 Funding Analyses

4.1 Pavement Revenue Sources

The online survey asked agencies to provide both their revenue sources and pavement expenditures for 2016/17, 2017/18, as well as estimating an annual average for future years. A total of 388 agencies responded with financial data this year, with 153 agencies reporting on SB1 funding.

As before, cities and counties identified a myriad of sources of funds for their pavement expenditures, broadly categorized into federal, state, or local. For local funds alone, more than a hundred different sources were identified. They included the following examples (this is by no means an exhaustive list and some funding sources have been changed with the advent of the FAST Act[10] which became law in December 2015):

Federal Funding Sources

- Regional Surface Transportation Program (RSTP)
- Surface Transportation Program (STP)
- Congestion Mitigation and Air Quality Improvement Program (CMAQ)
- Community Development Block Grant (CDBG)
- Highway Safety Improvement Program (HSIP)
- Federal Emergency Management Agency (FEMA)
- Forest Reserve
- Transportation Enhancement Activities (TEA)

State Funding Sources

- Gas taxes (Highway User Tax Account or HUTA)
- Transportation Development Act (TDA)
- State Transportation Improvement Program (STIP)
- Active Transportation Program (ATP) which now includes the Bicycle Transportation Account (BTA) and Safe Routes to Schools (SR2S)
- Vehicle License Fees (VLF)
- Transportation Improvement Fee
- Local Transportation Fund (LTF)
- Safe Routes to School
- Traffic Congestion Relief Fund (TCRP)
- CalRecycle grants

[10] http://www.fhwa.dot.gov/fastact/

Local Funding Sources

- Local sales taxes
- Development impact fees
- General funds
- Various assessment districts – lighting, maintenance, flood control, special assessments, community facility districts
- Traffic impact fees
- Traffic safety/circulation fees
- Utilities; e.g., stormwater, water, wastewater enterprise funds
- Transportation mitigation fees
- Parking and various permit fees
- Flood Control Districts
- Enterprise Funds (solid waste and water)
- Investment earnings
- Parcel/property taxes
- Indian reservation roads
- Indian gaming funds
- Vehicle registration fees
- Vehicle code fines
- Underground impact fees
- Transient Occupancy Taxes (TOT)
- Capital Improvement Program (CIP) Reserves/Capital Funds

The funding data were first reviewed to ensure that the description matched the funding source (i.e., federal, state or local). In cases where the source did not match the description, the source was re-categorized as appropriate. Funds were also further categorized as gas tax, sales tax, general fund or other, based on the description. Funds and expenditures were then summed by agency and year. Agencies that reported funding or expenditures for some years, but not others were further reviewed, and the data for reported years was used to estimate the data for unreported years.

Funds and expenditures for each agency were then divided by the number of lane-miles of roadway in that agency. The funding and expenditures data per lane-mile results were then reviewed for outliers. With the outliers removed, funding and expenditure data per lane mile were then averaged for urban counties, rural counties, urban cities and rural cities. These averages were used to determine the estimated total funds and expenditures for all cities and counties. Then the total expenditures and funds for these categories was summed to determine the statewide total values.

Table 4.1 and Figure 4.1 summarize the total pavement funding available as well as the percentage of the funding that comes from various sources. Note that there is a small increase in funding reported beginning in 2012/13; one reason is the annual revenue neutrality adjustment on a portion of the state gas tax as a source of revenue, which resulted in a temporary spike in the gasoline excise tax revenues. In addition, there are local bond measures that have essentially “front-loaded” the pavement expenditures. However, the most important item to note is that SB1 has a significant positive impact on funding, and is expected to contribute as much as 25 percent of total funding!

Table 4.1 Funding Sources for Pavements

	2008/ 09	2009/ 10	2010/ 11	2011/ 12	2012/ 13	2013/ 14	2014/ 15	2015/ 16	2016/ 17	2017/ 18	Future
Pavement Funding ($M)	$1,453	$1,571	$1,557	$1,530	$1,691	$1,836	$1,938	$1,967	$1,999	$2,378	$2,808
Federal	10%	23%	18%	17%	10%	12%	9%	9%	8%	11%	7%
State	62%	50%	53%	53%	52%	50%	44%	41%	43%	37%	35%
Local	28%	27%	29%	30%	38%	38%	47%	50%	49%	43%	33%
SB1										10%	25%

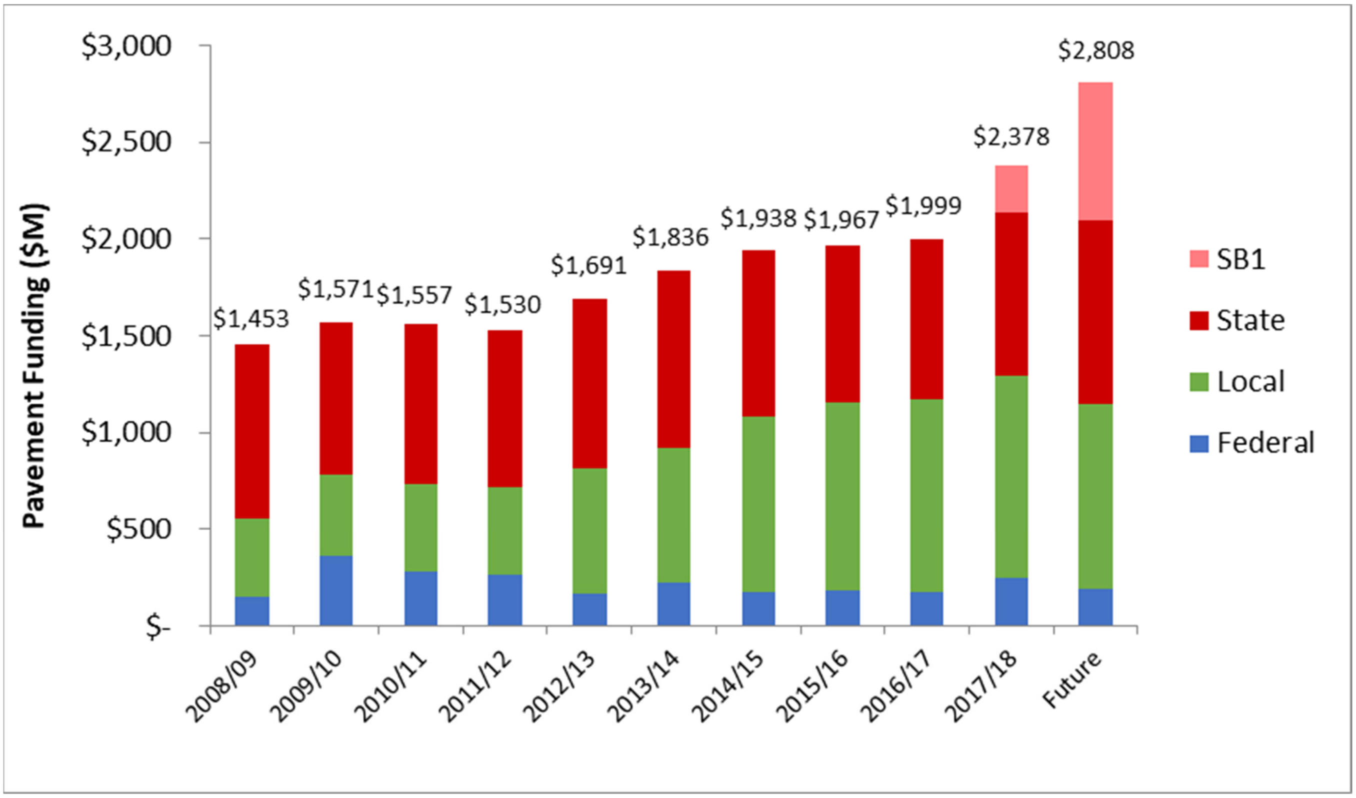


Figure 4.1 Pavement Funding by Source

Prior to SB1, the trend indicated that local agencies were relying more on local sources and less on state funding; with the advent of SB1, the percentage of state funding sources is back to 2008/09 levels.

Note that federal funding was a significant component in 2009/10 and 2010/11, reflecting the influx of American Recovery and Reinvestment Act (ARRA) which occurred during the recession. Since then, the percentage of federal funds has fluctuated around 10 percent and is projected to decrease to 7 percent. This is an important item to note since it indicates that cities and counties, in general, do not rely heavily on federal funds.

The Highway User Tax Account (HUTA), more commonly known as the state gas tax, is still the single largest funding source for cities and counties. However, Table 4.2 shows a revenue source that was declining, partly due to declining gas consumption, and partly due to the additional responsibilities for cities and counties; e.g., compliance with ADA, which reduces the amount of funding available for pavements. However, with SB1, Table 4.2 shows the amount of funding provided to cities and counties from the gas tax, as well as the percent of State-provided pavement funding and total pavement funding that came from gas tax proceeds. The table indicates that gas tax funds are projected to increase to almost $2 billion a year barring a repeal.

The gas tax is the single largest funding source for cities and counties, yet this is projected to decline statewide and nationally.

Table 4.2 Gas Tax Trends for Pavements

	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Future
Gas Tax ($M)	$1,115	$911	$861	$907	$1,096	$1,137	$891	$904	$843	$1,200	$1,989
% of State funding	66%	69%	75%	78%	93%	91%	86%	88%	91%	92%	94%
% of total funding	41%	34%	40%	41%	48%	46%	38%	36%	39%	43%	57%

Traditionally, cities and some counties have been able to rely on the General Fund for pavement funding. However, as Table 4.3 illustrates, the number of agencies that receive General Funds has slowly increased and now approaches 2008 levels, when it was a high of 132 agencies. It dropped sharply to only 62 when the recession occurred in 2009/10.

Of final interest is the trend in local sales tax measures. Table 4.4 shows an increasing reliance on the revenues from this source. Although local sales tax provided only 10 percent of the total pavement funding in 2008/09, this has steadily increased and is expected to remain at approximately 19 percent for the future.

Table 4.3 General Funds for Pavement Funding

	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Future
General Fund ($M)	$201	$120	$175	$168	$166	$232	$322	$406	$316	$303	$286
# of agencies	132	62	77	72	88	94	104	104	128	132	125
% of local funding	27%	16%	28%	25%	19%	24%	29%	33%	30%	25%	24%
% of total funding	7%	4%	8%	8%	7%	9%	14%	16%	15%	11%	8%

Table 4.4 Local Sales Tax Trends

	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Future
Sales Tax $M)	$285	$258	$256	$279	$374	$455	$364	$475	$500	$663	$651
% of local funding	38%	35%	41%	42%	43%	48%	32%	39%	47%	55%	56%
% of total funding	10%	10%	12%	13%	17%	18%	16%	19%	23%	24%	19%

4.2 Pavement Expenditures

The survey also asked for a breakdown of pavement expenditures in four categories:

- Preventive maintenance, such as slurry seals;
- Rehabilitation and reconstruction, such as overlays;
- Other pavement-related activities such as curbs and gutters; and
- Operations and maintenance, such as filling potholes, sealing cracks and street sweeping.

Table 4.5 shows the breakdown in extrapolated pavement expenditures for cities, counties and cities/counties combined. There was a drop in expenditures reported in 2010/2011, reflecting the recession. However, since 2012/13, expenditures have gradually increased and now exceed 2008 levels.

Table 4.5 Breakdown of Pavement Expenditures ($M)

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Future
Preventive Maint.	$273	$273	$333	$367	$373	$378	$479	$551	$709
Rehabilitation & Reconst.	$817	$794	$1,132	$1,208	$1,178	$1,194	$1,154	$1,429	$1,695
Other	$84	$82	$104	$109	$194	$167	$293	$332	$310
Operations & Maint.	$383	$381	$578	$615	$619	$631	$527	$563	$594
Totals	**$1,557**	**$1,530**	**$2,147**	**$2,298**	**$2,365**	**$2,370**	**$2,454**	**$2,874**	**$3,308**

Figure 4.2 illustrates the trends for all pavement expenditures graphically. Preventive maintenance continues to be a robust category, and has grown to 21 percent. This indicates that many agencies continue to be cognizant of the need to preserve pavements. Rehabilitation and reconstruction is relatively stable at 51 percent. Operations and maintenance has dropped to approximately 18 percent.

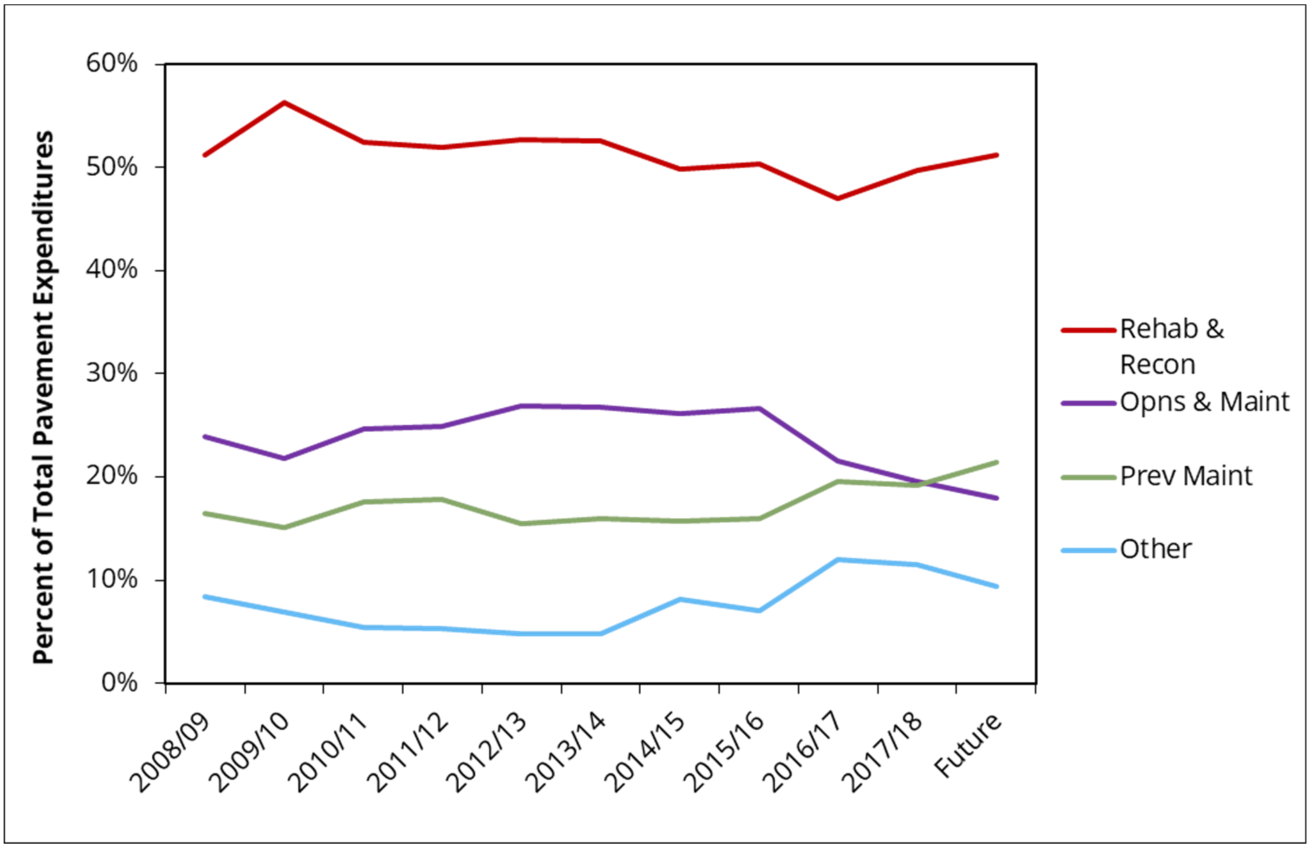


Figure 4.2 Trends in Pavement Expenditures

Finally, projected pavement expenditures for the next 10 years are shown in Table 4.6. As expected, counties indicate lower projected expenditures than cities; similarly, rural agencies project lower expenditures when compared to urban agencies. However, all categories have increased since 2016.

Table 4.6 Projected Pavement Expenditures Per Lane-Mile

	Pavement Expenditures ($/lane-mile)	
	Rural	Urban
County	$6,935	$15,247
City	$15,749	$10,320

The resulting total pavement expenditures for all 539 cities and counties were therefore estimated to be $2.808 billion annually. To put this funding level in perspective, $2.808 billion/year is approximately 1.3 percent of the total investment in the pavement network, the value of which is estimated at $220 billion.

However, our observations on the predicted versus actual expenditures revealed an interesting trend, as illustrated in Figure 4.3. Generally, local agencies are spending 10 to 20 percent <u>more</u> (pink line) than estimated (green line). From discussions with some respondents, it appears that the estimated expenditures are conservative and reflects a reluctance to rely on federal and state grants/sources in the future as well as the inability to predict how the economy will perform. The latter is important, since local sales taxes (a good indicator of economic robustness) now comprise almost 19 percent of total funding. However, given the large pavement needs ($6.7 billion annually), the difference is not overly significant.

Cities and counties are estimated to spend $3.083 billion annually on pavements. This is approximately 1.4% of the total invested in the pavement network.

Nonetheless, we projected that future expenditures may be $3.083 billion (with the addition of SB1 – blue line) instead of $2.808 billion. This number was used in our analysis in Section 4.6.

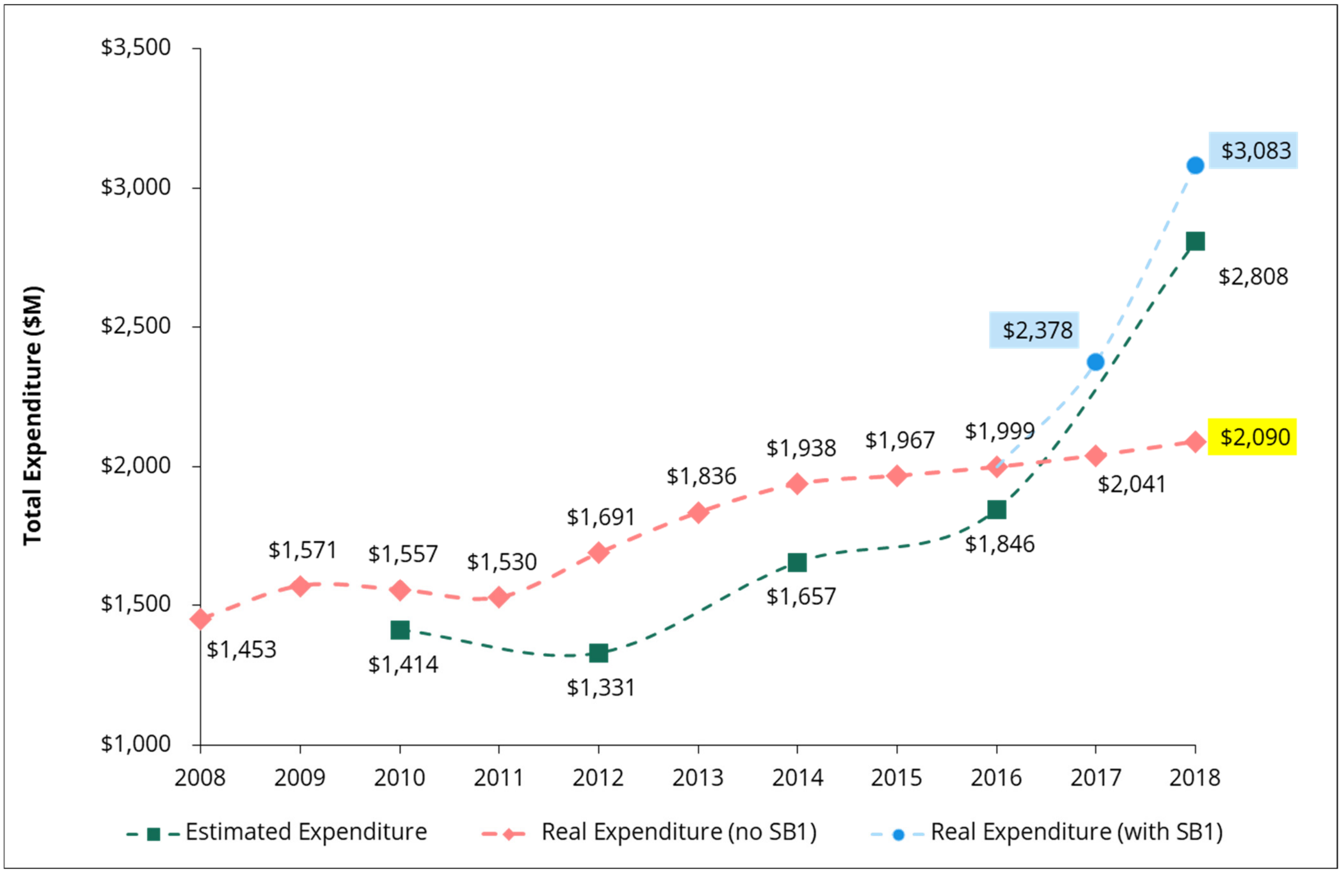


Figure 4.3 Differences Between Predicted and Actual Expenditures

4.3 Essential Components Revenue Sources

The revenue sources for essential components are shown in Table 4.7. Again, federal funds currently make only a small contribution to the cities and counties, in the order of 9 to 12 percent. However, unlike pavements, local sources are expected to account for 68 percent of total funding, with state sources accounting for 20 percent. In addition, there is no one single funding source like the gas tax.

Table 4.7 Funding Sources for Essential Components ($M)

Funding type	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Future
Total Funding ($M)	$885	$903	$1,204	$1,332	$1,111	$1,184	$1,459	$1,603	$1,420
Federal	16%	16%	12%	13%	11%	17%	9%	12%	11%
State	31%	31%	28%	23%	18%	17%	17%	18%	20%
Local	53%	53%	60%	65%	70%	66%	74%	70%	68%
SB1							0%	0%	1%

Since local revenues form the majority of the funding, Table 4.8 explores the five main funding sources: general funds, local sales taxes, lighting district funds, development impact fees, and other. The last category includes stormwater, sanitary and NPDES related sources. Future funding projections indicate a gradual increase in funding for 2016/17 and 2017/18, but a downward projection for the future.

Table 4.8 Local Revenue Sources for Essential Components ($M)

Funding type	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Future
General Fund	$104	$124	$83	$93	$398	$420	$789	$821	$661
Sales Tax	$112	$114	$129	$148	$98	$132	$115	$114	$115
Lighting District	-	-	-	-	$39	$40	$34	$35	$34
Dev. Impact Fees	$34	$37	$24	$32	$27	$23	$31	$46	$33
Other	$249	$255	$460	$556	$219	$163	$115	$114	$124
Totals	**$498**	**$530**	**$696**	**$830**	**$781**	**$779**	**$1,083**	**$1,129**	**$967**

4.4 Essential Components Expenditures

Table 4.9 details the expenditures by category. Storm drains and traffic signals continue to be the largest components. Overall, expenditures appear to fluctuate between $1 to $1.3 billion annually.

On average, anticipated expenditures for essential components over the next 10 years are shown in Table 4.10. As before, rural counties and cities are expected to have lower expenditures than their urban counterparts.

The resulting total expenditures for all 539 cities and counties were estimated to be over $1.3 billion annually.

4.5 Funding Shortfalls

One of the primary objectives of this study was to determine whether a funding shortfall exists for the next 10 years, and if so, the amount of that shortfall. Chapters 2 and 3 described the analysis to determine the funding needs for both the pavement and essential components, respectively. The preceding sections analyzed the revenues and expenditures as well.

Table 4.11 summarizes the results of all the preceding analyses and determines the funding shortfall to be $52 billion for pavements and essential components. An additional shortfall of $2.9 billion was estimated for additional regulatory requirements (e.g., NPDES, ADA and sign retroreflectivity; see Table 2.7). However, those numbers were not included in Table 4.11 because only half of the agencies had data, and half of those indicated that they were “informed estimates” or “guesses” at best.

Table 4.9 Breakdown of Expenditures for Essential Components

Essential Components	Annual Expenditures ($M)							% of total
	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	Future	
Storm Drains	$241	$341	$147	$131	$215	$233	$244	19%
Manholes, Inlets, Culverts, Pump Stations	-	-	$37	$46	$43	$50	$49	4%
Curb and Gutter	$69	$68	$55	$67	$38	$50	$52	4%
Sidewalk (public)	$117	$153	$110	$129	$101	$158	$117	9%
Other Pedestrian Facilities	$13	$18	$5	$22	$18	$27	$33	3%
Class 1 Bicycle Path	$22	$19	$24	$40	$29	$56	$48	4%
Other Bicycle Facilities	$27	$14	$4	$6	$17	$29	$128	10%
Curb Ramps	$59	$61	$47	$54	$50	$67	$63	5%
Traffic Signals	$215	$215	$210	$258	$223	$247	$214	16%
Street Lights	$106	$98	$122	$121	$188	$224	$194	15%
Sound/Retaining Walls	$9	$17	$4	$7	$10	$8	$9	1%
Traffic Signs	$72	$63	$61	$68	$54	$55	$63	5%
Tunnels	-	-	$0	$0	$4	$4	$5	0%
Other	$112	$117	$122	$102	$88	$90	$82	6%
Totals	**$1,062**	**$1,184**	**$949**	**$1,052**	**$1,078**	**$1,300**	**$1,300**	**100%**

Table 4.10 Breakdown of Expenditures by Agency

	Essential Components Expenditures ($/mile/year)	
	Rural	Urban
County	$1,234	$6,816
City	$4,511	$3,870

Table 4.11 Summary of 10-Year Needs & Shortfall (2018 $ Billion)

Transportation Asset	Needs ($B)					2018		
	2008	2010	2012	2014	2016	Needs	Funding	Shortfall
Pavement	$67.6	$70.5	$72.4	$72.7	$70.0	$61.7	$30.8	$(30.9)
Essential Components	$32.1	$29.0	$30.5	$31.0	$32.1	$34.1	$13.0	$(21.1)
Totals	**$99.7**	**$99.5**	**$102.9**	**$103.7**	**$102.1**	**$95.8**	**$43.8**	**$(52.0)**

In the 2016 study, the funding shortfall identified was $71.3 billion, so this is a decrease of $19.3 billion (a reduction driven largely by SB1 funding and cost savings from sustainable pavement strategies.) This is a hugely significant reduction of more than 27 percent, and reflects the first time that cities and counties project an optimistic outlook for the local transportation infrastructure.

The shortfall for local streets and roads has been reduced to $52 billion!

4.6 Pavement Funding Scenarios

California, together with the rest of the nation, faced severe economic challenges during the recession that began in 2008, with reductions in revenues, multi-billion-dollar deficits and a high unemployment rate. While economic growth and tax increases have helped stabilize state and local revenues for many programs, transportation funding levels lagged behind for many years.

However, after 10 years of working with policymakers, and providing the results of the statewide needs studies, the Governor signed SB1 into law. More than $5 billion a year was made available for transportation. Of that, cities and counties receive approximately $1.5 billion annually for streets and roads. This was a much needed infusion, and the funding scenarios illustrate the beneficial consequences of this additional funding. The potential loss of SB1 will immediately result in declining revenues and a deteriorating transportation system.

In addition, cities and counties have continued to stretch every existing dollar. One new factor in the 2018 analysis is the inclusion of sustainable technologies such as cold-in-place recycling and full-depth reclamation. These have cost savings of over 25 percent when compared to conventional treatments, and have been included in all the scenario.

The funding scenarios analyzed were:

1) Existing funding with SB1, estimated at $3.083 billion/year;
2) Existing funding <u>without</u> SB1, estimated at $2.090 billion/year; and
3) Funding to achieve best management practices (BMP) in 10 years.

Note that approximately $1 billion of SB1 is estimated to be spent on paving, with the remaining $0.5 billion allocated to essential components as well as operations and maintenance.

As noted in Chapter 1, an analysis period of 10 years was selected, not just for consistency with the SHOPP, but also because this was a reasonable time period to accomplish the BMP goal. Even if local agencies received $30.9 billion to erase the 10-year pavement shortfall today, it would not be possible to build or construct this large number of projects in one year, or two or even five. Few, if any, agencies have the resources to design, manage or inspect this quantity of work in such a short time frame, and the contracting community is also unlikely to have the resources to construct them. In discussions with the Oversight Committee, a 10-year timeframe was deemed to be reasonable and practical.

Scenario 1: Existing Funding with SB1 ($3.083 billion/year)

In this scenario, the most cost-effective treatments are funded first, and these are typically preventive maintenance or preservation strategies, such as seals. This approach generally treats a larger percent of pavement network resulting in optimizing the use of limited funds. At the existing funding level of $3.083 billion/year, this will essentially stabilize the pavement condition and unfunded backlog at existing levels. Figure 4.4 graphically illustrates these two trends.

Scenario 2: Existing Funding Without SB1 ($2.090 billion/year)

This scenario models the consequences if SB1 is repealed. As expected, the results are sobering; the average PCI will deteriorate to 57 and the unfunded backlog increase from $36.8 billion to $46.9 billion (27 percent increase).

Scenario 3: Reach Best Management Practices ($6.824 billion/year)

One of the objectives of this study was to determine what funding level would be required to reach a pavement condition where best management practices can be applied. This occurs when the PCI reaches an optimal level in the mid-80s, and the unfunded backlog will be eliminated in 2028.

Once the backlog has been eliminated, only $2.5 billion/year is required to maintain the network at BMP levels.

For this scenario, $6.824 billion/year is required to achieve this level (see Figure 4.6). The PCI will reach 87 and the unfunded backlog is eliminated by 2028. **Once eliminated, the cost of maintenance thereafter is significantly lower, requiring only $2.5 billion a year.**

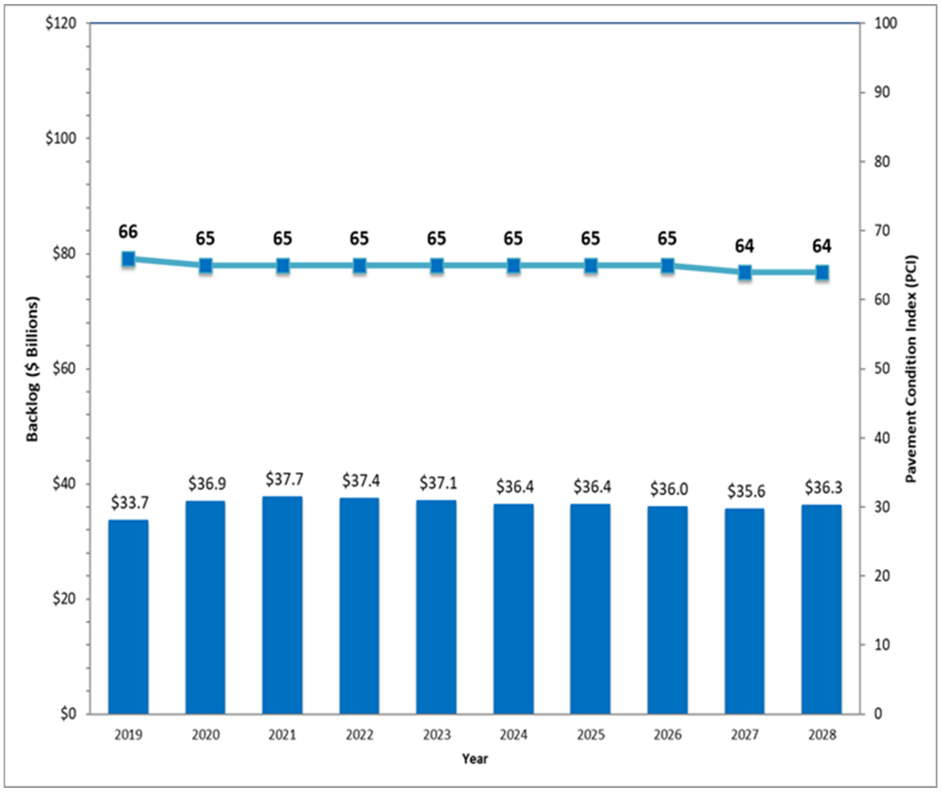


Figure 4.4 Results of Scenario 1: Existing Budget

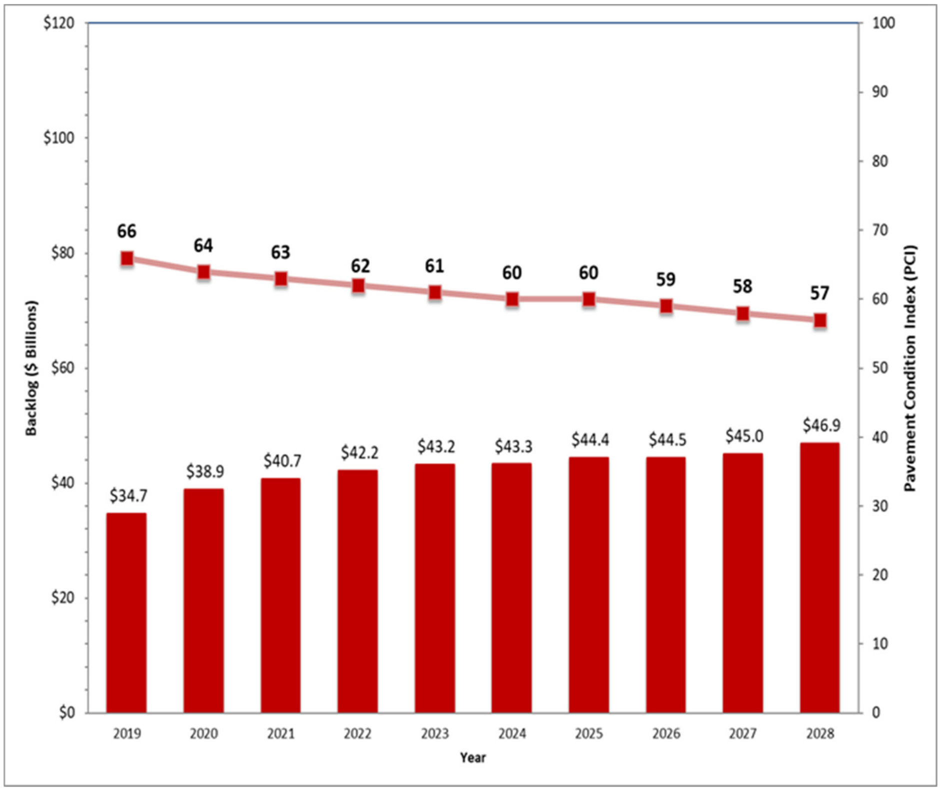


Figure 4.5 Results of Scenario 2: Existing Funding Without SB1

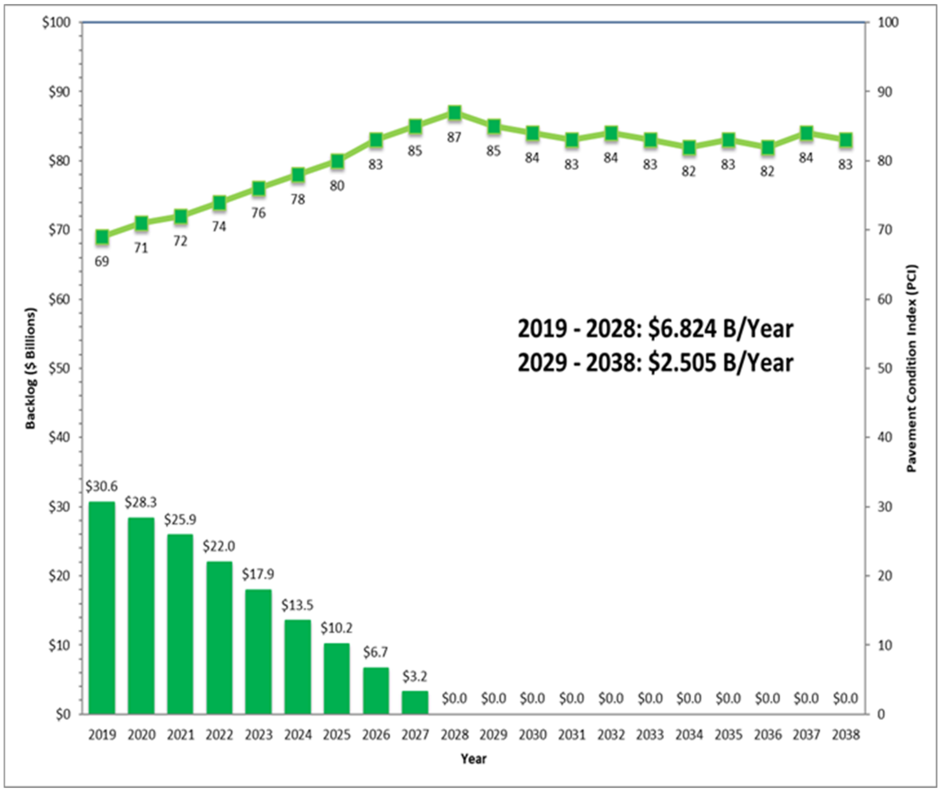


Figure 4.6 Results of Scenario 3: BMP in 10 years = $6.824 billion/year

4.7 Other Performance Measures

Although both PCI and the unfunded backlog are common performance measure for cities and counties, there are others that may be used. One such measure is the percentage of pavement area in different condition categories. Table 4.12 illustrates the breakdown in pavement area for each funding scenario.

The biggest factor that jumps out is that the percentage of pavements in good condition will jump significantly to 66.2 percent with SB1, and pavements in “poor” condition will drop slightly to 21 percent.

However, without SB1, the percentage of good pavements will drop to less than half and pavements in “poor” condition will increase to 28.4 percent. Figure 4.7 shows examples of “poor” local streets.

If SB1 funding is lost, over 28% of California’s streets will be in poor condition by 2028.

Table 4.12 Breakdown of Pavements by Condition Category for Each Scenario (2028)

Condition Category	Current Breakdown (2018)	Scenario 1 Existing Budget ($3.083 B/yr)	Scenario 2 Existing Budget w/o SB1 ($2.090 B/yr)	Scenario 3 BMP in 10 Years ($6.824 B/yr)
PCI 70-100 (Good to Excellent)	54.7%	66.2%	49.6%	100.0%
PCI 50-69 (Fair/At Risk)	20.4%	12.8%	22.0%	0.0%
PCI 0-49 (Poor)	24.9%	21.0%	28.4%	0.0%
Totals	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Figure 4.7 Examples of Poor Streets

4.8 How Did We Get Here?

For those who do not work with transportation issues every day, it can be difficult to understand how California's cities and counties have reached this situation. Yet the factors that have led us here can be quickly summarized:

- The population of California was approximately 30 million in 1990; it is now approximately 39 million, an increase of 30 percent. Attendant with that increase in population are increases in traffic, housing and new roads.
- There are many new regulations that have increased the responsibilities of cities and counties, such as ADA, NPDES and new traffic sign retroreflectivity standards.
- Greenhouse gas emissions-reduction policies and other policies designed to improve air quality, together with ADA standards, have also had an unexpected impact on streets and roads. One example is the use of heavy new buses that exceed the legal highway limits. These vehicles were upgraded to reduce GHG and other particulate air emissions and meet ADA standards but the higher loads will inevitably result in premature pavement failures and higher maintenance costs.

- Californians demand a high quality of life; e.g., complete streets or active transportation policies.
- Cities and counties need to consider, build and maintain a transportation system that has multiple transportation modes; e.g., bicycles, pedestrians, trucks and buses.
- The cost of road repairs and construction has steadily increased, at rates that are significantly higher than that of inflation. In the last 15 years, paving costs have increased much more than revenues. This can be attributable to the increasing costs of petroleum products which is directly correlated to asphalt costs as well as labor and equipment costs.
- The State gasoline excise tax did not increase for more than 20 years and yet is the single most important funding source for transportation. Cities and counties have relied on a diminishing revenue source for a transportation system that is aging and deteriorating rapidly – SB1 provides the first significant new infusion of funding.
- The increased fuel economy of vehicles as well as the popularity of hybrid and electric vehicles leads to decreasing gas consumption, and, in turn, to a reduction in gas taxes. Hence the need for a long-term sustainable revenue source.

4.9 Summary

From the results of the surveys as well as the funding scenarios, it is apparent that:

- Total funding for pavements is projected at $3.083 billion annually over the next ten years. Of this, 60 percent are expected to come from state funds (almost all gas tax and SB1), 7 percent from federal sources, and the remainder from local sources (mostly sales taxes).
- Total expenditures for essential components is projected to also grow to $1.3 billion annually. The majority of the funding is expected to come from local sources (68%) with the state contributing approximately 20%.
- With SB1, the total funding shortfall for pavements and essential components will drop significantly to $52 billion over the next ten years! This is the first time that the shortfall is projected to drop since 2008.
- Under the existing funding for pavements ($3.083 billion/year) with SB1, the local streets and roads will be stay essentially at current levels; i.e., PCI will be between 64 to 65, and the unfunded backlog at $36.3 billion. In addition, approximately two-thirds of the pavement network will be in “good to excellent’ condition by 2028. The percentage of pavements in the “poor” category will decrease slightly to 21 percent.
- If SB1 is repealed, the loss of funds will be sobering; the PCI will drop to 57 and the unfunded backlog grow to $46.9 billion by 2028. Less than half the network will be considered “good to excellent” and more than 28 percent will be in “poor” condition.
- The best management practice scenario would require approximately $6.824 billion annually to eliminate the backlog of work and raise the PCI to the mid-80s. Once the BMP goal has been reached, it will only require $2.5 billion/year to maintain the condition of the pavement network.

5 Bridge Needs & Funding Analysis

Bridges are an integral part of the transportation system, and therefore a study such as this one would be incomplete without a discussion of their needs. The catastrophic nature of a bridge failure is exemplified by the collapse of the I-35W bridge in Minneapolis during rush hour in August 2007. Thirteen people were killed and 145 injured. Failures in local bridges can also have significant consequences. Many rural bridges provide the only access to homes and communities, and if a bridge collapses, access to help is limited or not available. In other cases, detours of more than four hours may be necessary.

Addressing bridge investment needs is both a local and national challenge. In its report *Bridging the Gap*, the American Association of State Highway and Transportation Officials (AASHTO) describes age and deterioration as the first of five top problems facing the nation's bridge population[11]. Other problems include congestion, increased construction costs, maintaining bridge safety, and addressing new bridge needs. The Federal Highway Administration (FHWA) estimated the national backlog of bridge investment needs to be $121 billion in 2012, with a national investment level of $11.9 billion needed to keep the backlog from rising. This figures does not include consideration of addressing congestion or other new bridge needs[12]. California's bridge population is one of the largest in the country, and thus California bridge conditions have a significant bearing on any national-level analyses.

Although a compelling case can be made for making needed investments in California's local bridges, the simple truth is that local budgets are tightly constrained, there is significant uncertainty about future funding, and there are many different competing needs for available funds. Thus, bridge owners, taxpayers, and legislators need the most accurate information available to make the best decisions about how to allocate scarce resources.

For the 2018 update, both Quincy Engineering (QE) and Spy Pond Partners (SPP) collaborated to provide the analysis to determine both the bridge needs and funding scenarios, respectively. These results are shown in Appendix F.

[11] AASHTO. *Bridging the Gap: Restoring and Rebuilding the Nation's Bridges.* 2008.

[12] FHWA *2015 Status of the Nation's Highways, Bridges, and Transit: Conditions & Performance*. Report to the United States Congress. http://www.fhwa.dot.gov/policy/2013cpr/pdfs.cfm.

5.1 Bridge Inventory Data

Two bridge inventory data sets were used for this study. First is the National Bridge Inventory database (NBI), which includes data collected by Caltrans on behalf of local agencies on a biennial basis and provided to Federal Highway Administration (FHWA) to be included in the NBI database. Second, local agency bridge inventory data are gathered from the Statewide survey on short (less than 20 feet in length) and non-vehicular bridges, which are excluded from the NBI database.

The NBI database contains detailed bridge information such as general geometry (length, width number of supports), year built, various conditional ratings and designations. It also contains Structurally Deficient (SD), the now outdated Functionally Obsolete (FO) designations, and the Sufficiency Ratings (SR) that are used to determine the general condition of a bridge.

Structurally Deficient (SD) is a designation used to describe a bridge that has one or more structural defects that require attention. It is determined based on the structural evaluation and the condition ratings of the bridge deck, substructure, and superstructure. These component evaluations and ratings are listed in the NBI database documents along with the details of the nature and severity of the defects.

The **Sufficiency Rating (SR)** is a method of evaluating a bridge by calculating multiple factors to obtain a numeric value; this value is used to indicate the sufficiency of the bridge to remain in service. The result is a percentage, with 100 percent representing an entirely sufficient bridge and zero percent representing an entirely insufficient or deficient bridge. The SR is essentially an overall rating of a bridge's fitness for the duty that it performs based on factors derived from multiple NBI data fields, including fields that describe its structural evaluation, functional obsolescence, and its essentiality to the public. A low SR may be due to structural defects, narrow lanes, low vertical clearance, or any of many possible issues.

Functionally Obsolete (FO) is an outdated designation that was previously used to describe a bridge that is no longer functionally adequate for its task. Major reasons for this classification include inadequate bridge width for the volume of traffic accommodated, inadequate vertical clearances for traffic, and inadequate clearances over waterways. By far, the biggest driver of this classification is inadequate bridge width for traffic. This typically occurs in older bridges that may have been initially built with an adequate number of lanes and shoulder width to meet standards of the day but have experienced a significant growth in traffic volumes over their lifetimes. The FO classification did not necessarily imply deficiencies of a structural nature; a bridge with this rating could be perfectly safe, but could be a source of traffic congestion or not have a high enough clearance to allow oversized vehicle traffic.

With the passage of MAP-21, FHWA shifted towards "performance measure" metrics in evaluating infrastructure investment. The primary measures of bridge performance are "Good," Fair" or "Poor" and are based on condition ratings of the bridge's superstructure, substructure, and deck elements. In general, components with condition values of 4 and below are considered "Poor", components with condition values of 5 and 6 are considered "Fair", and components with condition values of 7 and above are considered "Good". The lowest measure for an individual bridge's component is used to categorize the entire structure. FHWA eliminated the FO categorization and no longer emphasizes the SR formula.

Also, the official definition of "Structurally Deficient" was modified in 2018 to be the same as the definition for "Poor" condition.

MAP-21 essentially consolidated the Highway Bridge Replacement and Rehabilitation Program with other funding programs to allow DOT's flexibility in allocating funding on overall performance criteria rather than individual programmatic criteria. While FHWA no longer uses Structurally Deficient, Functionally Obsolete, or Sufficiency Rating for determining funding eligibility, Caltrans still distributes federal funding to local agencies based on the previously established Highway Bridge Program criteria. Utilizing these criteria, Caltrans still recognizes both Sufficiency Rating and the Structurally Deficient categorization.

To remain consistent with the methodology used in the 2016 study, Quincy allowed the use of both Structurally Deficient and Sufficiency Rating as criteria for evaluating bridge replacement and rehabilitation needs. This is consistent with national FHWA metrics, since the condition states that formally triggered the "Structurally Deficient" classification are essentially the same as the condition states that currently trigger the "Poor" condition rating. Furthermore, Caltrans still uses the Structurally Deficient classification and Sufficient Rating for determining funding eligibility in administering federal transportation funds.

While Functionally Obsolete is no longer a recognized classification, bridges that are too narrow for the traffic volumes they carry still have a need for replacement or rehabilitation. Correspondingly, this study still considered the cost of narrow bridges and bridge with inadequate vertical overhead clearances as a need for future remediation through widening.

A total of 12,105 local agency bridges in California were assessed from the 2015 NBI database. This is approximately 48 percent of the total of 25,318 bridges. Local agency bridges are defined as bridges that are owned by local agencies such as counties and cities and are typically not on the State Highway System. Bridges owned by others, such as State, Bay Area Rapid Transit, private, railroad and federal bridges, are not considered as local agency bridges and were not included in this study.

There are 12,105 local bridges in California, which represents 48% of the total.

Figure 5.1 represents a breakdown of local bridge count by county. Most counties (including city bridges within the county) have a few hundred bridges, averaging about 200 bridges per county. In general, the larger populated counties have a significantly higher number of bridges than the lower populated counties. Los Angeles County has the most locally owned bridges, with over 1,400 bridges.

Figure 5.2 illustrates the age distribution of all the statewide local bridges. The largest age group are bridges 40 years or older, followed by bridges that are 50 years or older. As bridges age, the need for rehabilitation or replacement becomes greater. As with streets and roads, it is more cost-effective to maintain bridges in good condition than it is to allow those bridges to deteriorate at a faster rate and require replacement sooner. Figure 5.2 also shows that there are more than 2,000 bridges that are over 80 years old.

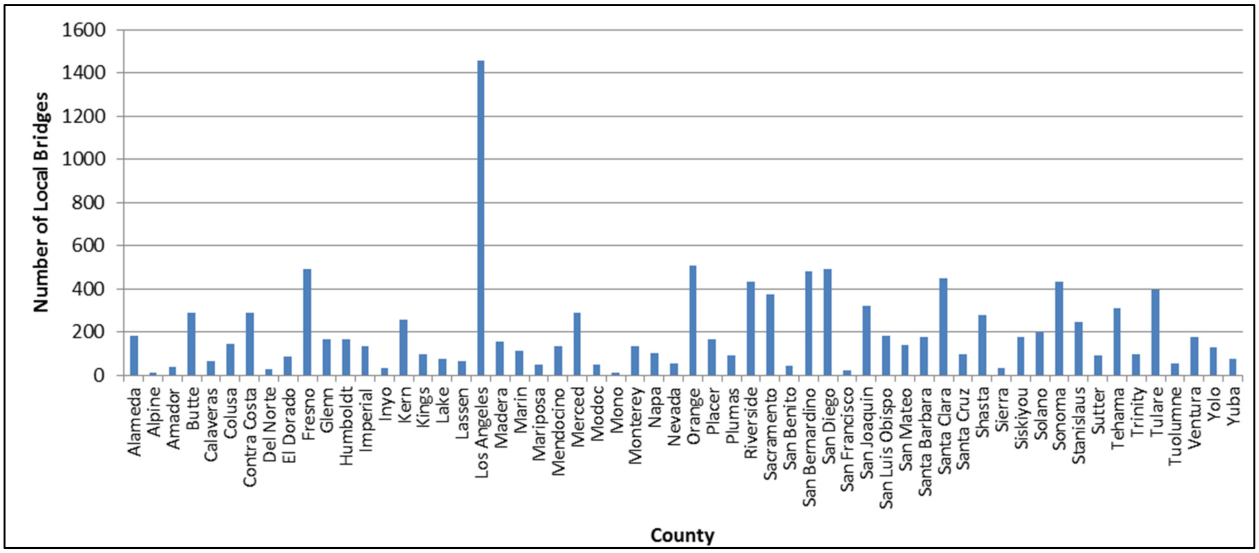


Figure 5.1 Number of Local Bridges by County (includes Cities within County)

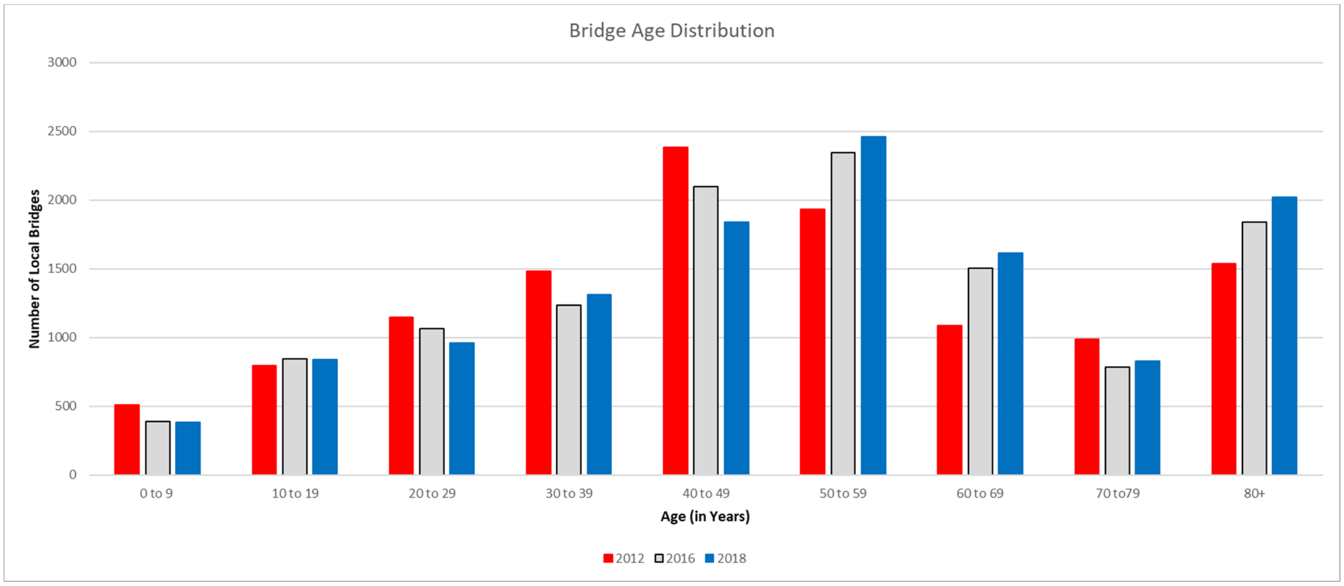


Figure 5.2 Age Distribution of Local Bridges

Current bridge design codes[13] anticipate a minimum lifespan of 75 years. However, older bridges may not have been designed and constructed to such high standards; previous bridge standards anticipated a 50-year lifespan. Therefore, it is anticipated that a significant portion of bridges over 80 years old may require replacement soon.

[13] AASHTO Load Resistance Factor Design Bridge Design Specifications

Figure 5.3 is a scatter plot that shows the SR for all local bridges. Although the average SR is 81, there are a significant number of bridges with an SR less than 50. County specific charts are available on the www.SaveCaliforniaStreets.org website.

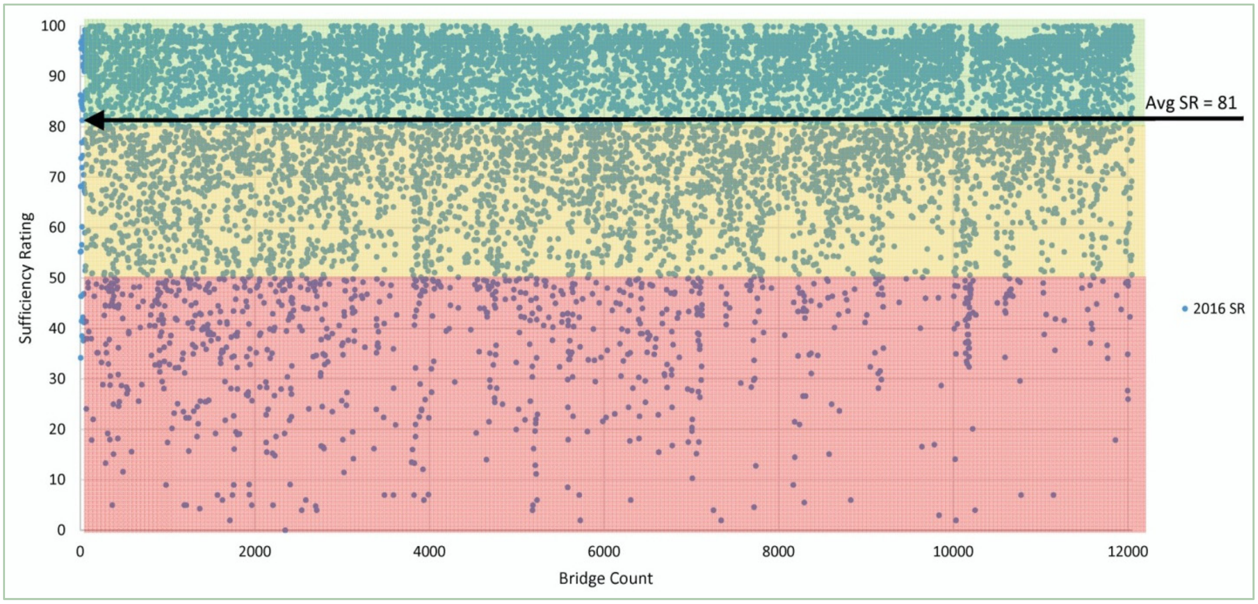


Figure 5.3 Scatter Plot of Sufficiency Ratings for Local Bridges

Of the 12,105 local agency bridges, 6,315 bridges are considered "on-system" and 5,494 are "off-system". "On-system" bridges are listed in the National Highway System or are bridges with the following functional classifications:

- Urban Principal Arterial – Interstate
- Urban Principal Arterial – Other Freeways or Expressways
- Urban Other Principal Arterial
- Urban Minor Arterial
- Urban Collector
- Rural Principal Arterial – Interstate
- Rural Principal Arterial – Other
- Rural Major Arterial
- Rural Major Collector

Off-system bridges are bridges that are not on the National Highway System and have the following functional classifications:

- Urban Local
- Rural Minor Collector
- Rural Local

Recent Caltrans Inspection Methodology Changes

There is one significant change from the first bridge assessment conducted in 2012. Caltrans recently modified its bridge inspection practice to perform element-level inspections. The goal of this method is to more accurately assess the overall condition of bridges by evaluating the individual structural elements that comprise larger bridge components.

Bridge ***components*** fall under one of three major categories: deck, superstructure, and substructure and are assessed and recorded in the Structure Inventory and Appraisal record of the NBI. Bridge ***elements*** vary based on bridge type and materials. Several elements usually comprise one component. For example, the superstructure component of a steel girder bridge may be composed of steel girder elements, bearing system elements, and joint seal elements. In addition to assessing the condition of global components, element-level inspection also provides understanding of how individual elements are faring in the bridge's exposure environment and how best to improve the performance of a structure with targeted maintenance of its individual elements.

Caltrans current practice is to use mathematical formulas and logic charts to compute major component NBI condition ratings based on the bridge element-level ratings.

It is important to note that the modification has resulted in changes to the NBI bridge component ratings that are not necessarily the result of physical changes to the condition of assessed bridges. ***In general, the resulting trend of implementing the element-level inspection procedures is an increase in Sufficiency Ratings for individual bridges.*** As a result of higher SRs on specific individual bridges, the total bridge needs increase is small compared to what one might have anticipated based on increased age and use of the bridge inventory since the previous assessment in 2012.

5.2 Survey Results

As noted previously, the online statewide survey was conducted in 2016 to verify NBI bridges and obtain non-NBI bridge inventory and funding level information from local agencies. Of all the local agencies surveyed, 51 of 58 counties (88%) responded to the survey and 337 of 482 cities (70%) responded to the survey. This is a significant increase from the 2012 survey, when only 49 counties and 128 cities responded.

Of the 12,105 local agency bridges in California, 1,448 bridges (12%) are Structurally Deficient, and 1,930 bridges (16%) are Functionally Obsolete. The results indicate that 829 bridges (7%) require replacement and 1,834 bridges (15%) require rehabilitation.

The results indicate that 2,663 bridges require rehabilitation or replacement!

5.3 Cost Data

Several sources were utilized to develop the costs for determining the bridge needs; i.e., local agencies, Caltrans Office of Local Assistance, Caltrans Structures Maintenance and Investigations and Quincy Engineering's project contractor bid history. Information obtained from Caltrans included the Highway Bridge Program (HBP)'s historical funding application data from the Federal Authorization Database

(FMIS), the current HBP funding level of outstanding bridge list, and Caltrans remaining Local Bridge Seismic Retrofit Program funding list (LBSRP). For the 2018 update, costs were escalated from 2016.

Bridge rehabilitation costs include design cost, associated roadway costs such as traffic control, and construction management cost. Replacement cost includes construction costs, approach roadway construction, preliminary and final engineering, environmental compliance and right-of-way certification and acquisition, and construction engineering and contract management costs. As such, replacement costs account for the majority of bridge needs.

The time value of money also plays an important role in estimating the bridge needs. The historical costs are important because the value of dollar changes over time, typically depreciating with inflation. For this study, the bridge needs are assessed in 2018 dollars. The Caltrans Construction Cost Index was used to adjust inflation for construction of bridge and approach roadway work. Figure 5.4 shows the Caltrans Construction Cost Index over time. The Consumer Price Index was also considered when adjusting historical costs to account for inflation.

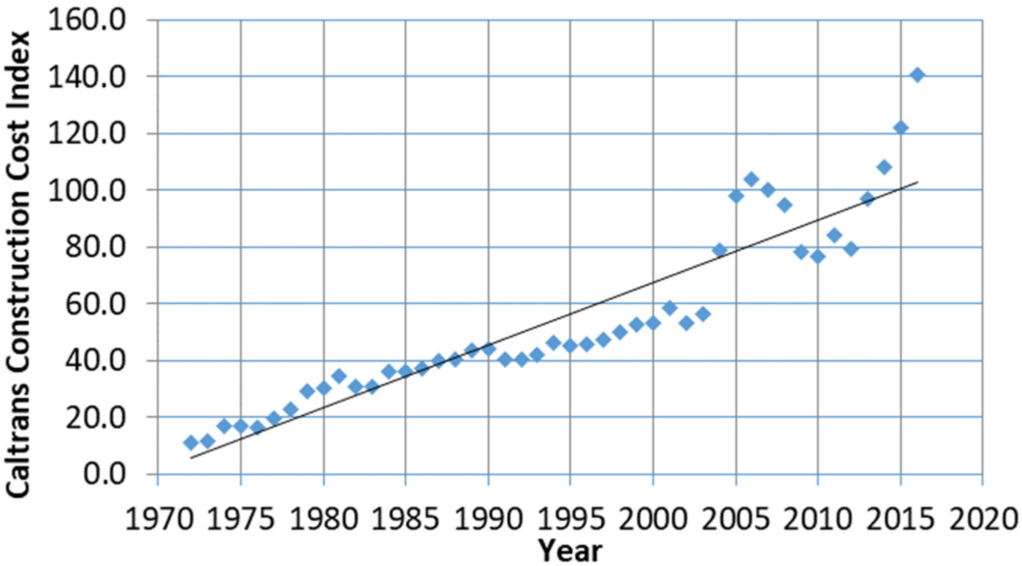


Figure 5.4 Caltrans Construction Cost Index

5.4 Needs Assessment

The bridge needs assessment methodology used in this study was extensively described in the 2012 report and a brief summary is included herein. Briefly, it follows the FHWA guidelines as listed below:

- A bridge is defined as eligible for <u>replacement</u> if the SR is less than 50 and the bridge is structurally deficient (Poor Condition) or is geometrically deficient.
- A bridge is defined as eligible for <u>rehabilitation</u> if the SR is greater than or equal to 50 but less than or equal to 80 and the bridge is structurally deficient or geometrically deficient.

Figures 5.5 and 5.6 illustrate examples of structurally deficient bridges.

Figure 5.5 Structurally Deficient – Poor Deck & Superstructure Condition (Bello Street Bridge, City of Pismo Beach)

Figure 5.6 Structurally Deficient – Poor Substructure Condition (Pine Hill Road, Humboldt County)

Two large bridges were excluded from this study. The Golden Gate-San Francisco Bay Bridge (Bridge #27 0052) is owned by a local toll authority and is not considered a local bridge. The Los Angeles River Bridge on Sixth Street (Bridge #53C1880) is owned by the City of Los Angeles, has an SR of 11.7 and is classified as Structurally Deficient. However, this bridge is already programmed and federally obligated for $230 million dollars for construction and $105 million dollars for right-of-way, and is currently under construction.

5.4.1 Historically Significant Bridges

Historically significant bridges are structures that are on or are eligible to be on the National Register of Historic Places and are a special category. Typically, historic bridges represent unique types that are no longer constructed because they are not as cost-effective as more modern designs. An example is the historic steel truss bridge in Figure 5.7. Historically significant bridges require more effort to rehabilitate or replace. These added efforts include special design considerations, environmental analysis and mitigation measures and public outreach. Due to the additional effort required to work on historically significant bridges, these bridge replacement types were classified into their own category requiring a higher level of engineering design, environmental compliance and higher construction costs.

Figure 5.7 Historically Significant Steel Truss Bridge (Klamath River Bridge, Siskiyou County)

5.4.2 Bridge Replacement

Figure 5.8 shows the average bridge replacement unit cost (dollars per square foot) of all the bridges that are assessed to require replacement. This cost is based on site characteristics and includes the new bridge and old bridge removal costs. It does not include approach roadway and other bridge project costs.

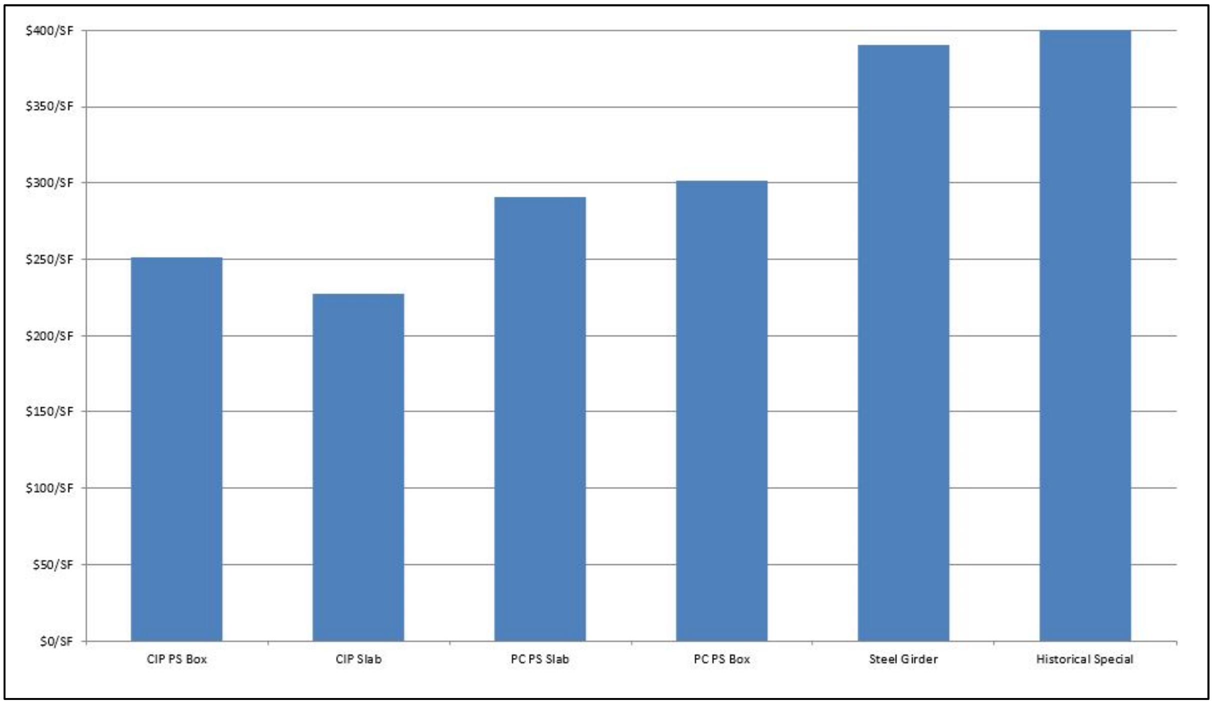


Figure 5.8 Average Bridge Replacement Unit Cost

Figure 5.9 shows the different components of the bridge replacement associated cost. In addition to the cost of replacing the bridge, the other associated costs include costs for roadway approaches, right-of-way, design engineering and environmental, construction mobilization, construction contingency, and construction management. **A total of 829 bridges require replacement at a cost of approximately $3.4 billion.**

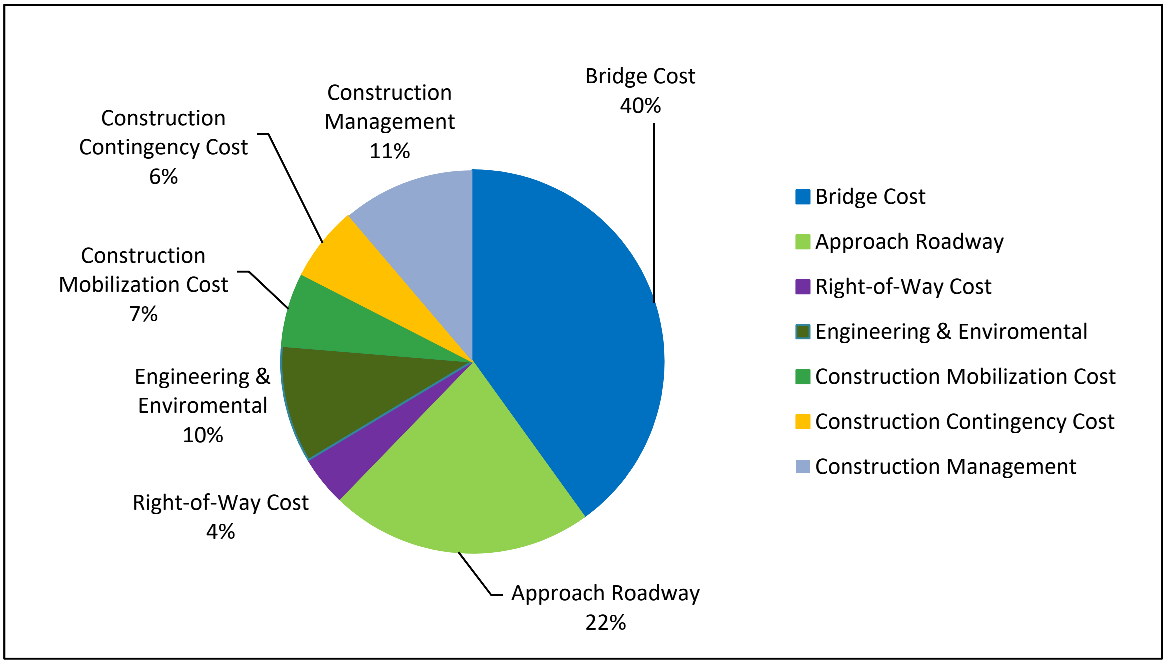


Figure 5.9 Total Bridge Replacement Associated Costs

5.4.3 Bridge Rehabilitation

As mentioned previously, rehabilitation is categorized into the following three categories:

1) Bridge deck rehabilitation and deck replacement (deck improvement),
2) Bridge strengthening, and
3) Bridge widening.

Of the 1,834 bridges eligible for rehabilitation, approximately 587 bridges require either deck rehabilitation or deck replacement at a cost of $490 million. Figure 5.10 is an example of a bridge deck that requires replacement.

Figure 5.10 Bridge Deck Requiring Replacement

Bridge deck improvement is the most common bridge rehabilitation, and contributes to the majority of the bridge rehabilitation costs in California. Because it accounts for the majority of bridge rehabilitation cost, a refined assessment of the unit cost of bridge decks was required. A unit cost of $20-30/sf for deck improvement and $120/sf for deck replacement was used. The unit prices are based on Caltrans and Quincy Engineering's historical design and construction support data. The unit cost is conservatively estimated to include common preservation needs such as rehabilitation of expansion joints and bridge bearings.

5.4.4 Bridge Strengthening

Bridge strengthening project costs vary widely depending on individual projects. For example, to strengthen an older steel bridge built before 1970, lead abatement and environmental mitigation will be required. Depending on the amount of work involved in bridge strengthening, the cost of lead abatement can vary from a local containment to a full bridge containment system, which tends to be very costly.

The cost associated with bridge strengthening was obtained from bridge improvement data within the NBI database. To scale the improvement needs to 2018 dollars, a Construction Cost Index was used. This methodology was considered to be more accurate because local bridge inspectors and agencies have more site-specific information on a project-by-project basis. The weighted average cost per area is $250/sf. It was estimated that **approximately 400 bridges required bridge strengthening at a total cost of $520 million**.

5.4.5 Bridge Widening

Similar to bridge strengthening, bridge widening costs are highly dependent on specific project needs. Note that widening projects are completed to bring bridges up to current width standards, and are not for adding capacity; i.e., adding lanes. Figure 5.11 illustrates the bridge widening cost distribution over all the local agency bridges. Most bridges that require widening are located in Los Angeles County due to the high Average Daily Traffic (ADT) count in comparison to the traveling capacity of the existing bridge. LA county bridges also have a higher project cost due to site-specific variables such as higher right-of-way acquisition costs and construction limitations due to congested conditions. According to the NBI data, **there are approximately 140 bridges that require widening at a cost of $372 million**.

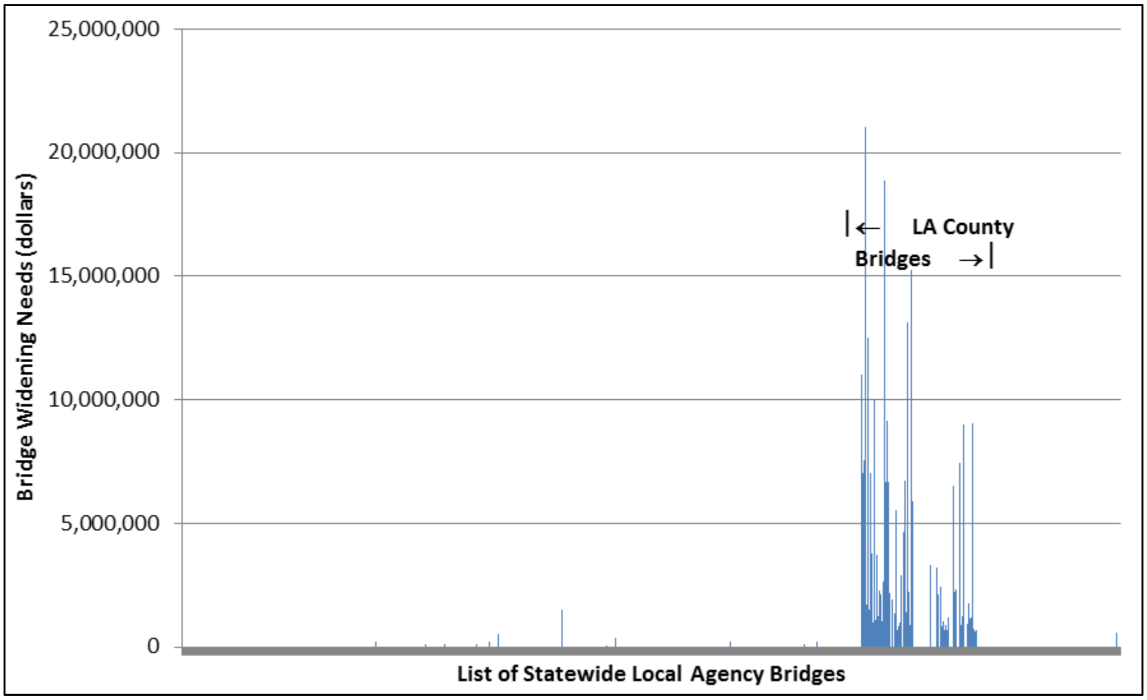


Figure 5.11 Distribution of Bridge Widening Projects

5.4.6 Bridge Seismic Retrofit

Seismic retrofit needs are also project-specific, with costs varying greatly between individual projects. The Caltrans Local Bridge Seismic Retrofit Program (LBSRP) list provides remaining projects that are eligible for LBSRA Funds. Since the 2012 study, several bridges with seismic retrofit needs have been addressed. As a result, **the total seismic needs have decreased to $74 million**.

5.4.7 Non-NBI Bridges

Non-NBI Bridges are non-vehicular bridges or vehicular bridges less than 20 feet long. While a bridge may be considered non-NBI due to its limited length or because of its pedestrian and/or bicycle designation, these bridges are still of significant importance to our communities. For instance, there are many local short vehicular bridges that provide the only access for fire trucks in case of emergencies. Therefore, it is important to include non-NBI bridges in this analysis.

Unlike NBI bridges, non-NBI bridge information is not compiled in a state or national database. Therefore, the survey information was the only source available. Because not all agencies responded to the survey, a method of approximation had to be developed to estimate the non-NBI bridge counts.

Briefly, the methodology to estimate the missing or unknown county bridge data was to consider geography, adjacent county data, and population. For instance, based on the 2010 United States Census, Sutter County, Yuba County, and Nevada County have similar population size. Based on geography, the three counties have similar rivers characteristics. Since bridge survey data are available for Sutter and Nevada counties, Yuba County's missing data can be estimated to be similar to those counties.

The method to estimate city non-NBI bridges was based on available data from adjacent cities. However, not all cities within a county are similar; some cities have larger populations. For this analysis, it was assumed that cities within a county have a similar bridge-to-population ratio. Within a given county, the geographical characteristics of its land and rivers are assumed to be similar. Therefore, the number of bridges per population should be similar.

Based on the assumptions above, the total number of non-NBI bridges was estimated to be approximately 4,000, which is more than the 3,500 estimated in 2012. **The non-NBI bridge needs are estimated to range from $80 to $100 million.**

5.4.8 Summary of Local Bridge Needs

The total statewide local agency bridge need is estimated to be $4.9 billion. The breakdown is as follows:

- Bridge replacement needs are approximately $3.4 billion.
- Bridge deck rehabilitation and deck replacement costs are approximately $490 million.
- Bridge structural strengthening requires approximately $520 million.
- Bridge widening requires approximately $372 million.
- Bridge seismic retrofit needs are approximately $74 million.
- Non-NBI bridge needs are estimated at $80 to $100 million.

Appendix F contains a summary of the bridge needs by County as well as a map.

The total statewide local bridge needs are estimated at $4.9 billion.

5.5 Funding Sources

Several funding data sources were used for this study, including the historical funding data from the Federal Authorization Database (FMIS), the current HBP funding level of outstanding bridge list and Caltrans remaining Local Bridge Seismic Retrofit Program funding list (LBSRP). The local agency funding data were obtained from the survey.

A significant factor is that effective October 2016, Caltrans will no longer use the Functionally Obsolete category. As a result, bridges that are Functionally Obsolete due to bridge deck geometries are no longer eligible for federal funding through the Highway Bridge Program as administered by Caltrans unless they are also structurally deficient.

However, bridges that are Functionally Obsolete still have a need for replacement or rehabilitation. Removing the FO designation does not change their physical characteristics nor eliminate their needs.

For this study, the methodology of assessing bridge needs is consistent with the guidelines set by FHWA, and is consistent with the methodology used in the 2012 bridge needs assessment and was described in detail in the 2012 report.

Table 5.1 Total Bridge Needs

Bridge Repair Type	Total Bridge Needs ($M)
Replacement	$3,400
Deck Improvement	$490
Widening	$372
Strengthening	$520
Seismic Retrofit	$74
Non-NBI Bridges	$100
Totals	**$4,956**

5.6 Funding Analysis

The funding analysis by Spy Pond considered maintenance, repair, rehabilitation actions required to preserve existing structures. Also, it included needs to perform seismic retrofits, strengthen bridges, raise bridges to increase vertical clearance, and widen bridges (without adding lanes) to address clearance or safety issues. Bridge replacement was considered in the analysis when it was projected to be more cost-effective than preservation or functional improvement, or when other actions were deemed to be infeasible. The analysis did not consider costs associated with adding lanes to existing structures to relieve congestion.

To develop the projections, the FHWA's National Bridge Investment Analysis System (NBIAS)[14] was used. FHWA uses NBIAS to develop its biannual Conditions and Performance Report[15]. NBIAS has a modeling approach similar to that of the AASHTO Pontis Bridge Management System (BMS), which is used by Caltrans for managing its bridges. However, NBIAS requires only publicly available NBI data to run, in contrast to Pontis, which requires detailed element data that are not part of the NBI. The 2017 NBI data were downloaded for FHWA in June 2018. ***(Note that the 4,000 non-NBI bridges were not included in this analysis. However, their needs are only approximately 2 percent of the total, so were not considered to be significant.)***

Though NBIAS is populated with default costs, deterioration models, and other parameters, it is important to calibrate the system results so that they provide as realistic a projection as possible. The costs in NBIAS were calibrated using data provided by Quincy Engineers (as described in earlier sections).

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[14] *NBIAS 3.3 Technical Manual* ,Cambridge Systematics, Inc., Technical Report prepared for FHWA, 2007.

[15] *2010 Status of the Nation's Highways, Bridges, and Transit: Conditions & Performance*, FHWA and FTA, Report to the United States Congress, 2012.

Consequently, the calculation of initial needs corresponds to that developed independently by Quincy Engineers. Further, seismic retrofit needs, which are not modeled by NBIAS, were calculated by Quincy Engineers. The deterioration models used in the system were originally developed by Caltrans, and are included in NBIAS, along with models from other states. A set of calibration runs was previously performed during the 2012 assessment to confirm the deterioration models.

The results obtained from NBIAS provide a projection of bridge investment needs over time for different budget assumptions. Investment needs are funds that should be invested to minimize bridge costs over time and address economically justified functional improvements. To the extent that projected funds are insufficient for addressing all needs, the system simulates what investments will occur with an objective of maximizing benefits given an available budget. The system also predicts new needs that may arise considering deterioration and traffic growth, and projects a range of different physical measures of bridge condition, as described further in the next section.

5.6.1 Projected Statewide Bridge Conditions and Needs

Table 5.2 presents the summary results for 10 years in the statewide analysis. The table shows results for annual budgets from $0 to $600 million. For each budget level, the table shows results by year for 10 years for the following measures.

Available Budget – the money available for spending on work during the year.

Needs – investment need as of the beginning of the year, shown in millions of dollars. The projections include costs for replacement, functional improvement, rehabilitation, minor preservation activities, and seismic retrofits.

Work Done – total spending over time, shown in millions of dollars. Typically this measure increases by the budgeted amount each year, but in some cases may increase by less than the budgeted amount if no needs remain to be met, or if during the program simulation the available budget was less than the cost of the next recommended action.

Backlog – the difference between the needs at the beginning and work done during the year.

Average Health Index – the average calculated from predicted element conditions, where a value of 75 or less for an individual bridge generally indicates the bridge is in fair or poor condition (in need of rehabilitation) and a value of 90 or greater for an individual bridge indicates the bridge is in good condition.

Average Sufficiency Rating – average rating calculated based on FHWA definitions. Unlike the Health Index, the Sufficiency Rating includes adjustments for functional characteristics of a bridge.

% Deck Area Good – percent of bridges classified as Good based on FHWA definitions, weighted by deck area.

% Deck Area Fair – percent of bridges classified as Fair based on FHWA definitions, weighted by deck area.

% Deck Area Poor – percent of bridges classified as Poor based on FHWA definitions, weighted by deck area.

Note that the level of spending in 2016 was approximately $200 million/year. Figure 5.12 shows bridge needs by annual budget. Figures 5.13, 5.14 and 5.15 show the projected Health Index, average Sufficiency Rating, and percent or bridges with a Poor rating, respectively, for each budget category. In the case of the Health Index, the results show a decline over time even when the needs are addressed. To some extent, this is due to the aging bridge population.

Table 5.2 Summary Bridge Funding Analysis (2018 to 2027)

	Value by Year										
Description	**Base**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
Available Budget ($M)											
$300M		300	300	300	300	300	300	300	300	300	300
$400M		400	400	400	400	400	400	400	400	400	400
$500M		500	500	500	500	500	500	500	500	500	500
$600M		600	600	600	600	600	600	600	600	600	600
S/F Needs ($M)											
$300M		5,021	5,714	6,117	6,510	6,879	7,089	7,800	8,419	9,090	9,746
$400M		5,021	5,612	5,915	6,166	6,418	6,484	6,955	7,154	7,259	7,440
$500M		5,021	5,514	5,688	5,813	5,929	5,792	5,983	5,734	5,593	5,629
$600M		5,021	5,414	5,472	5,477	5,380	5,100	5,118	4,769	4,530	4,386
Work Done ($M)											
$300M		300	300	300	300	300	300	300	300	300	300
$400M		400	400	400	400	400	400	400	400	400	400
$500M		500	500	500	500	500	500	500	500	500	500
$600M		600	600	600	600	600	600	600	600	600	600
Backlog ($M)											
$300M		4,721	5,414	5,817	6,210	6,579	6,789	7,500	8,119	8,790	9,446
$400M		4,621	5,212	5,515	5,766	6,018	6,084	6,555	6,754	6,859	7,040
$500M		4,521	5,014	5,188	5,313	5,429	5,292	5,483	5,234	5,093	5,129
$600M		4,421	4,814	4,872	4,877	4,780	4,500	4,518	4,169	3,930	3,786
Health Index											
$300M	92.79	92.03	91.28	90.56	89.86	89.19	88.58	88.03	87.59	87.31	87.18
$400M	92.79	92.07	91.38	90.72	90.12	89.57	89.28	89.38	89.82	90.19	90.23
$500M	92.79	92.11	91.49	90.91	90.43	90.39	91.07	91.50	91.60	91.64	91.62
$600M	92.79	92.16	91.59	91.11	91.01	91.90	92.24	92.36	92.41	92.44	92.45
% Deck Area Good											
$300M	48.92	33.07	22.16	16.51	12.22	11.19	8.62	7.95	8.38	8.87	9.49
$400M	48.92	33.36	23.00	17.81	14.26	13.61	12.45	13.92	15.10	16.69	16.35
$500M	48.92	33.59	23.81	19.44	16.39	18.63	22.99	25.39	23.15	21.78	21.07
$600M	48.92	33.92	24.61	20.87	21.59	29.51	30.66	29.77	26.49	25.21	25.15
% Deck Area Fair											
$300M	39.51	51.30	59.37	62.44	64.66	64.21	63.58	61.25	57.77	54.31	51.72
$400M	39.51	51.08	58.81	61.79	63.45	63.00	61.74	58.94	57.16	54.84	54.69
$500M	39.51	50.90	58.32	60.79	62.23	59.45	54.19	52.62	55.46	56.89	57.79
$600M	39.51	50.65	57.87	59.90	58.20	50.86	49.83	52.18	56.56	58.66	59.22
% Deck Area Poor											
$300M	11.57	15.63	18.47	21.05	23.12	24.60	27.80	30.80	33.85	36.82	38.79
$400M	11.57	15.55	18.19	20.40	22.29	23.40	25.81	27.14	27.74	28.47	28.97
$500M	11.57	15.51	17.87	19.77	21.38	21.92	22.82	21.99	21.40	21.32	21.14
$600M	11.57	15.43	17.52	19.22	20.21	19.63	19.51	18.06	16.94	16.14	15.63

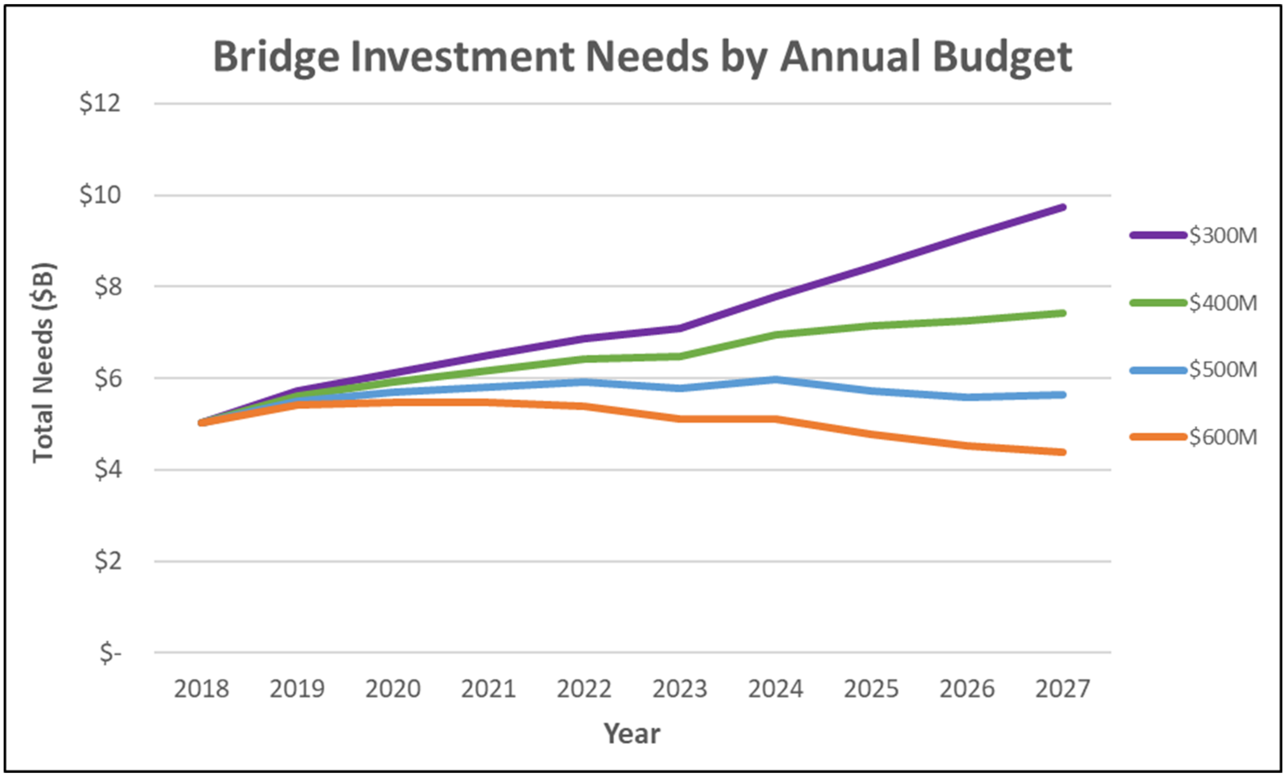


Figure 5.12 Projected Total Needs Through 2027

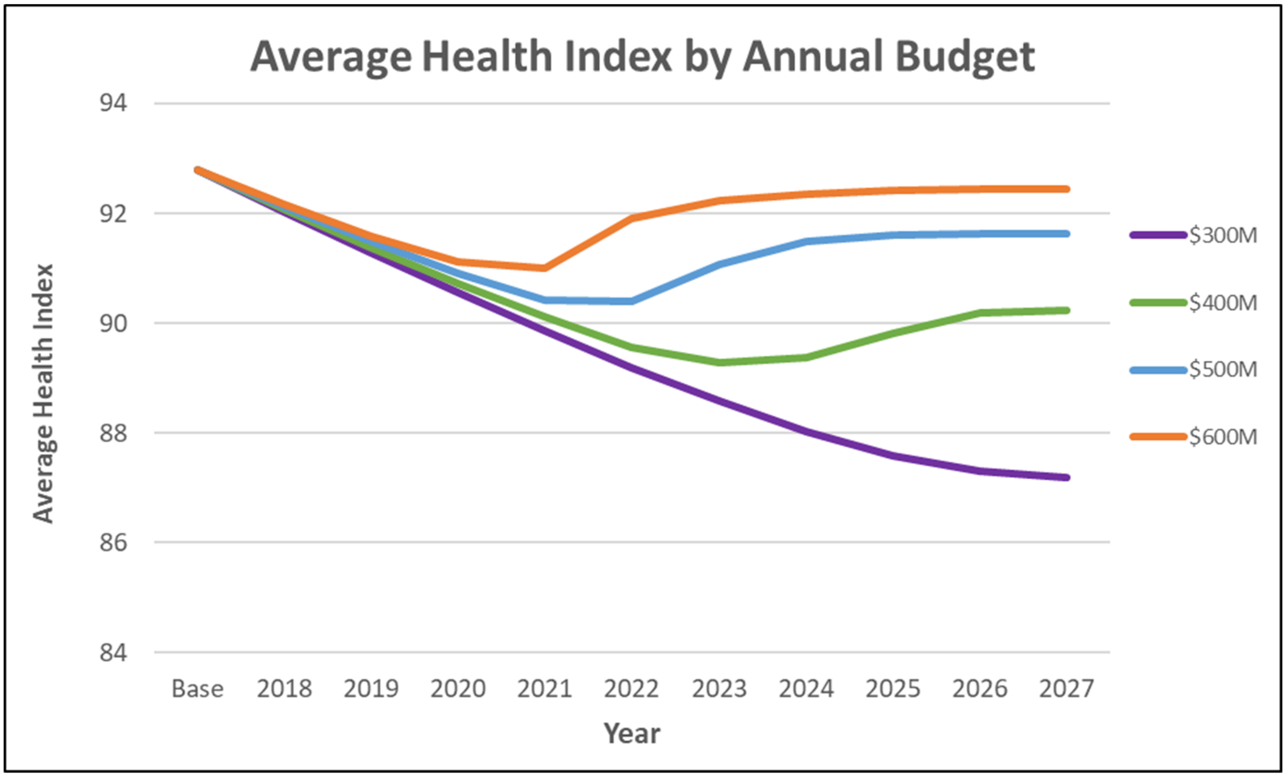


Figure 5.13 Projected Health Index Through 2027

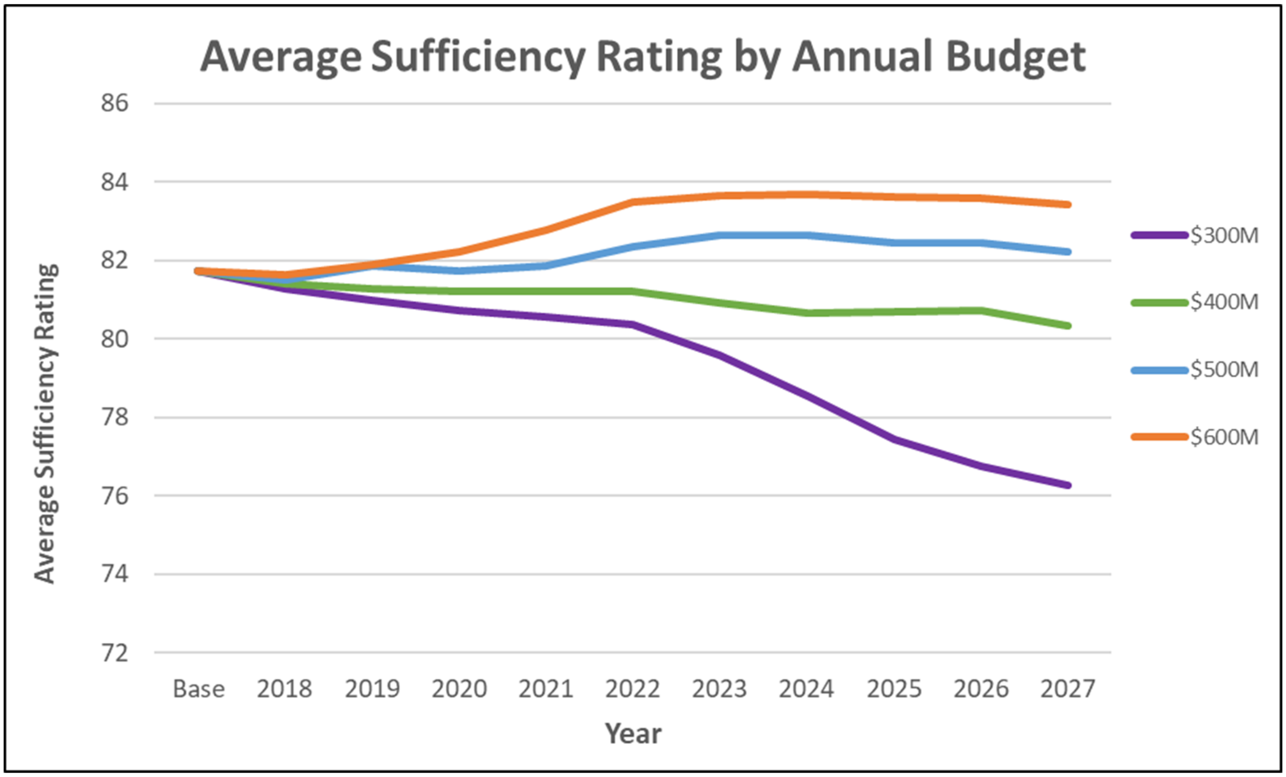


Figure 5.14 Projected Sufficiency Rating Through 2027

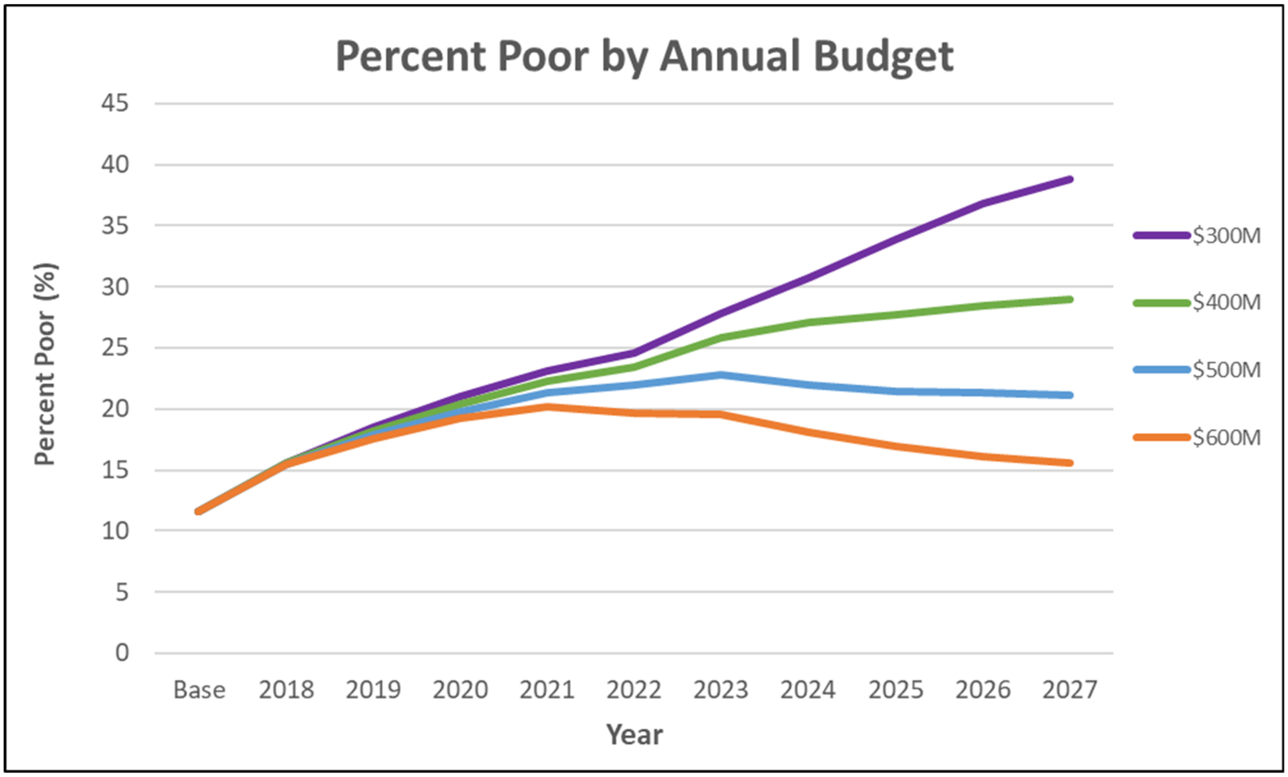


Figure 5.15 Projected Percent Bridges in Poor Condition Through 2027

5.7 Summary

The total estimated present funding need for the local bridges is estimated to be $4.9 billion, which includes rehabilitation, replacement and seismic retrofit costs. Appendix F summarizes the present bridge needs by county.

The analysis shows that an annual budget of $549 million would be required to maintain the level of investment need over a 10-year period for California's local bridges. The average investment level required to maintain conditions is greater over longer periods, though results depend upon the measure and scope of bridges included in the analysis. Current funding levels are approximately $200 million annually.

$5.49 billion is required over the next 10 years to maintain bridge investment needs at current levels.

While the analysis shows the funds required to achieve a given target condition, it does not recommend a specific level of funding. Given that the investment needs in NBIAS are based on consideration of what work is economically justified, ideally a bridge owner would address all needs for their bridge inventory, rather than simply maintaining conditions. However, doing this in the short term would require a substantial increase in budget, and is not practical in this case. Another approach to setting a target level of investment is to base the investment level on a specific target condition. There are several issues with this approach in the case of California's local bridges. First, it is difficult to summarize conditions using an average Health Index or Sufficiency Rating, as an average may mask the extent of bridges in very poor condition requiring immediate attention. An average is a good measure for illustrating trends, but less useful for characterizing the distribution of conditions.

The percent of bridges classified as being in Poor Condition is a better measure than an average condition index for illustrating the extent of California's bridge needs backlog. However, some caution is needed in interpreting this measure. Because it is a threshold measure (a value of 4 or less for any of the ratings renders the bridge in Poor Condition) a small error in future predictions of condition ratings can result in a large error in the percent predicted to be in poor condition.

For lack of a better alternative, we recommend using the level of investment need as the best measure for use in establishing target investment levels for California's local bridges. Absent budget constraints, an organization seeking to maximize economic efficiency would address all investment needs. Considering budget constraints, a reasonable goal is to at least keep needs from increasing by addressing new investment needs as they arise, if not to lower the backlog of needs over time. Even with the goal of gradually lowering needs, however, one faces a situation in which needed work is being deferred, potentially increasing the work that must be performed on a given bridge.

The statewide analysis indicated that the initial bridge need is $4.9 billion, including economically justified needs for replacement, functional improvement, rehabilitation, minor preservation actions, and seismic retrofits. Over the next 10 years an average annual budget of $549 million would be required to maintain bridge investment needs at their current level.

6 Summary and Conclusions

The results of this study are clear; SB1 funding makes a significant difference and achieves its intended goal of stabilizing the local street and road network at its current condition. The funding shortfall is significantly reduced; Table 6.1 summarizes the results for pavements, essential components and bridges. The total funding needs over the next 10 years is $101.3 billion, and the resulting shortfall is $30.9 billion for pavements, $21.1 billion for essential components and $2.6 billion for bridges. The total shortfall is $54.6 billion over the next 10 years.

Table 6.1 Summary of 10-Year Needs and Shortfall Calculations (2018 $ Billion)

Transportation Asset	Needs ($B)					2018 ($B)		
	2008	2010	2012	2014	2016	Needs	Funding	Shortfall
Pavement	$67.6	$70.5	$72.4	$72.7	$70.0	$61.7	$30.8	$(30.9)
Essential Components	$32.1	$29.0	$30.5	$31.0	$32.1	$34.1	$13.0	$(21.1)
Bridges		$3.3	$4.3	$4.3	$4.6	$5.5	$2.9	$(2.6)
Totals	**$99.7**	**$102.8**	**$107.2**	**$108.0**	**$106.7**	**$101.3**	**$46.7**	**$(54.6)**

For the pavements, the annual funding of $3.083 billion a year, coupled with cost savings from sustainable strategies, will result in a stable PCI of 64 to 65 and a backlog of $36.3 billion by 2028. Even more significantly, two-thirds of the network will be in good condition, the streets in poor/failed condition will decrease slightly to 21 percent (Table 6.2).

Table 6.2 Summary of Funding Analysis

Scenarios	Annual Budget ($B)	PCI in 2028	Condition Category	% Pavements in Poor/Failed Condition	% Pavements in Good Condition
Current Condition (2018)	-	65	At Risk	24.9%	54.7%
1. Existing Funding with SB1	$3.083	64	At Risk	21.0%	66.2%
2. Existing Funding without SB1	$2.090	57	At Risk	28.4%	49.6%
3. Best Mgmt. Practices	$6.824	87	Excellent	0.0%	100.0%

However, if SB1 funds are repealed, there is a clear downward trend projected for the next ten years. At an estimated funding level of $2.09 billion a year, the PCI will continue to deteriorate to 57. Even more critically, the backlog will increase to $46.9 billion. This is assuming that construction costs do not outstrip the anticipated revenues. Further, it is estimated that more than a quarter of California's local streets and roads will be in "poor/failed" condition.

To bring the transportation network to a level where best management practices can occur will require more than twice the existing level of funding. For pavements, that will require $6.824 billion a year.

However, once this has been achieved, it will only require $2.5 billion a year after that to maintain the pavement network.

For essential components, it will require an additional $21.1 billion to address the ten year needs, and for bridges, it will require an additional $2.6 billion for a total of $54.6 billion.

Appendix A

List of Fiscal Sponsors

FISCAL SPONSORS COUNTIES	
Alameda	Placer
Alpine	Plumas
Amador	Riverside
Butte	Sacramento
Calaveras	San Benito
Colusa	San Bernardino
Contra Costa	San Diego
Del Norte	San Francisco
El Dorado	San Joaquin
Fresno	San Luis Obispo
Glenn	San Mateo
Humboldt	Santa Barbara
Imperial	Santa Clara
Inyo	Santa Cruz
Kern	Shasta
Kings	Sierra
Lake	Siskiyou
Los Angeles	Solano
Madera	Sonoma
Marin	Stanislaus
Mariposa	Sutter
Mendocino	Tehama
Merced	Trinity
Modoc	Tulare
Mono	Tuolumne
Monterey	Ventura
Napa	Yolo
Nevada	Yuba
Orange	

FISCAL SPONSORS CITIES		
Alameda	Carlsbad	Dorris
Alhambra	Carmel-by-the-Sea	Downey
Aliso Viejo	Carpinteria	East Palo Alto
Alturas	Carson	Eastvale
Anaheim	Cathedral City	El Cajon
Arcata	Cerritos	El Centro
Arroyo Grande	Chino	El Cerrito
Atascadero	Chino Hills	El Monte
Atherton	Chula Vista	El Segundo
Auburn	Citrus Heights	Elk Grove
Azusa	Claremont	Emeryville
Bakersfield	Clayton	Encinitas
Baldwin Park	Clovis	Escalon
Barstow	Coalinga	Eureka
Beaumont	Colfax	Fairfax
Bell	Colma	Fairfield
Bell Gardens	Colton	Fillmore
Belmont	Colusa	Folsom
Belvedere	Commerce	Fontana
Berkeley	Compton	Fortuna
Big Bear Lake	Concord	Foster City
Biggs	Corcoran	Fowler
Bishop	Corning	Fremont
Blue Lake	Corona	Fresno
Bradbury	Coronado	Galt
Brea	Corte Madera	Garden Grove
Brentwood	Cotati	Gardena
Brisbane	Covina	Gilroy
Buena Park	Culver City	Glendale
Burbank	Cupertino	Glendora
Burlingame	Davis	Goleta
Calabasas	Del Mar	Gonzales
Calipatria	Del Rey Oaks	Grand Terrace
Calistoga	Delano	Grass Valley
Capitola	Dixon	Greenfield

FISCAL SPONSORS CITIES		
Gridley	Larkspur	Morgan Hill
Gustine	Lathrop	Morro Bay
Hawaiian Gardens	Lemon Grove	Mountain View
Hawthorne	Lincoln	Napa
Hayward	Live Oak	National City
Hercules	Livermore	Newark
Hermosa Beach	Livingston	Newman
Hesperia	Lodi	Newport Beach
Highland	Lomita	Norwalk
Hillsborough	Lompoc	Novato
Huntington Beach	Long Beach	Oakdale
Huron	Loomis	Oakland
Imperial Beach	Los Alamitos	Oakley
Indian Wells	Los Altos	Oceanside
Indio	Los Gatos	Ontario
Industry	Madera	Orinda
Inglewood	Malibu	Orland
Ione	Maricopa	Oroville
Irvine	Marina	Oxnard
Jackson	Martinez	Pacific Grove
King City	Marysville	Palm Desert
La Canada Flintridge	Menifee	Palm Springs
La Mesa	Menlo Park	Palmdale
La Mirada	Mill Valley	Palo Alto
La Puente	Millbrae	Paramount
La Quinta	Milpitas	Pasadena
Lafayette	Mission Viejo	Patterson
Laguna Beach	Monrovia	Perris
Laguna Hills	Montclair	Petaluma
Laguna Niguel	Montebello	Piedmont
Lake Elsinore	Monterey	Pinole
Lake Forest	Monterey Park	Pismo Beach
Lakeport	Moorpark	Placentia
Lakewood	Moraga	Placerville
Lancaster	Moreno Valley	Pleasant Hill

FISCAL SPONSORS CITIES		
Plymouth	San Juan Capistrano	Stockton
Portola	San Leandro	Suisun City
Portola Valley	San Luis Obispo	Sunnyvale
Poway	San Marcos	Susanville
Rancho Cucamonga	San Marino	Sutter Creek
Rancho Mirage	San Mateo	Taft
Rancho Palos Verdes	San Pablo	Temecula
Red Bluff	San Rafael	Thousand Oaks
Redding	San Ramon	Tracy
Redondo Beach	Sand City	Truckee
Redwood City	Sanger	Tustin
Reedley	Santa Barbara	Twentynine Palms
Rialto	Santa Clarita	Ukiah
Richmond	Santa Fe Springs	Upland
Rio Dell	Santa Maria	Vallejo
Rio Vista	Santa Monica	Ventura
Ripon	Santa Rosa	Vernon
Riverbank	Saratoga	Walnut Creek
Rosemead	Sausalito	Waterford
Roseville	Seaside	Weed
Sacramento	Sebastopol	West Covina
Salinas	Shafter	West Hollywood
San Anselmo	Sierra Madre	West Sacramento
San Bernardino	Signal Hill	Westminster
San Bruno	Simi Valley	Wheatland
San Carlos	Solana Beach	Whittier
San Clemente	Soledad	Wildomar
San Dimas	Solvang	Williams
San Fernando	Sonoma	Windsor
San Francisco	South El Monte	Winters
San Gabriel	South Gate	Woodlake
San Jacinto	South Pasadena	Woodland
San Joaquin	South San Francisco	Yreka
San Jose	St. Helena	Yuba City
San Juan Bautista	Stanton	Yucaipa

FISCAL SPONSORS REGIONAL TRANSPORTATION PLANNING AGENCIES (RTPA)	
Alpine Co. Local Transportation Commission	Mono Co. Local Transportation Commission
Amador Co. Transportation Commission	Nevada Co. Transportation Commission
Butte Co. Association of Governments	Orange Co. Transportation Authority
Calaveras Council of Governments	Placer Co. Transportation Planning Agency
Colusa Co. Transportation Commission	Plumas Co. Transportation Commission
Council of San Benito Co. Governments	Riverside Co. Transportation Commission
Del Norte Local Transportation Commission	Sacramento Area Council of Governments
El Dorado Co. Transportation Commission	San Bernardino Associated Governments
Fresno Council of Governments	San Diego Association of Governments
Glenn Co. Transportation Commission	San Joaquin Council of Governments
Humboldt Co. Association of Governments	San Luis Obispo Council of Governments
Imperial Co. Transportation Commission	Santa Barbara Co. Association of Governments
Inyo Co. Local Transportation Commission	Santa Cruz Co. Regional Transportation Commission
Kern Council of Governments	Sierra Co. Transportation Commission
Kings Co. Association of Governments	Siskiyou Co. Local Transportation Commission
Lake Co./City Area Planning Council	Tahoe Regional Planning Agency
Lassen Co. Transportation Commission	Tehama Co. Transportation Commission
Los Angeles Co. Metropolitan Transportation Authority	Transportation Agency for Monterey Co.
Madera Co. Transportation Commission	Trinity Co. Transportation Commission
Mendocino Council of Governments	Tulare Co. Association of Governments
Merced Co. Association of Governments	Tuolumne Co. Transportation Council
Metropolitan Transportation Commission	Ventura Co. Transportation Commission
Modoc Co. Transportation Commission	

Appendix B

Data Collection

This appendix describes the data collection efforts for this update. The goal was to ensure participation by all 58 Counties and 481 Cities.

B.1 Outreach Efforts

As with the previous studies, significant efforts were made to reach all 539 agencies in January-March 2018. This included letters sent out by NCE on behalf of the League and CEAC/CSAC. The contact database had over 2,500 contacts for all the cities and counties. This was compiled from a variety of sources including contacts from the previous surveys in 2016, the memberships of both CSAC and the League, the email listserv for the Regional Transportation Agencies (RTPA) and NCE's client contacts.

The contacts included Public Works staff (Directors of Public Works, City Engineers or engineers responsible for pavement/asset management), Directors of Finance, City Managers, County Administrative Officers, RTPAs (Regional Transportation Planning Agencies), and MPOs (Metropolitan Planning Agencies).

Over 2,500 contact letters were mailed out in mid-January 2018 (see Exhibit B-1) with instructions on how to access the online survey and a fact sheet explaining the project. The deadline for responding to the survey was March 30th, 2018, but this was extended for an additional week as there were numerous requests from agencies for more time to respond. MTC also sent numerous emails to its 109 member agencies. The League and CSAC/CEAC spread the word via their email listservs, and as before, publicized the survey at the annual Public Works Officers Institute conference in March 2018.

B.2 Project Website

The website at www.SaveCaliforniaStreets.org (see Figure B.1) was originally designed and developed for the 2008 study. This was subsequently modified to accommodate the 2018 survey. The intent of this website was to act as both an information resource on this study and as a repository of related reports that might be of interest to cities and counties. More importantly, it was a portal to the online survey described in Section B.3. CSAC currently hosts the website.

B.3 Online Survey Questionnaire

A survey questionnaire was prepared and finalized in December 2017, and a blank example is included in Exhibit B-1. Briefly, it included a request for the following information:

1) Contact name and information for both pavements and financial data
2) Streets and pavements data (including sustainable pavements and complete streets)
3) Essential components (safety, traffic, and regulatory) data
4) Regulatory requirements
5) Funding and expenditure data
6) Non-highway NHS roads
7) Training and technical needs (optional)

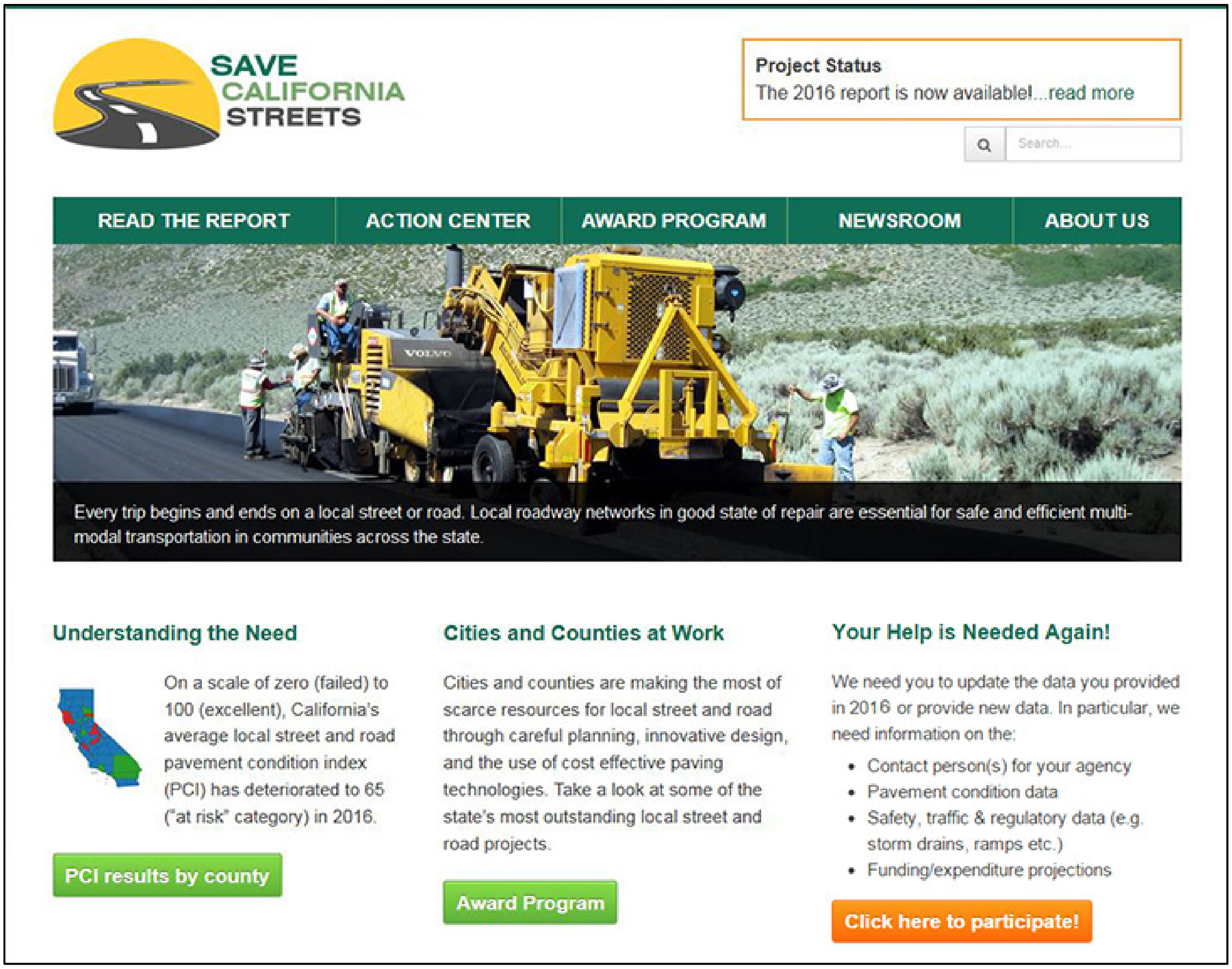


Figure B.1 Home Page of www.SaveCaliforniaStreets.org Website

Like the previous studies, no hardcopy surveys were available to the cities and counties, thus requiring all data entry to be made online. The online survey made data aggregation much simpler and faster. The custom database was updated for 2018.

Data from 99% of the state's local streets and roads are included in this study.

B.4 Results of Data Collection

A total of 484 agencies (89.8 percent) responded to the survey, which was an increase from the 462 agencies in 2016. In fact, this year's response rate is the highest ever in the history of the assessment! When these were added to the agencies who responded in previous surveys, they represented 99.8 percent of the total centerline miles of local streets and roads in the state (see Figure B.2).

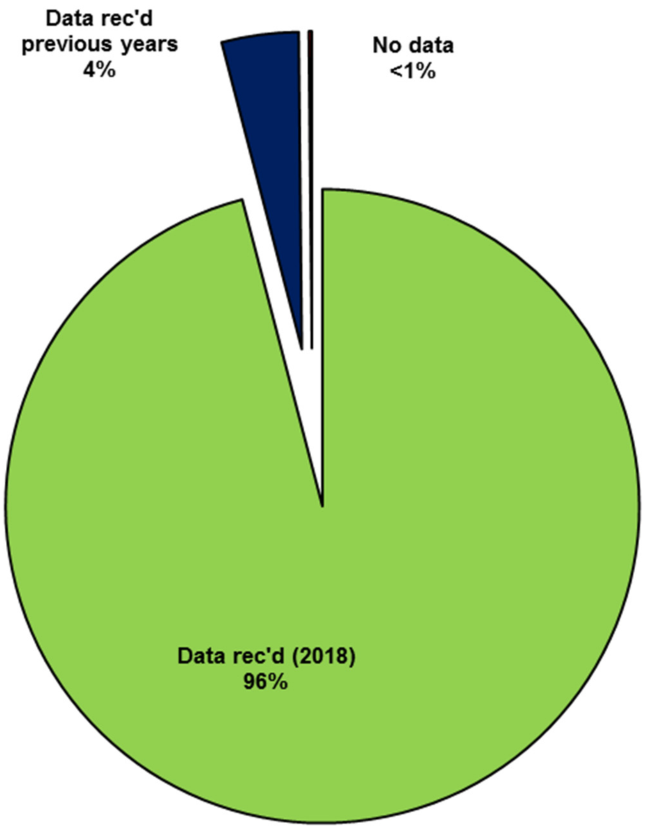


Figure B.2 Responses to Survey (% centerline miles)

Only seven[1] agencies have not responded to this or any previous survey; all have less than 100 centerline miles, and all have populations less than 50,000.

[1] Cities of Orange Cove, Calipatria, Del Rey Oaks, Loma Linda, Escalon and Sonora. The City of Rolling Hills is not included since they do have any publicly owned streets.

Table B.1 illustrates the survey responses by type of data. The pavement data had the most responses (484), but the remaining data elements all showed increased responses compared to previous years. Note that the cells with blanks indicated that those data elements were not requested during the applicable survey years.

Table B.1 Number of Agencies Responding by Data Type

Data Type	2008	2010	2012	2014	2016	2018
Pavement data	314	344	273	371	454	484
Unit costs	50	260	211	177	187	225
Sustainable practices	-	-	280	269	428	472
Complete streets	-	-	269	250	421	469
Safety, Traffic & Regulatory	188	296	159	152	197	239
Bridges	-	-	177	-	400	-
Additional Regulatory Requirements	-	-	220	199	382	427
Financial	137	300	238	276	340	388

B.4.1 Are Data Representative?

Throughout the data collection phase, it was important to ensure that the data received were representative in nature. This was critical for the analyses – as with the previous studies, the criterion used was network size.

The distribution of responses with respect to network size is shown in Figure B.3. Small agencies are those that have less than 100 centerline miles; medium between 101 to 300 miles, and large agencies have more than 300 miles. Figure B.3 shows all the agencies who responded in 2018 (green), those who responded in previous surveys (blue) and the ones who have never responded in red. Clearly, the bulk of the agencies who did not respond had less than 100 miles of pavement network (small cities), but we still had 218 responses in this category, so our confidence in the responses were validated.

An important point to note is that small agencies account for a very small percentage of the state's pavement network. There are 260 cities with less than 100 centerline miles of streets, and 162 cities with less than 50 centerline miles of streets. However, they comprise only 8.1 percent and 3.0 percent of the total miles in the state, respectively. Their impact on the statewide needs is consequently minimal.

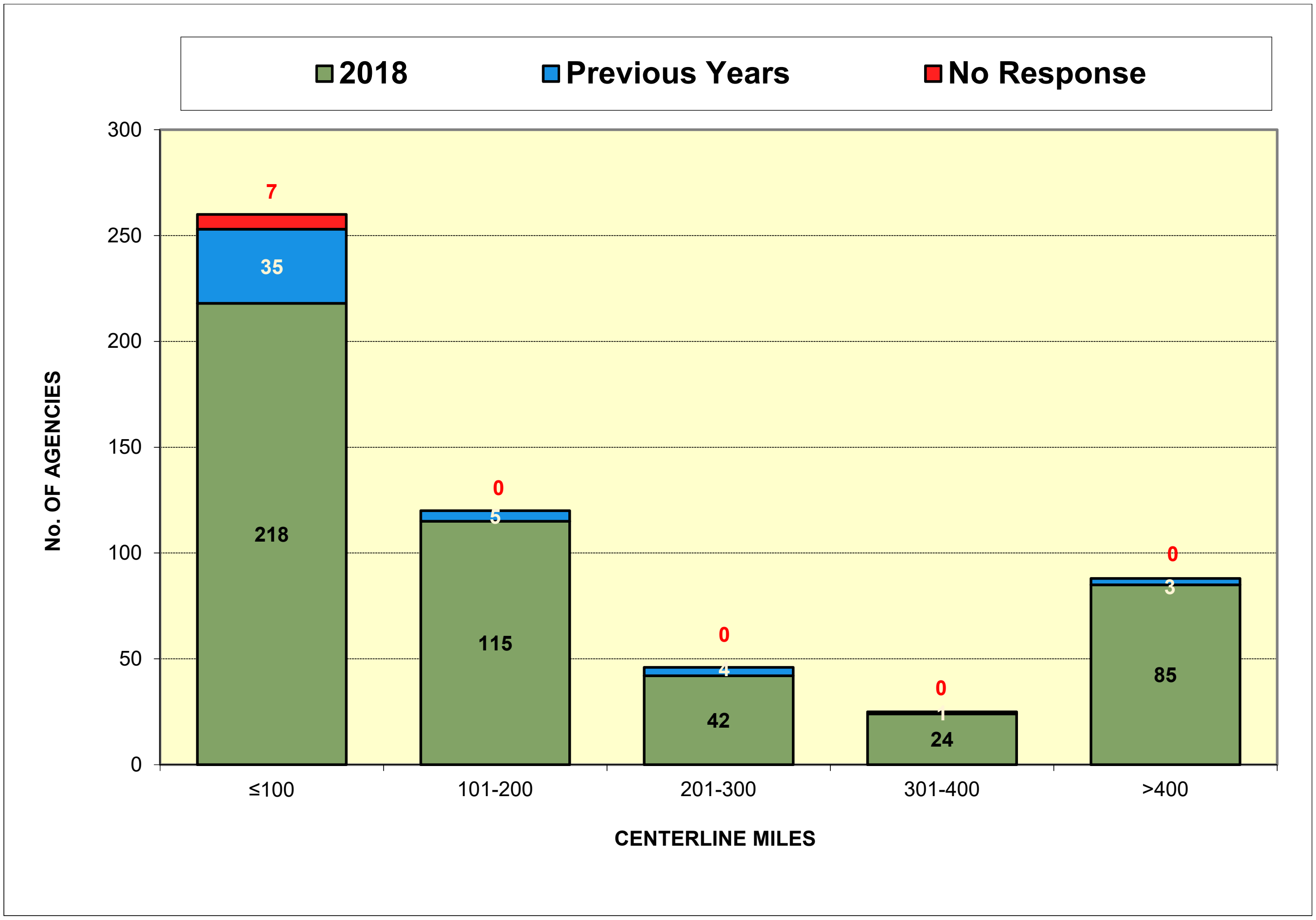


Figure B.3 Distribution of Agency Responses by Network Size (centerline miles)

B.4.2 PMS Software

The survey responses also indicated that 86 percent of the responding agencies had a pavement management system (PMS) in place (see Figure B.4). The StreetSaver® (51 percent) and PAVER (19 percent) software were the two main ones in the state, which is not surprising given their reasonable costs. StreetSaver® was developed and supported by the Metropolitan Transportation Commission (MTC) and PAVER is supported by the American Public Works Association (APWA).

Due to the widespread use of a PMS, the quality of the pavement data received contributed immensely to the validity of this study's results.

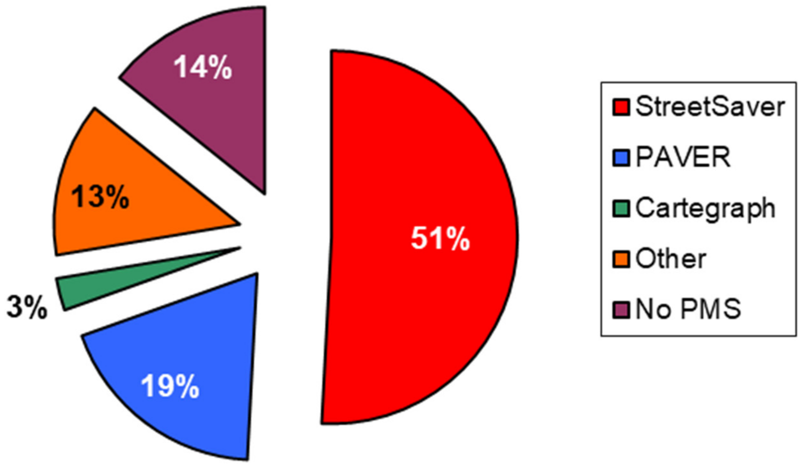


Figure B.4 PMS Software Used By Cities And Counties

What is more important is that approximately 96 percent of the total miles owned by cities and counties are included in a pavement management system, which lead to a high confidence in the data submitted.

B.5 Summary

Overall, the number and quality of the survey responses received again exceeded expectations and more than met the needs of this study. To obtain data on more than 96 percent of the state's local streets and roads network was a remarkable achievement. That agencies with a pavement management system in place removed many obstacles in the technical analyses. In particular, the consistency in the pavement conditions reported contributed enormously to the validity of the study.

Exhibit B-1

Contact Letter, Instructions for Online Survey, Fact Sheet & Survey

Questionnaire

January 12, 2018

Oversight Committee

Charles Herbertson
City of Culver City
Chairman

Keith Cooke
City of San Leandro

Greg Kelley
Los Angeles County

Panos Kokkas
Yolo County

Dave Leamon
Stanislaus County

Damon Letz
City of Santa Clarita

William Ridder
LA Metro

Theresa Romell
MTC

Mike Sartor
City of Palo Alto

Dawn Vettese
San Diego Association of Governments

Ron Vicari
Sacramento County

Mike Woodman
Nevada County Trans. Comm.

Staff

Rony Berdugo
Derek Dolfie
Meghan McKelvey
League of California Cities

Merrin Gerety
CEAC

Chris Lee
Kiana Valentine
CSAC

TO CALIFORNIA CITIES & COUNTIES

SUBJECT: 2018 CALIFORNIA STATEWIDE LOCAL STREETS AND ROADS NEEDS ASSESSMENT

Dear Madam/Sir:

Your help in responding to our survey in 2016 made a difference! In large part due to your efforts to provide timely and accurate data on the condition of California Local Streets and Roads, the Governor signed SB1 in April 2017, which provides approximately $1.5 billion/year for local streets and roads.

Since 2008, the California Statewide Local Streets and Roads Needs Assessment Report has been invaluable to the California State Association of Counties (CSAC) and the League of California Cities (League) on a number of transportation efforts at both the state and federal level. We have used the findings to educate elected officials, policy- and decision-makers, and the public about the condition of the local transportation network and the funding needed to bring the system into a state of good repair.

CSAC and the League have also used the findings to advocate for additional funding such as SB1 (the 2016 report is available at www.SaveCaliforniaStreets.org). In addition to deterring negative policies and budget decisions, CSAC and the League have used the findings in proactive efforts including SB 375 implementation, seeking revenues for Cap and Trade funding, and other sustainable transportation efforts.

In 2018-19, we will continue to use the findings of the 2018 assessment to emphasize the importance of retaining SB1 funding for maintenance of our local streets and roads.

As in the past, this project is being funded through contributions from stakeholders. Regional Transportation Planning Agencies (RTPAs) have provided half the cost, with cities and counties sharing equally in the remaining cost. It is essential that each agency contribute toward this study in order to demonstrate how critical this issue is to sustaining our state's transportation infrastructure.

An ongoing effort is needed to update the local streets and roads needs on a regular, consistent basis, much like the State does in preparing the State Highway Operation and Protection Program (SHOPP). NCE will assist us in performing the 2018 update of the Statewide Needs Assessment.

YOU CAN CONTINUE TO MAKE A DIFFERENCE!

We need your immediate assistance on the following items:

1. To ensure a widespread dissemination of this request, this letter has been sent to the City Manager/County Administrative Officer, Public Works Director, City/County Engineer, and Finance Director. We recognize that the data may come from multiple sources, so we ask your agency to coordinate among yourselves to ensure that the most recent and accurate information is entered. Please provide NCE with your agency's contact information if you are not the appropriate contact. This person(s) should be able to provide all the information

Page 2 of 2
January 12, 2018

requested in the survey. We need information on two main areas plus an optional survey:

a. Technical – pavement, safety, regulatory and traffic needs.
b. Financial – projected funding revenues/expenditures.
c. Optional survey from the City and County Pavement Improvement Center to identify training and pavement technical needs.

2. Fill out the online survey at www.SaveCaliforniaStreets.org. Instructions for filling out the survey are enclosed. Your agency's login and password are on the label below.

It is essential that we have this data no later than **March 30th, 2018 in order to complete the 2018 Local Streets and Roads Needs Assessment on time**. Should you have any questions, please do not hesitate to contact:

Ms. Margot Yapp, P.E.
Vice President/Project Manager
NCE
501 Canal Blvd, Suite I
Pt. Richmond, CA 94804
(510) 215-3620
myapp@ncenet.com

(Login & Password)

We appreciate your help in providing this information.

Sincerely,

Charles D. Herbertson, P.E., L.S.
President, Public Works Officers Department
League of California Cities
Director of Public Works/City Engineer
City of Culver City
Project Manager of Statewide Needs Assessment

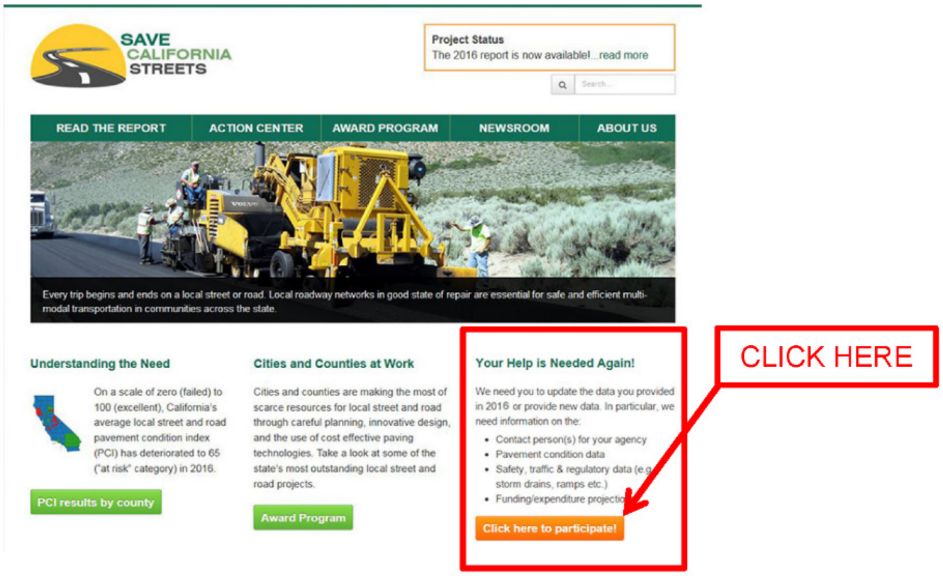
Jeff Pratt, President
County Engineers Association of California
Public Works Agency, Director/
Road Commissioner
County of Ventura

Enclosures: Fact Sheet
Instructions for Online Survey

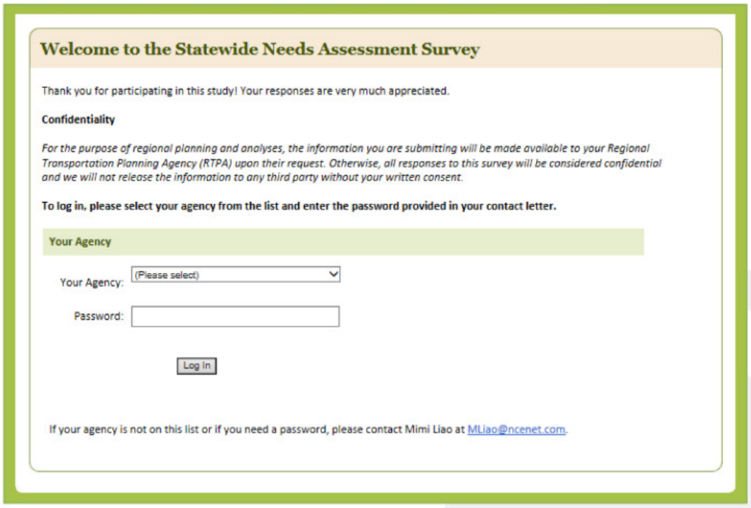
Collaboration. Commitment. Confidence.[SM]

Instructions for Online Survey

Step 1. Go to http://www.savecaliforniastreets.org. Click on the button that says “Click here to participate”.

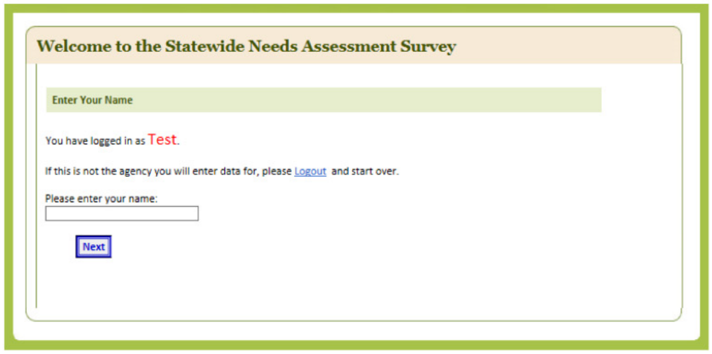


Step 2. On the login page, select the name of your agency from the dropdown list. If you responded to the 2016 or earlier surveys, the information you previously entered will be shown so that you can update it. You will need your agency’s login and password, which was mailed to you. If you do not have this information, please contact Mimi Liao at (510) 215-3620 or at mliao@ncenet.com.

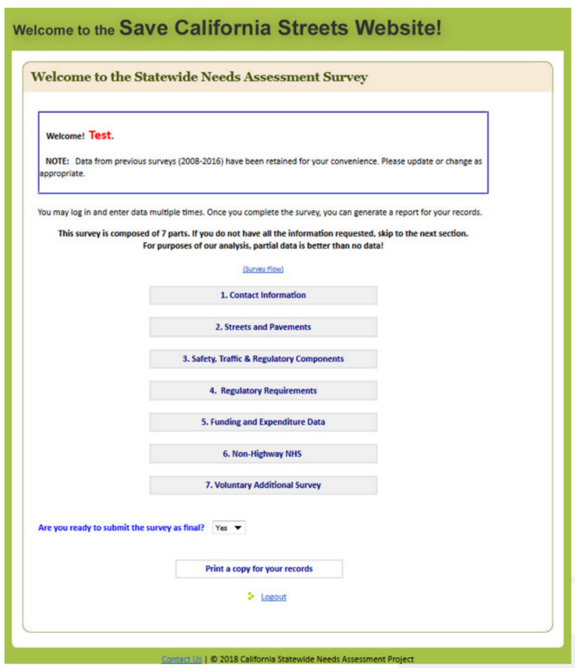


Collaboration. Commitment. Confidence.SM

Step 3. Enter your name, then click "Next" to the main survey page.



Step 4. There are seven (7) parts in this survey (see image below). Click on each button to enter the relevant information. <u>If you do not have all the information requested, skip to the next section.</u>



Step 5. Once data entry is complete, you can view and print your entry by clicking on the "Print a copy for your records" button. If there are no more changes, select "Yes" on the "Are you ready to submit the survey as final?" question.

Step 6. Click "Logout" button when done.

THANK YOU FOR YOUR PARTICIPATION!

FACT SHEET

Why are we updating the 2016 study?

Transportation funding for Cities and Counties continues to be at risk.

The 2016 statewide needs study identified a funding shortfall of $73 billion for local streets and roads (the final report is available on the www.SaveCaliforniaStreets.org website). The California State Association of Counties and League of California Cities were successful in using this report to advocate for more funding for local roads.

In April 2017, the Governor signed SB1, which provides over $5 billion a year for transportation needs, of which $1.5 billion goes to cities and counties. However, there are efforts underway to repeal it in 2018. This update will help us once again with our efforts to protect our transportation funds.

Why is this update important?

Performing a needs assessment biennially will provide updated information to maintain and obtain transportation funding, similar to Caltrans. Hopefully, the information from this study will embed into the decision makers' minds the importance of maintaining sufficient transportation funding for local streets and roads. Additionally, we need to make it clear what the detrimental consequences are for deferring or reducing local street and road funds. This study is the only comprehensive and systematic statewide approach to quantify the needs for local streets and roads.

Study Achievements

The findings have been used to:

- Successfully advocate for SB1, which includes $1.5 billion a year for local streets and roads.
- Educate elected officials, policy- and decision-makers, and the public about the condition of the local transportation network and the funding needed. This study has been cited by many media sources and reports.
- Advocate against, and ultimately avoid, potential devastating cuts to local transportation funding over several state budget cycles.
- Proactively advocate for funding from the SB 375 implementation, Cap and Trade, and other sustainable transportation efforts.

How can Cities and Counties help?

Your help in 2016 made a difference; and we need your input again!

Please go to www.SaveCaliforniaStreets.org and login to our online survey to provide updates in the following categories:

- Contact Person from your Agency
- Pavement condition data
- Safety, traffic, and regulatory data
- Funding/expenditure projections

FACT SHEET

We are anxious to begin the study, so please provide us with the contact person who is responsible for both the technical and funding information in your agency (see our contact information below). We will be in touch with them soon to obtain this information. The deadline for responding to this survey is **March 30th, 2018**.

Who is sponsoring this project?

Many cities and counties contributed funding to this study. The agencies listed below have accepted the leadership responsibility for completing this study on behalf of the cities and counties in California.

- California State Association of Counties (CSAC)
- League of California Cities (League)
- County Engineers Association of California (CEAC)
- County of Los Angeles
- City of Culver City
- California Regional Transportation Planning Agencies (RTPA)
- Metropolitan Transportation Commission (MTC)
- California Rural Counties Task Force (RCTF)

The Oversight Committee is composed of representatives from each organization, with the City of Culver City (representing the League of California Cities) acting as the Project Manager. NCE is the consultant who will be performing the update. Oversight Committee members include:

Charles Herbertson, City of Culver City
Keith Cooke, City of San Leandro
Greg Kelley, Los Angeles County
Panos Kokkas, Yolo County
Dave Leamon, Stanislaus County
Damon Letz, City of Santa Clarita
William Ridder, LA Metro
Theresa Romell, Metropolitan Transportation Commission
Mike Sartor, City of Palo Alto
Dawn Vettese, San Diego Association of Governments
Ron Vicari, Sacramento County
Mike Woodman, Nevada County Transportation Commission

Staff

Rony Berdugo, League of California Cities
Derek Dolfie, League of California Cities
Meghan McKelvey, League of California Cities
Merrin Gerety, CEAC
Chris Lee, CSAC
Kiana Valentine, CSAC

Who should I contact for more information?

Margot Yapp, Vice President
NCE
501 Canal Blvd., Suite I
Pt. Richmond, CA 94804
Tel: (510) 215-3620

Charles Herbertson, Director of Public Works/ City Engineer & President, Public Works Officers Department
Project Manager
9770 Culver Blvd.
Culver City, CA
Tel: (310) 253-5630

Statewide Needs Assessment Online Survey Report (2018)

Agency Name:

1. CONTACT INFORMATION

Contact Type	Salutation	Name	Title	Department	Address Line 1	Address Line 2	City	Zip Code	Email	Phone
Main Contact Person										
Alternative Contact Person										
Contact Person for Financial Data										
Alternative Contact Person for Financial Data										

2. STREETS AND PAVEMENTS

2.1 Pavement Management System and Pavement Distress Survey Procedures

1. Does your agency use Pavement Management System (PMS) software?
(Go to Question 1a if "Yes"; Go to Question 1b if "No".)

1a. Select your agency's PMS software:

Enter your agency's PMS software name (if "Other" is selected above):

1b. Select the reason your agency does not use a PMS:

Enter the reason your agency does not use a PMS (if "Other" is selected above):

2. What pavement distresses do you collect for Asphalt Concrete (AC)? If you collect distresses that are not listed below, please enter in the "Other AC Distresses" box.

1) Alligator Cracking
2) Block Cracking
3) Distortions
4) Long. & Trans. Cracking
5) Patch & Util. Cut Patch
6) Rutting/Depression
7) Weathering & Raveling

Other AC distresses your agency collects, if any:

3. Does your agency have Portland Cement Concrete (PCC) pavements?

If yes, what pavement distresses do you collect for PCC? If you collect distresses that are not listed below, please enter in the "Other PCC Distresses" box.

1) Corner Break
2) Divided Slab
3) Faulting
4) Linear Cracking
5) Patching & Utility Cuts
6) Scaling/Map Cracking/Crazing
7) Spalling

Other PCC distresses your agency collects, if any:

4. What other condition data do you collect?

Deflection
Ride Quality e.g. International
Roughness Index (IRI)
Friction
Drainage
Structure/Core
Complaints
Pavement Age

Other condition data your agency collects, if any:

5. What is the scale of the pavement condition index/rating used (e.g. 0-100, A-F)?

Lowest possible rating(e.g. 0)

Highest possible rating(e.g. 100)

6. How much will you require annually to maintain existing conditions (e.g. if your current PCI is 70, indicate the annual funding required to maintain the pavement network at 70.)

$

7. Any notes you would like to add regarding your pavement distress survey procedures (e.g. collected by consultant, in-house, frequency of collection, etc.), or any comments/notes you have regarding any portion of this survey/your data:

8. Are larger/heavier vehicles (e.g. buses, refuse/recycling trucks, snow removal vehicles, etc) impacting pavement performance or your maintenance practices? If so, please explain the type of vehicles and how they impact performance:

2.2 Sustainable Pavement Practices

1. What sustainable pavement practices does your agency utilize?

Sustainable Pavement Practice	Does your agency utilize?	Unit Cost ($/sy)	Additional Costs or Savings	Percentage of Additional Costs or Savings
Use of Reclaimed Asphalt Pavement (RAP) in pavements				%
Cold In-place Recycling (CIR)				%
Hot In-place Recycling (HIPR)				%
Cold Central Plant Recycling				%
Warm Mix Asphalt				%
Permeable/Porous Pavements				%
Full Depth Reclamation (FDR)				%
Subgrade Stabilization				%
Rubberized Asphalt Concrete (RAC)				%
Pavement Preservation Strategies e.g. chip seals, fog seals, microsurfacing, cape seals				%
Other (please explain below)				%

if "Other" is used in the above table, please describe below:

2. Will you continue applying sustainable pavement practices?

3. If you do not employ sustainable practices, please indicate the reason(s) why (check all that apply):
1) High construction cost
2) Lack of knowledge
3) No local contractors
4) No street/road candidates
5) Other (please explain below)

4. Other comments regarding sustainable pavement practices:

2.3 Inventory and condition Information

Functional Class/Road Type	Year of Last Inspection	Pavement Condition Rating (Weighted Average)	Center Line Miles	Lane Miles	Area(sq. yd.)	PCC (as % of the area)
Urban Major Roads						
Urban Residential/Local Roads						
Rural Major Roads						
Rural Residential/Local Roads						
Unpaved Roads						

2.4 Pavement Treatment Policy and Unit Costs

Urban Major Roads:

Pavement Treatment	PCI Range	Unit Cost ($/sq. yd.)
Do Nothing	70 - 100	
Preventive Maintenance (e.g. slurry, chip seal, cape seal)	70 - 69	
Thin overlay (e.g. less than or equal to 2 inches)	50 - 69	
Thick overlay (e.g. more than 2 inches)	25 - 49	
Reconstruction (e.g. remove & replace)	0 - 24	

Urban Residential/Local Roads:

Pavement Treatment	PCI Range	Unit Cost ($/sq. yd.)
Do Nothing	90 - 100	
Preventive Maintenance (e.g. slurry, chip seal, cape seal)	70 - 89	
Thin overlay (e.g. less than or equal to 2 inches)	50 - 69	
Thick overlay (e.g. more than 2 inches)	25 - 49	
Reconstruction (e.g. remove & replace)	0 - 24	

Rural Major Roads:

Pavement Treatment	PCI Range	Unit Cost ($/sq. yd.)
Do Nothing	90 - 100	
Preventive Maintenance (e.g. slurry, chip seal, cape seal)	70 - 89	
Thin overlay (e.g. less than or equal to 2 inches)	50 - 69	
Thick overlay (e.g. more than 2 inches)	25 - 49	
Reconstruction (e.g. remove & replace)	0 - 24	

Rural Residential/Local Roads:

Pavement Treatment	PCI Range	Unit Cost ($/sq. yd.)
Do Nothing	90 - 100	
Preventive Maintenance (e.g. slurry, chip seal, cape seal)	70 - 89	
Thin overlay (e.g. less than or equal to 2 inches)	50 - 69	
Thick overlay (e.g. more than 2 inches)	25 - 49	
Reconstruction (e.g. remove & replace)	0 - 24	

2.5 Complete Streets Policy

1. Has your agency adopted a "Complete Streets Policy"?
If your answer is "No" or "Don't know", skip this section. Please explain below why not if known.

2. What complete streets elements are included or assumed in the policy? Check all that apply.

- Bicycle facilities ☐
- Pedestrian facilities ☐
- Landscaping ☐
- Medians ☐
- Lighting ☐
- Roundabouts ☐
- Traffic Calming e.g. reducing lane widths ☐
- Signs ☐
- Curb Ramps ☐
- Transit elements ☐

Comments/Additional items:

3. Do you have other plans that incorporate these elements even if you do not have a Complete Streets policy?

4. What percentage of roads will have Complete Streets elements? (e.g. enter 10 for 10%)

%

5. What is the estimated average <u>incremental</u> costs to provide Complete Street enhancements ($/sq. yd) i.e. in addition to conventional costs?

$ /sq. yd

6. Do you have a representative project that included Complete Streeets elements that was recently constructed? If yes, please provide a brief description.

7. Do you anticipate more of these projects in the future? If so, approximately how many?

8. What are the major challenges you face in implementing a Complete Streets Policy? Check all that apply.

- Insufficient right-of-way ☐
- Trees/environmental features ☐
- Existing structures ☐
- Insufficient funding ☐
- Other (please explain) ☐

If "Other" is checked, please describe below:

9. Other comments or notes you would like to add regarding Complete Streets:

3. SAFETY, TRAFFIC AND REGULATORY COMPONENTS (as related to the road network)

Category	Inventory (Quantity)	Unit	Total Replacement Cost	Accuracy
Storm Drains - pipelines		mile		
Other elements e.g. manholes, inlets, culverts, pump stations etc		ea		
Curb and gutter		ft		
Pedestrian facilities: Sidewalk (public)		sq. ft.		
Other pedestrian facilities, e.g. over-crossings		ea		
* Bicycle facilities: Class I bicycle path		mile		
Other bicycle facilities, e.g. bike shelters/lockers, etc.		ea		
Curb ramps		ea		
Traffic signals		ea		
Street Lights		ea		
Sound Walls/Retaining walls		sq. ft.		
Traffic signs		ea		
Tunnels		ft		
Other physical assets or expenditures that constitute >5% of total non-pavement asset costs e.g. heavy equipment, corporation yards etc. Note: Do NOT include bridges (handled separately)		ea		

4. REGULATORY REQUIREMENTS

Does your agency have additional regulatory requirements such as Americans with Disabilities Act (ADA), National Pollutant Discharge Elimination System (NPDES) requirements or Traffic Sign Retroreflectivity?

If you answered "Yes" above, please fill out the table at the bottom of this page. Otherwise, skip this section.

May we contact you if we have follow-up questions?

Additional comments regarding "Additional Regulatory Requirements":

Regulatory Requirements	Do you track costs separately?	Estimated 10-Year Needs	Estimated 10-Year Expenditures	Accuracy

5. FUNDING AND EXPENDITURE DATA

5.1 Actual/Estimated Revenues for Pavement-Related Activities

Funding Source	Type	Amount (FY16/17)	Amount (FY17/18)	Annual Average (FY18/19 to 27/28)

5.2 Actual/Estimated Revenues for Safety, Traffic & Regulatory Components

Funding Source	Type	Amount (FY16/17)	Amount (FY17/18)	Annual Average (FY18/19 to 27/28)

5.3 Expenditures on Pavements

Name	Amount (FY16/17)	Amount (FY17/18)	Annual Average (FY18/19 to 27/28)
Preventive Maintenance e.g. crack seals, slurry seals etc			
Rehabilitation & reconstruction e.g. overlays			
Other (pavement related)			
Other Operations & Maintenance (non-pavement related e.g. vegetation, cleaning ditches, sweeping, markings, signs, etc.)			

Of the totals reported above, what percentages are due to "Sustainable Pavement Practices", "Complete streets Policy" and "Additional Regulatory Requirements"? Enter in table below.

Name	% of Amount (FY16/17) Total	% of Amount (FY17/18) Total	% of Annual Average (FY18/19 to 27/28) Total
Sustainable Pavement Practices			
Complete Streets Components			
Additional Regulatory Requirements			

5.4 Expenditures on Safety, Traffic & Regulatory Components

Name	Amout (FY16/17)	Amount (FY17/18)	Annual Average (FY18/19 to 27/28)
Storm Drains - pipelines			
Other elements e.g. manholes, inlets, culverts, pump stations etc			
Curb and gutter			
Pedestrian facilities: Sidewalk (public)			
Other pedestrian facilities, e.g. over-crossings			
* Bicycle facilities: Class I bicycle path			
Other bicycle facilities, e.g. bike shelters/lockers, etc.			
Curb ramps			
Traffic signals			
Street Lights			
Sound Walls/Retaining walls			
Traffic signs			
Tunnels			
Other physical assets or expenditures that constitute >5% of total non-pavement asset costs e.g. heavy equipment, corporation yards etc. Note: Do NOT include bridges (handled separately)			

Of the above total expenditures, what percentages are due to a "Complete Streets Policy"?

Name	% of Amount (FY16/17) Total	% of Amount (FY17/18) Total	% of Annual Average (FY18/19 to 27/28) Total
Complete Streets Components			

5.5 Financial Questions

1. What innovative methods is your agency doing to “stretch” the dollar? e. g. new technologies, use of recycling techniques, partnering with other agencies for lower bids, preventive maintenance, etc.

2. Are there new revenues sources that your agency is considering?

3. Is there a city/county wide sales tax solely for transportation?

4. Is there a city/county wide sales tax that is partially used for transportation?

5. If you answered "Yes" above, please describe how it is used.
   (e.g. local match for highways, local streets & roads only, transit, etc).

6. NON-HIGHWAY NHS ROADS

The table below lists the non-highway NHS roads in your agency as listed in http://dot.ca.gov/hq/tsip/hseb/nhs.html. Please provide any additional information you may have. This will be used to determine the maintenance needs.

	Street	From	To	Length (ft)	Width (ft)	Area (sf)	Posted Speed Limit (mile/hour)	IRI (in/mile)	PSR (1-5)	Cracking (%)	PCI (0-100)	Surface Type	Rutting (in)	Faulting (in)	Comments
Edit															
Edit															

If there are additional non-highway NHS roads that are not listed above, use the table below to add:

	Street	From	To	Length (ft)	Width (ft)	Area (sf)	Posted Speed Limit (mile/hour)	IRI (in/mile)	PSR (1-5)	Cracking (%)	PCI (0-100)	Surface Type	Rutting (in)	Faulting (in)	Comments
Save Clear															

First Previous Next Last

If you have this information in an Excel file, you may upload it instead of filling out this table

Browse... Upload

7. Training and Technical Needs (Optional)

Purpose and summary of questions

This voluntary survey asks for your input regarding what you see as your agency's needs for pavement-related training and other forms of technical support, and some specific questions about your agency's pavement management, design, construction and maintenance practices. Your answers to these questions will be used to set the priorities and direction for the training, support and research program of the recently formed City and County Pavement Improvement Center.

The questions will require knowledge of technical issues. The questions are grouped by expertise area. The questions only require knowledge of needs and practices, and none of the questions require data or other detailed information.

Please answer as many questions as possible, even partial input will be very helpful.

Question 1: Needs and priorities

Who should answer: technical staff in charge of pavements, may require asking across different departments involved with pavements.

Q1: Please fill in the top four areas for which your agency could use training, technical support, pilot implementation support, technical guidance, example specifications or research and development regarding maintaining your road network? For each issue indicate what type of support you are looking for.

1.
2.
3.
4.

Questions 2 through 7: Pavement management practices

Q2: Does your agency apply maintenance (preservation) treatments prior to the appearance of extensive distress on the pavement surface as a standard practice?

Comments

Q3: Does your agency select treatments primarily based on Pavement Condition Index (PCI)?
Other criteria for selecting treatments?

Q4a: For asphalt surfaced pavements that handle heavy traffic (buses, trucks) other than garbage trucks what is the typical preservation or maintenance treatment that you would use for each of these cases?
If heavily cracked
If moderately cracked
If no cracking but showing signs of aging

Q4b: How many preservation or maintenance treatments do you typically do before you do a rehabilitation? (fill in number)

Q5a: For your asphalt surfaced pavements that do not handle heavy vehicle traffic other than garbage trucks what is the typical preservation or maintenance treatment that you would use for each of these cases?
If heavily cracked
If moderately cracked
If no cracking but showing signs of aging

Q5b: How many preservation or maintenance treatments do you typically do before you do a rehabilitation (fill in number)?

Q6: Does your agency routinely consider use of recycling treatments for your asphalt pavements such as cold in-place recycling (CIR), Cold Central Plant Recycling (CCPR), subgrade stabilization or full-depth reclamation (FDR) in your treatment selection process for pavements with extensive cracking?
Comments

Q7: Has your agency done life cycle cost analysis (LCCA) to evaluate the timing and selection of your preservation, maintenance and rehabilitation treatments included in your PMS decision trees?
Comments

Questions 8 through 15: Pavement materials and construction specifications

Who should answer: technical staff in charge of pavement materials and construction quality management.

Q8: Does your agency allow supplementary cementitious materials to replace cement in your concrete for pavement, gutters and sidewalks?

Comments

Q9: Does your typical specification include a required minimum cement content in your concrete for pavement, gutters and sidewalks?

Comments

Q10: Does your typical specification language require measurement of density on compacted asphalt in the field using cores or calibrated nuclear gauges?
Comments

Q11: Who does your agency use to monitor asphalt compaction in the field? Other?

Q12: Does your agency assess penalties on the contractor for poor asphalt compaction based on measured in place densities?
Comments

Q13: Does your agency offer any incentives for contractors to meet or exceed the asphalt compaction standard?
Comments

Q14: How would you rate your agency satisfaction that adequate asphalt compaction is being achieved?

Q15: Do you allow the use of recycled asphalt pavement (RAP) in your asphalt mixes?
If Yes, maximum percentage? %
Comments

Appendix C

Pavement Condition* & Needs by County

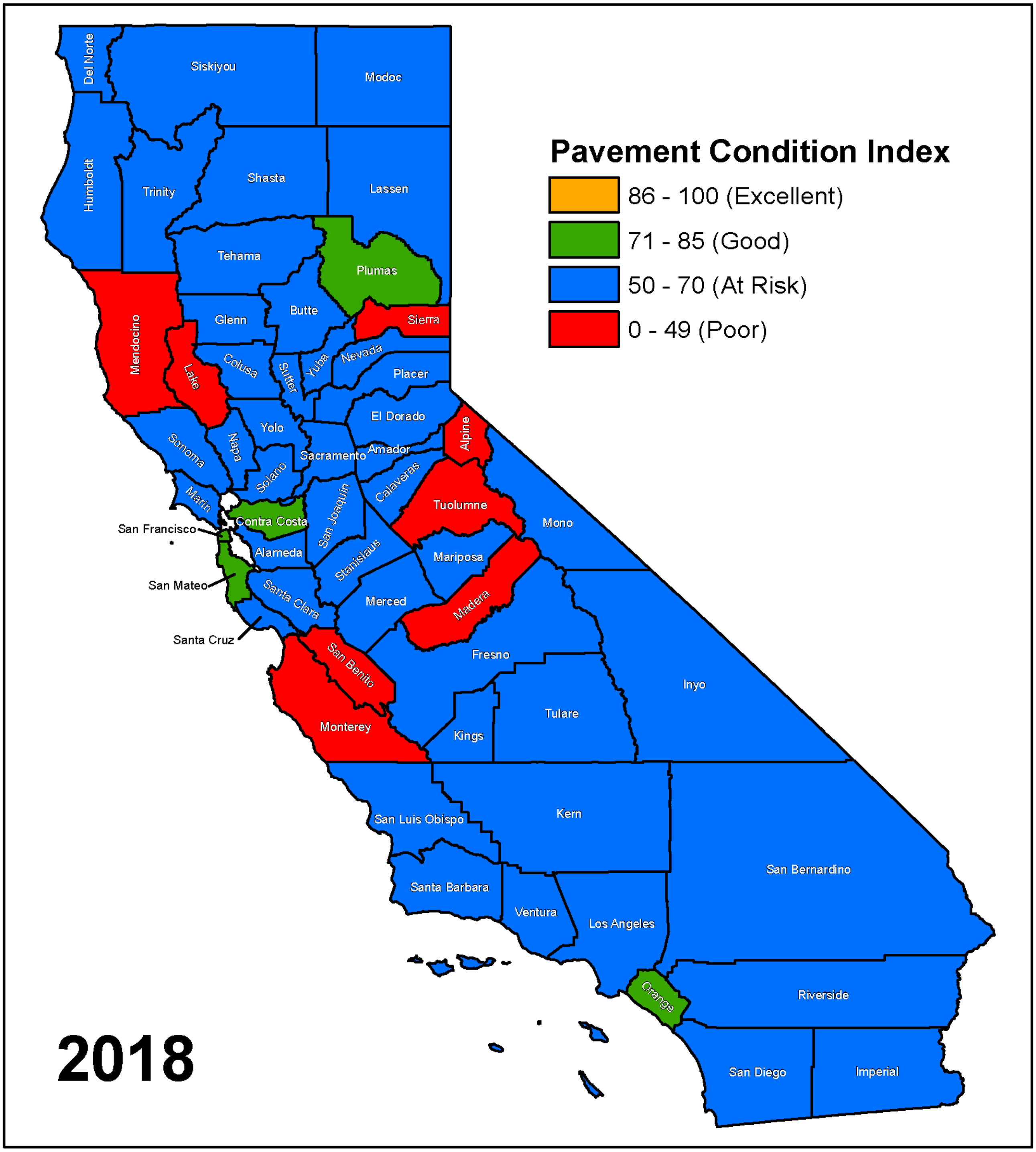
*Pavement condition data for the MTC region provided by MTC in 2018.

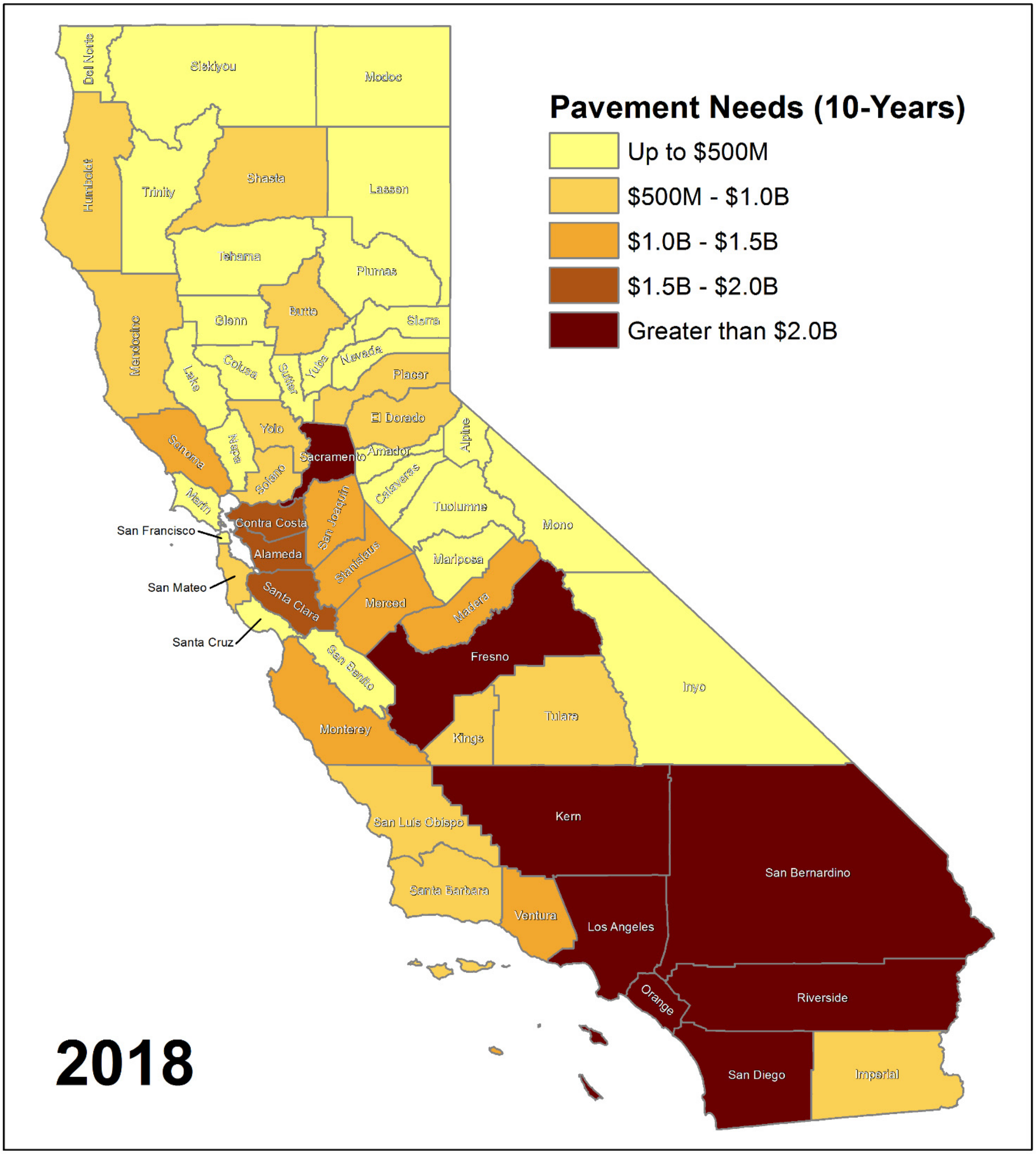
Table C.1 Pavement Needs by County* (2018 $)

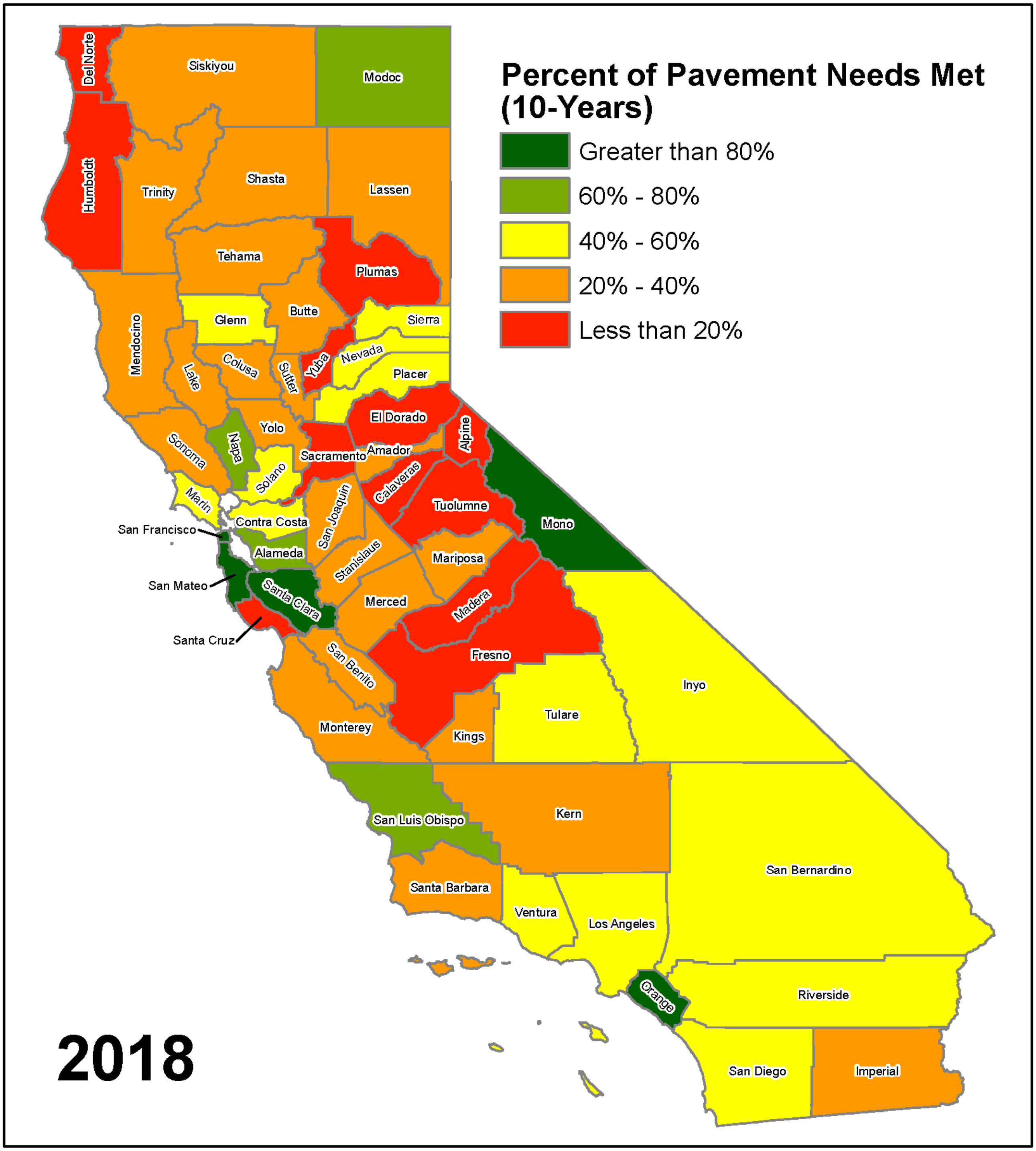
County (Cities Included)	Center Line Miles	Lane Miles	Area (sq. yd.)	2018 PCI	10 Year Needs (2018 $M)
Alameda County	3,576	8,088	77,528,034	68	$1,678
Alpine County	135	270	1,900,800	41	$34
Amador County	477	945	5,908,703	51	$204
Butte County	1,839	3,698	29,321,289	60	$692
Calaveras County	717	1,333	8,937,332	50	$302
Colusa County	761	1,247	13,240,593	60	$292
Contra Costa County	3,426	7,159	70,805,960	71	$1,638
Del Norte County	323	646	4,414,995	60	$81
El Dorado County	1,399	2,684	21,459,847	63	$537
Fresno County	6,225	13,044	106,510,511	61	$2,858
Glenn County	910	1,822	13,917,626	68	$293
Humboldt County	1,464	2,921	24,247,391	56	$703
Imperial County	3,017	6,102	76,815,365	55	$844
Inyo County	1,133	1,832	13,681,682	61	$215
Kern County	5,507	12,184	110,236,890	63	$2,675
Kings County	1,363	2,858	21,107,430	60	$571
Lake County	753	1,493	10,860,623	38	$424
Lassen County	431	879	6,282,324	60	$181
Los Angeles County	21,001	63,009	461,254,896	67	$10,516
Madera County	1,809	3,604	25,503,864	44	$1,001
Marin County	1,033	2,054	16,610,103	67	$374
Mariposa County	362	719	5,334,893	65	$132
Mendocino County	1,125	2,256	15,527,236	46	$526
Merced County	2,335	4,881	38,705,388	56	$1,125
Modoc County	1,505	3,010	17,142,256	59	$338
Mono County	737	1,473	9,613,552	65	$91
Monterey County	1,824	3,854	34,172,191	49	$1,280
Napa County	745	1,518	13,153,110	59	$380
Nevada County	806	1,625	10,348,493	68	$191
Orange County	6,592	16,493	151,894,951	79	$2,163
Placer County	2,068	4,282	34,279,854	64	$815
Plumas County	704	1,411	9,090,224	73	$125
Riverside County	7,929	17,916	158,743,818	68	$3,337
Sacramento County	5,059	11,041	96,283,230	60	$2,582
San Benito County	492	761	5,156,435	37	$265
San Bernardino County	8,898	22,161	180,402,259	70	$3,332
San Diego County	7,759	18,763	173,945,867	64	$3,784

County (Cities Included)	Center Line Miles	Lane Miles	Area (sq. yd.)	2018 PCI	10 Year Needs (2018 $M)
San Francisco County	943	2,142	21,246,638	74	$367
San Joaquin County	3,218	6,773	59,200,181	70	$1,226
San Luis Obispo County	1,850	3,348	27,009,051	65	$626
San Mateo County	1,876	3,927	33,604,631	72	$634
Santa Barbara County	1,591	3,252	28,815,818	61	$771
Santa Clara County	4,477	9,996	97,851,778	70	$1,967
Santa Cruz County	867	1,764	14,021,795	55	$453
Shasta County	1,692	3,509	26,158,393	58	$707
Sierra County	399	800	5,566,517	44	$138
Siskiyou County	1,488	2,985	20,233,539	55	$415
Solano County	1,745	3,723	33,143,732	67	$697
Sonoma County	2,388	4,968	39,925,047	54	$1,305
Stanislaus County	2,913	5,989	51,918,449	63	$1,324
Sutter County	1,027	2,073	15,015,996	69	$273
Tehama County	1,203	2,408	15,512,649	54	$442
Trinity County	697	1,121	11,757,354	59	$275
Tulare County	4,105	8,286	31,738,980	62	$891
Tuolumne County	602	1,122	8,214,336	41	$366
Ventura County	2,520	6,117	54,295,141	69	$1,201
Yolo County	1,338	2,698	23,007,951	58	$634
Yuba County	1,066	1,504	19,557,588	66	$427
California	**144,244**	**328,541**	**2,712,135,577**	**60**	**$61,718**

* Includes Cities within County

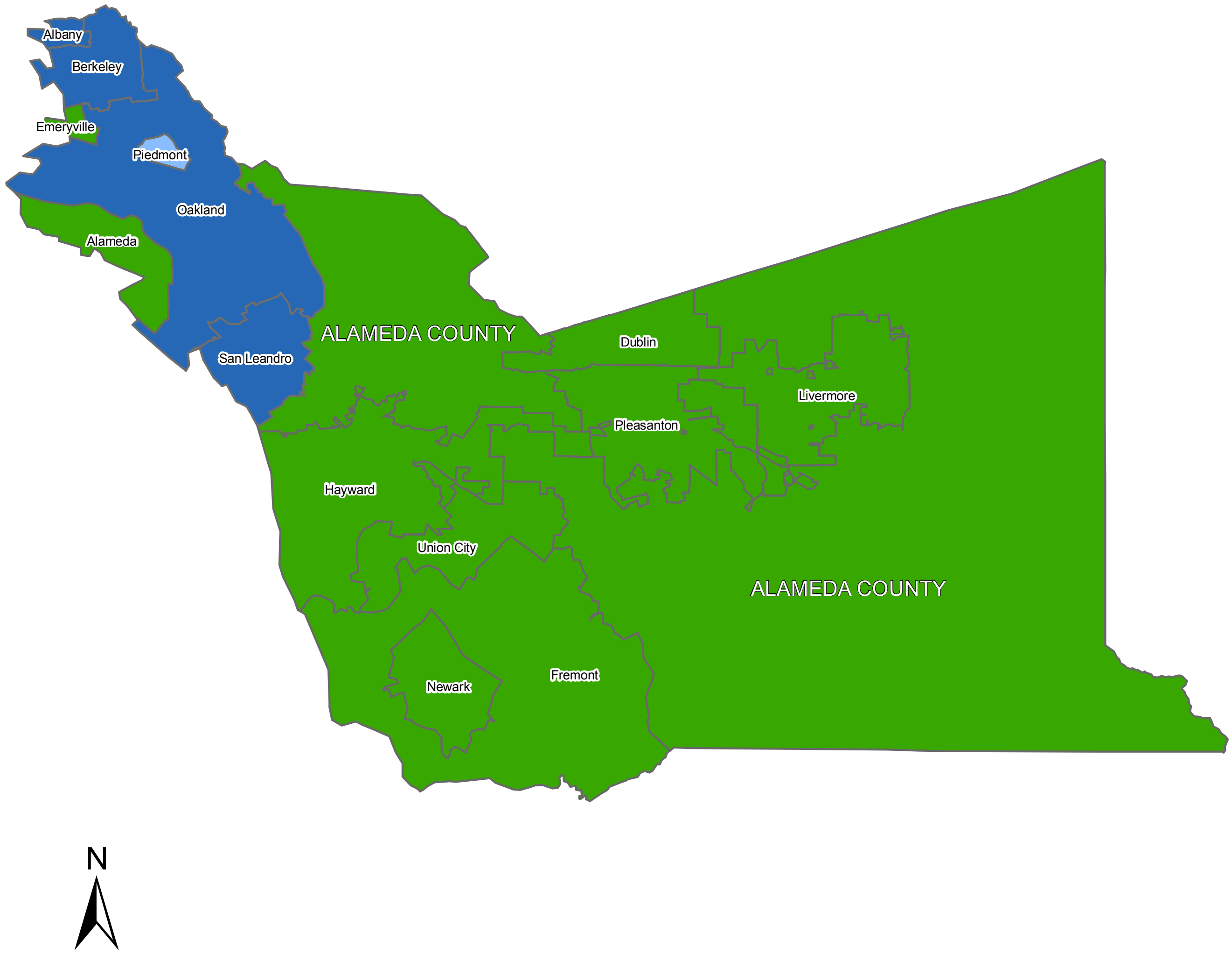

Pavement Condition Index
86 - 100 (Excellent)
71 - 85 (Good)
50 - 70 (At Risk)
0 - 49 (Poor)
2018
Del Norte
Siskiyou
Modoc
Humboldt
Trinity
Shasta
Lassen
Tehama
Plumas
Mendocino
Glenn
Butte
Sierra
Lake
Colusa
Sutter
Yuba
Nevada
Placer
El Dorado
Yolo
Alpine
Sonoma
Napa
Sacramento
Amador
Solano
Calaveras
Marin
Tuolumne
San Francisco
Contra Costa
San Joaquin
Mono
Alameda
Mariposa
Stanislaus
San Mateo
Santa Clara
Merced
Madera
Santa Cruz
Fresno
San Benito
Inyo
Tulare
Monterey
Kings
San Luis Obispo
Kern
San Bernardino
Santa Barbara
Ventura
Los Angeles
Orange
Riverside
San Diego
Imperial


Pavement Needs (10-Years)
Up to $500M
$500M - $1.0B
$1.0B - $1.5B
$1.5B - $2.0B
Greater than $2.0B
2018
Del Norte
Siskiyou
Modoc
Humboldt
Trinity
Shasta
Lassen
Tehama
Plumas
Glenn
Butte
Sierra
Mendocino
Lake
Colusa
Sutter
Yuba
Nevada
Placer
Yolo
El Dorado
Sonoma
Napa
Sacramento
Amador
Alpine
Solano
Marin
Calaveras
Contra Costa
San Joaquin
Tuolumne
Mono
San Francisco
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Madera
Santa Cruz
San Benito
Fresno
Inyo
Tulare
Kings
Monterey
Kern
San Luis Obispo
San Bernardino
Santa Barbara
Ventura
Los Angeles
Orange
Riverside
San Diego
Imperial


Percent of Pavement Needs Met (10-Years)
Greater than 80%
60% - 80%
40% - 60%
20% - 40%
Less than 20%
2018
Del Norte
Siskiyou
Modoc
Humboldt
Trinity
Shasta
Lassen
Tehama
Plumas
Glenn
Butte
Sierra
Mendocino
Lake
Colusa
Sutter
Yuba
Nevada
Placer
El Dorado
Alpine
Yolo
Napa
Sonoma
Solano
Sacramento
Amador
Marin
Calaveras
San Joaquin
Tuolumne
Mono
Contra Costa
San Francisco
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Madera
Santa Cruz
Fresno
San Benito
Inyo
Tulare
Monterey
Kings
San Luis Obispo
Kern
San Bernardino
Santa Barbara
Ventura
Los Angeles
Orange
Riverside
San Diego
Imperial

Alameda County

SAVE CALIFORNIA STREETS

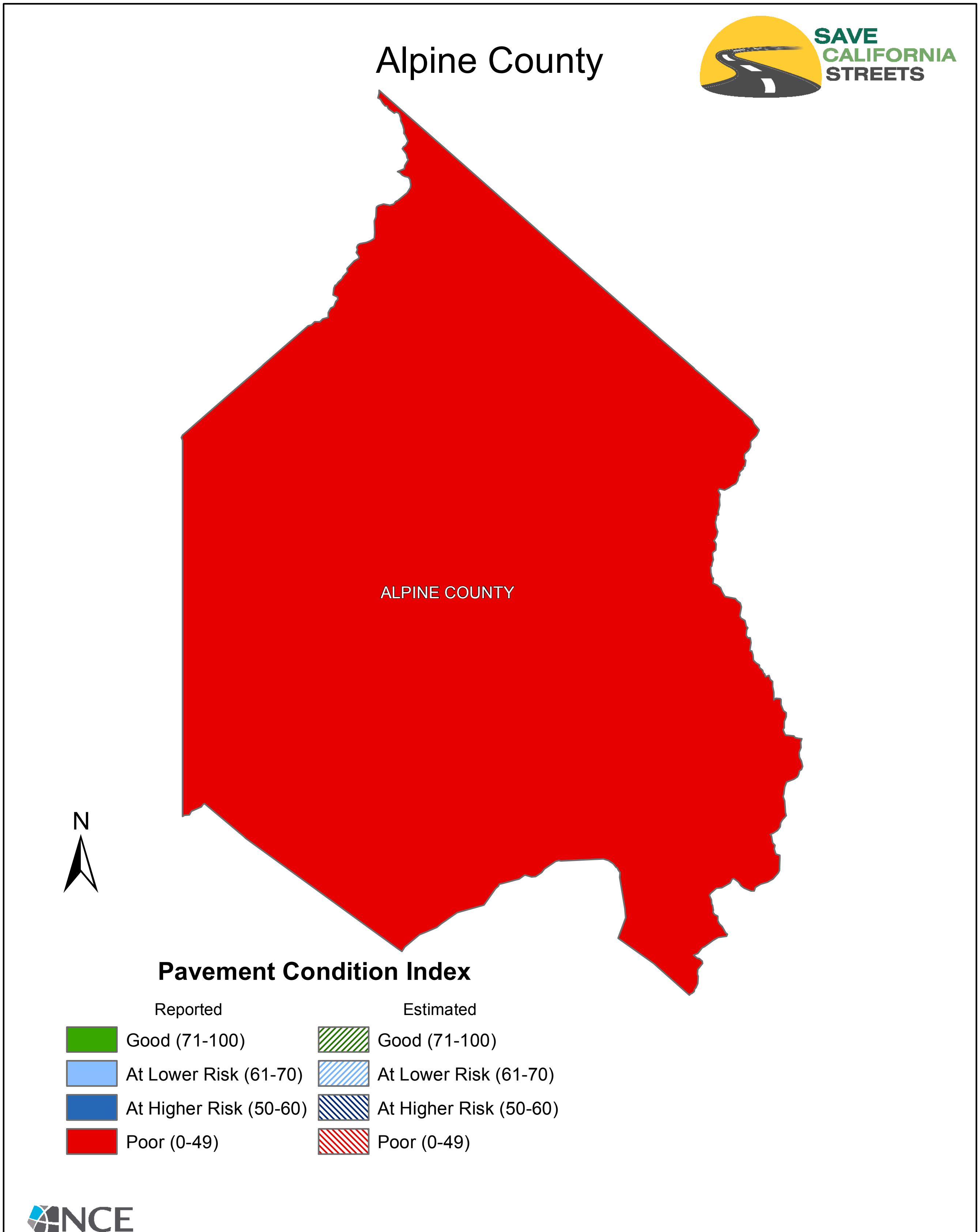


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

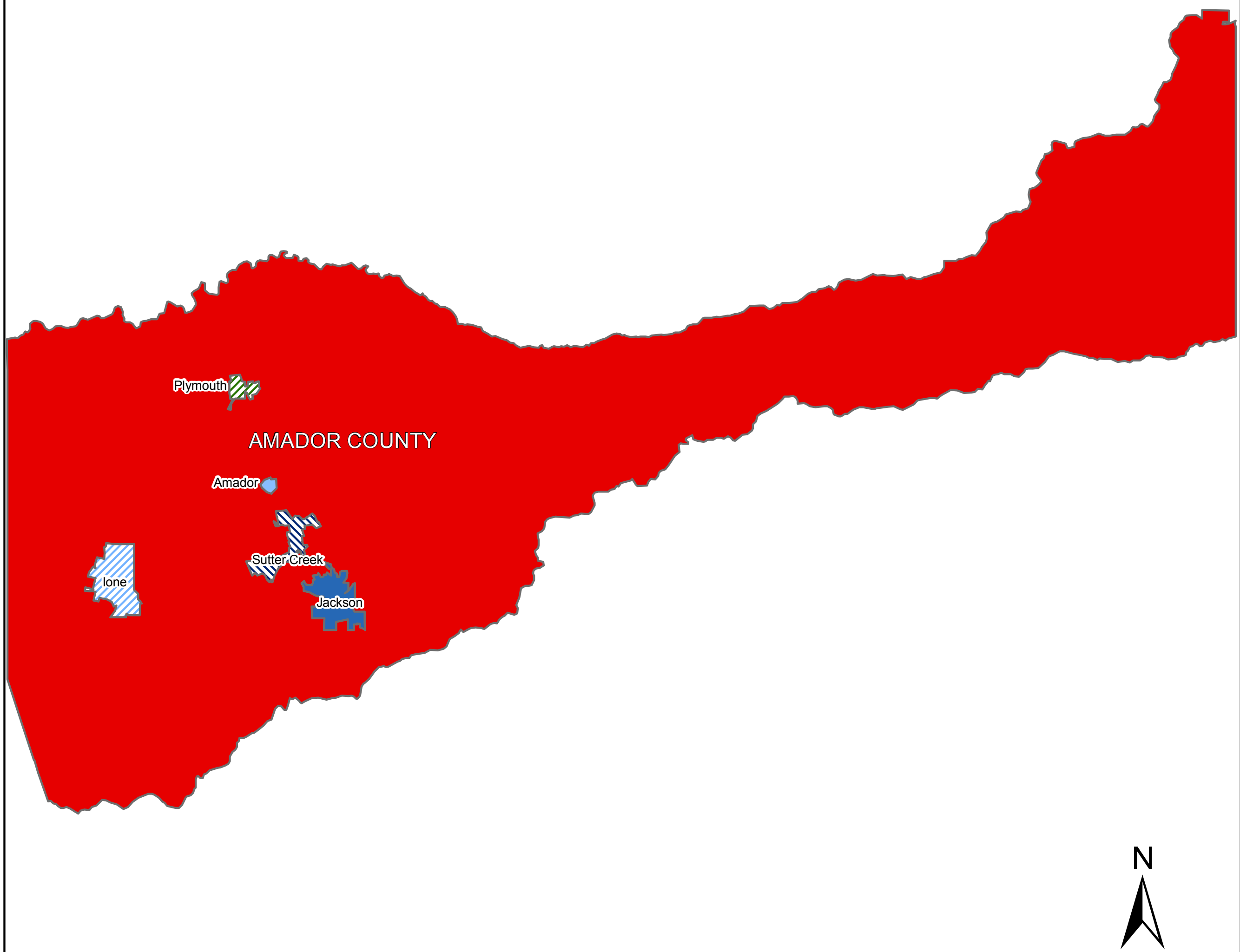
NCE

 GIS mapping data modified from US Census Bureau TIGER Cartographic Boundary Shapefiles (http://www.census.gov/geo/maps-data/data/tiger.html), accessed August 2016. Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.



Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Amador County

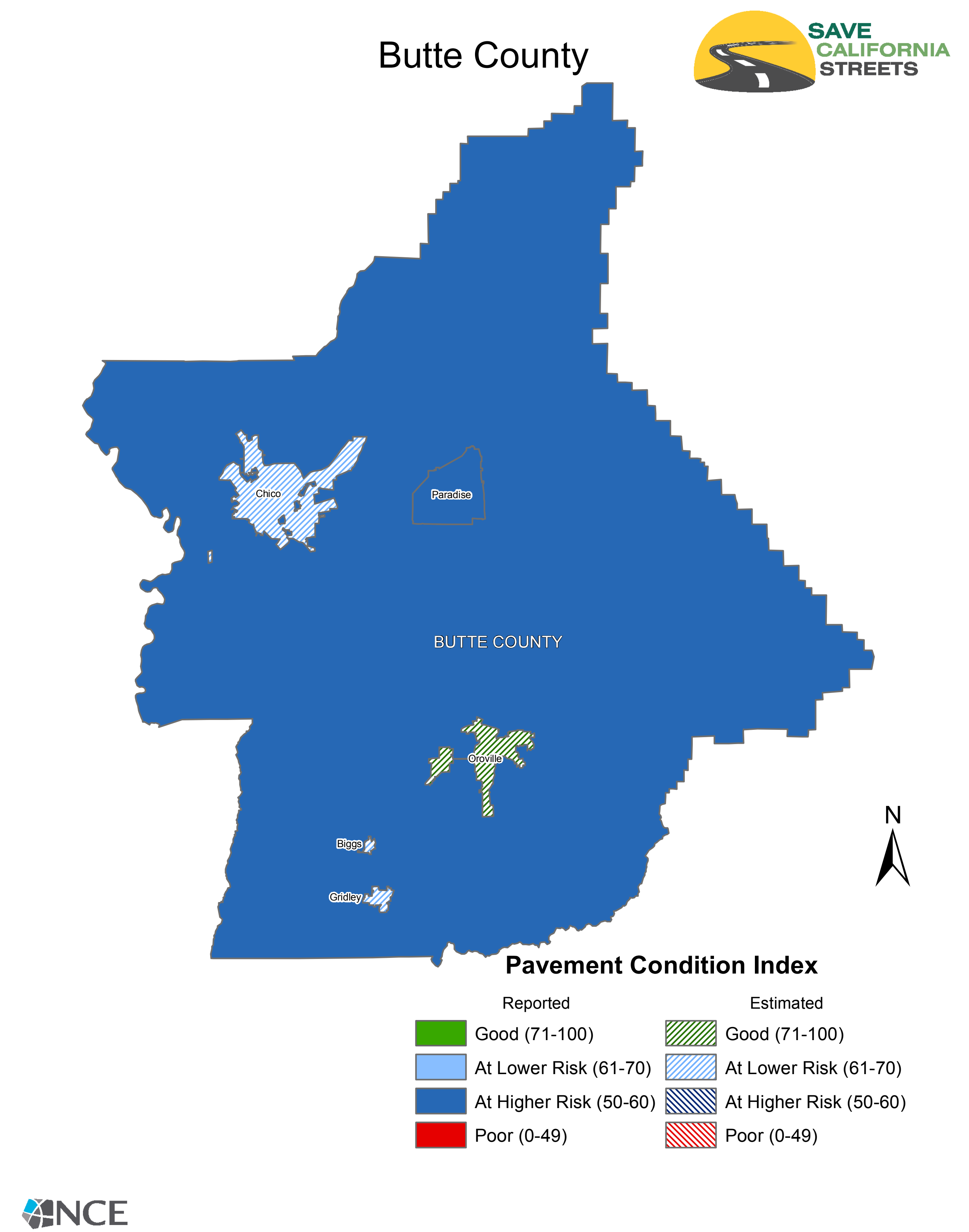


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

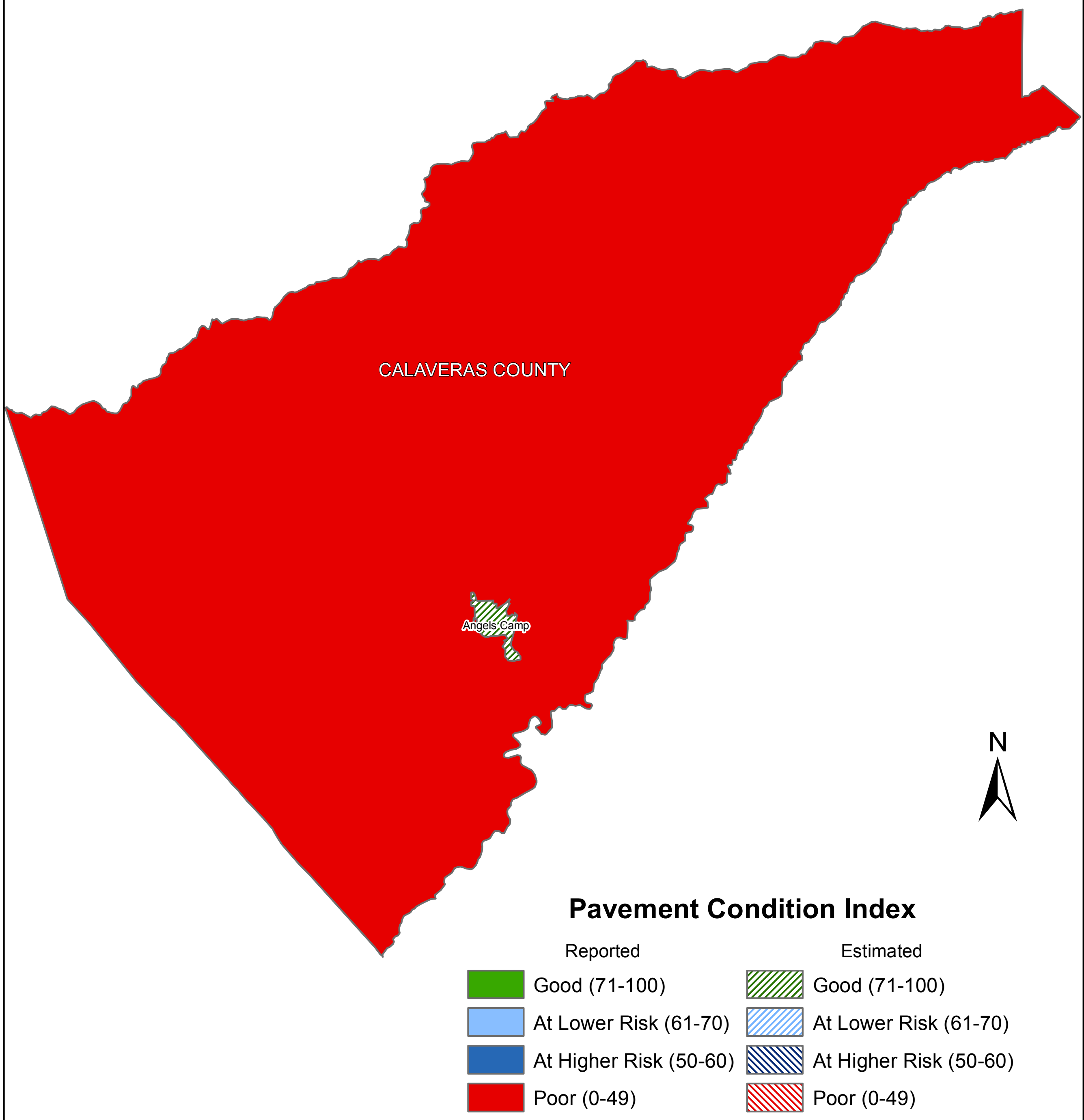
NCE

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.



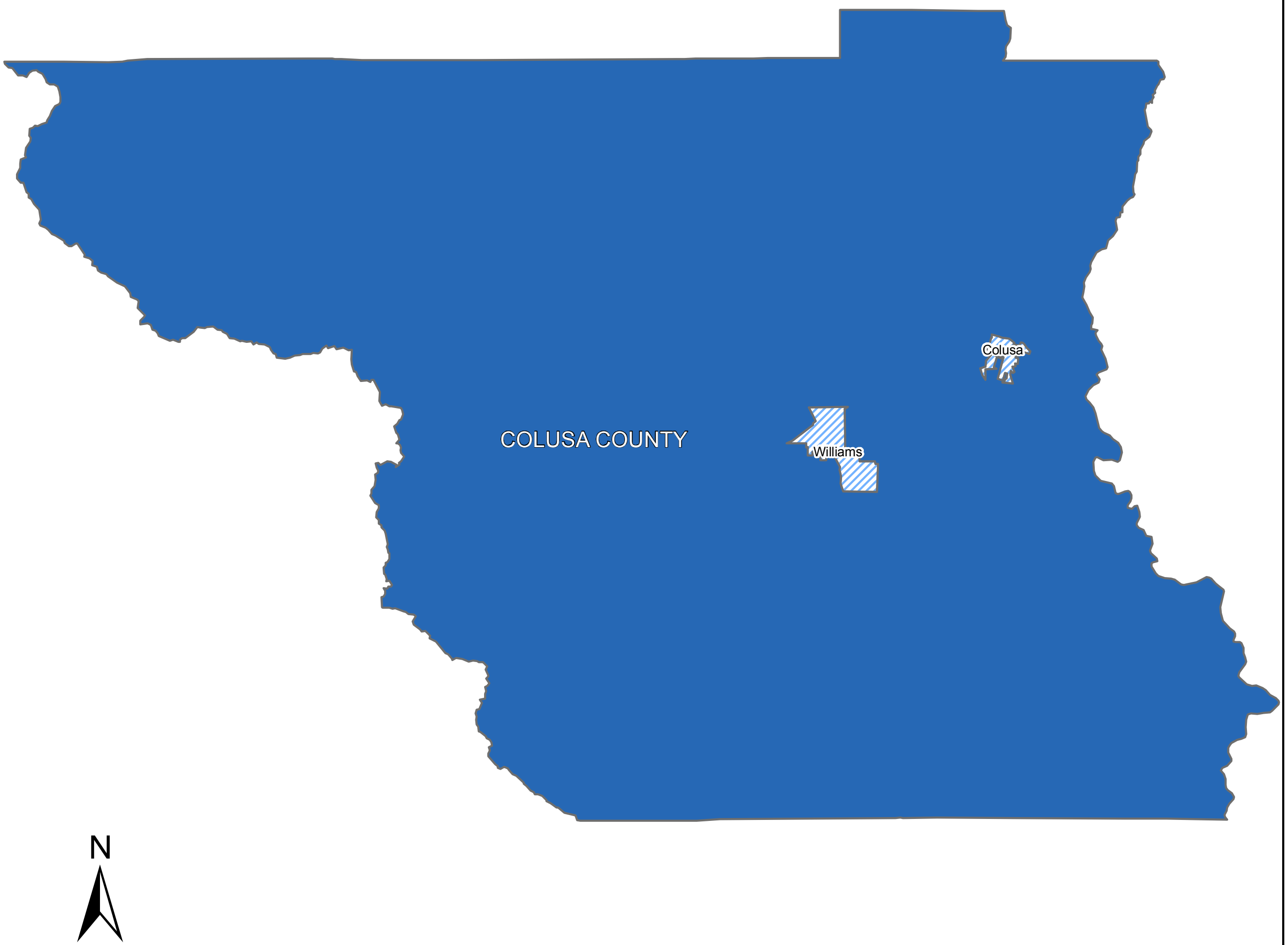
Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Calaveras County



 GIS mapping data modified from US Census Bureau TIGER Cartographic Boundary Shapefiles (http://www.census.gov/geo/maps-data/data/tiger.html), accessed August 2016. Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Colusa County

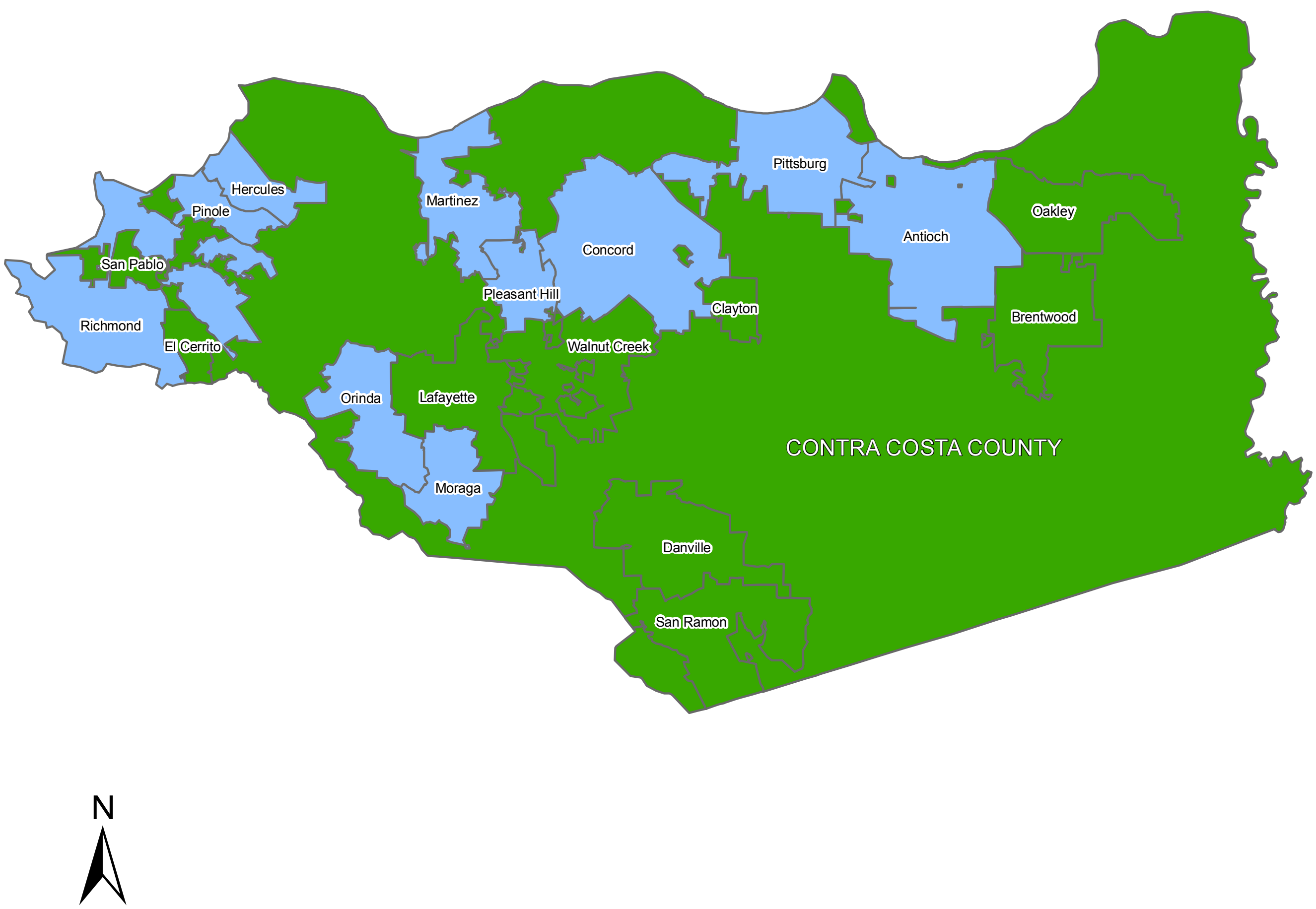


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Contra Costa County

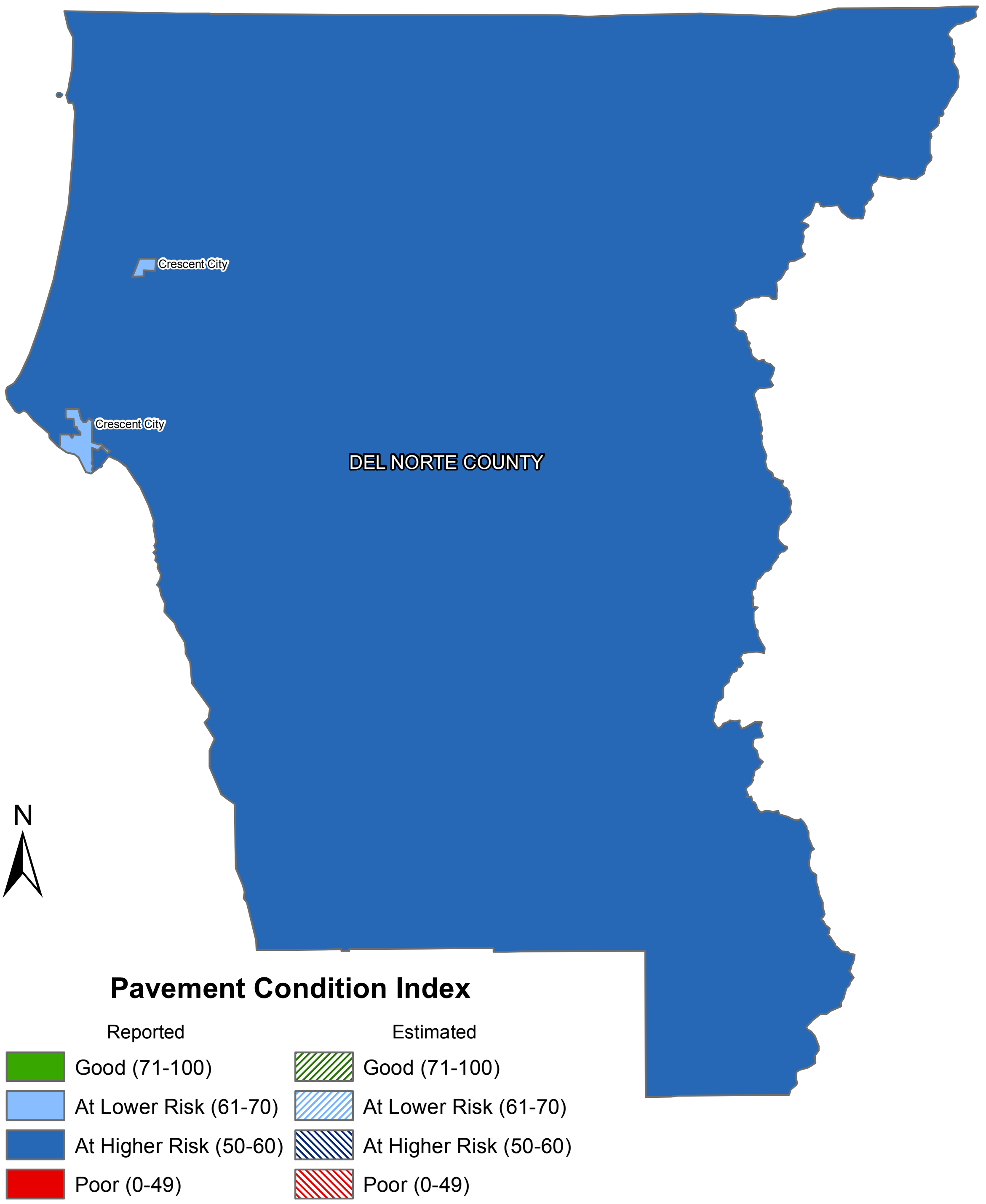


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

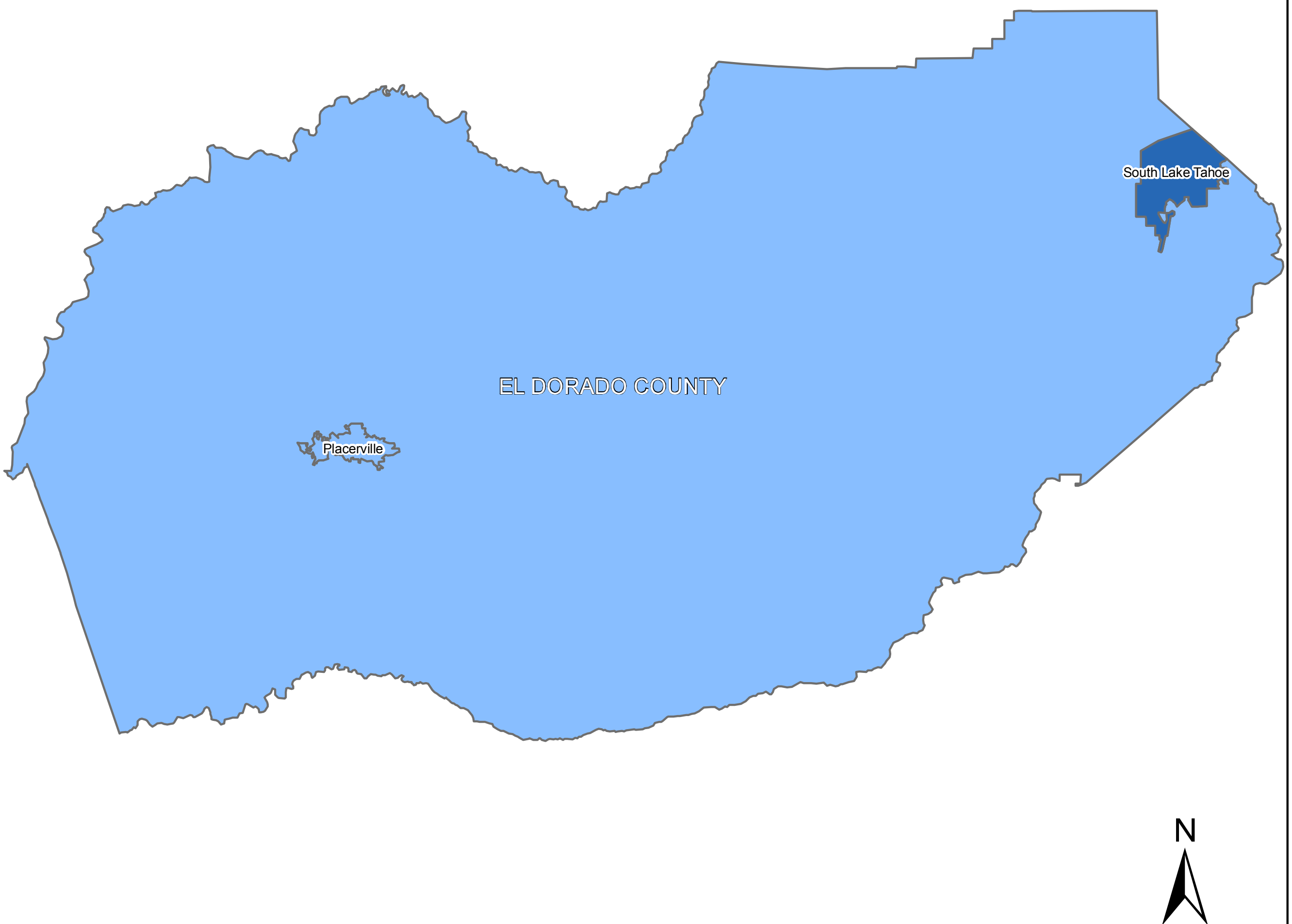
Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Del Norte County



Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

El Dorado County

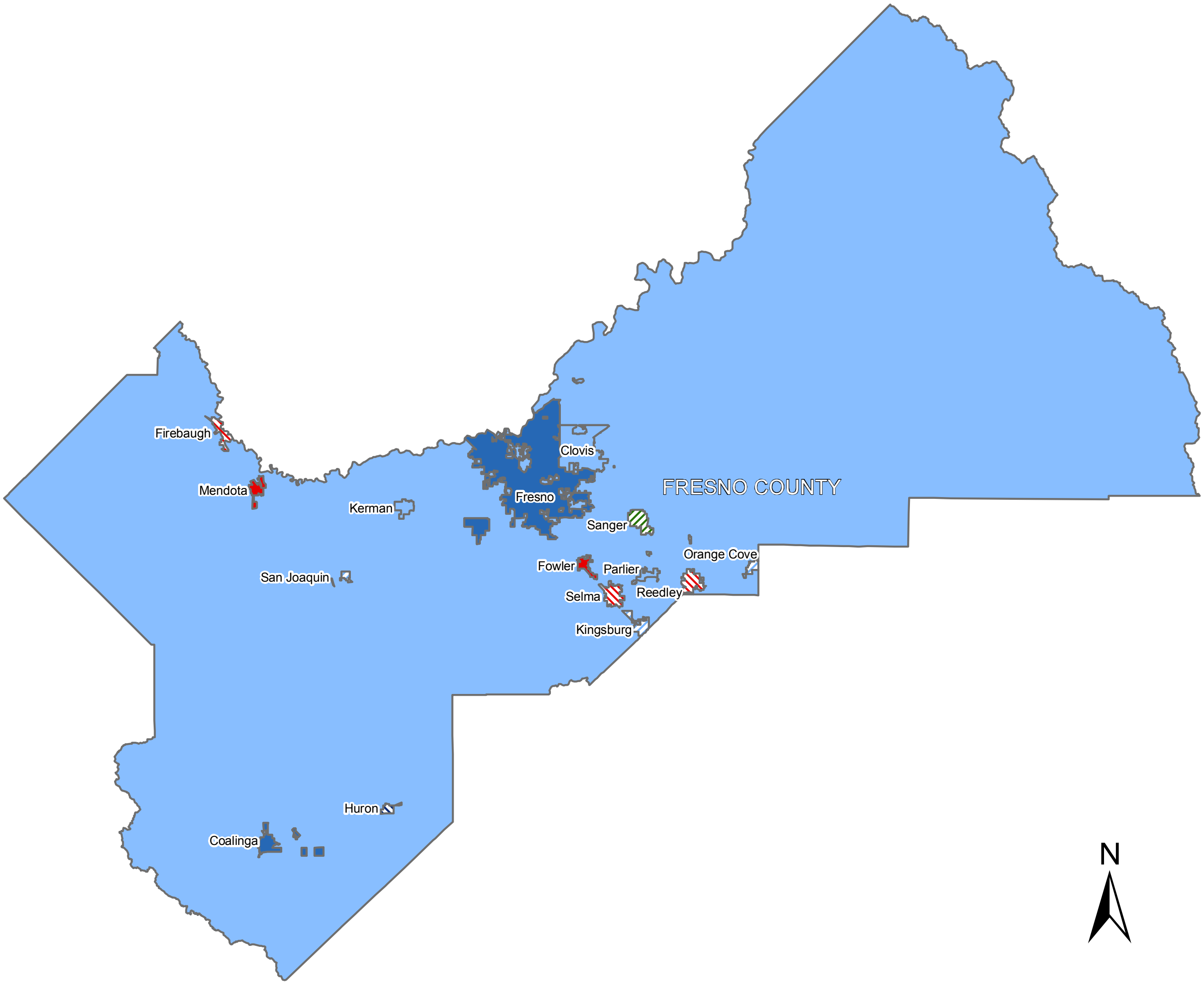


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

 GIS mapping data modified from US Census Bureau TIGER Cartographic Boundary Shapefiles (http://www.census.gov/geo/maps-data/data/tiger.html), accessed August 2016.
Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Fresno County

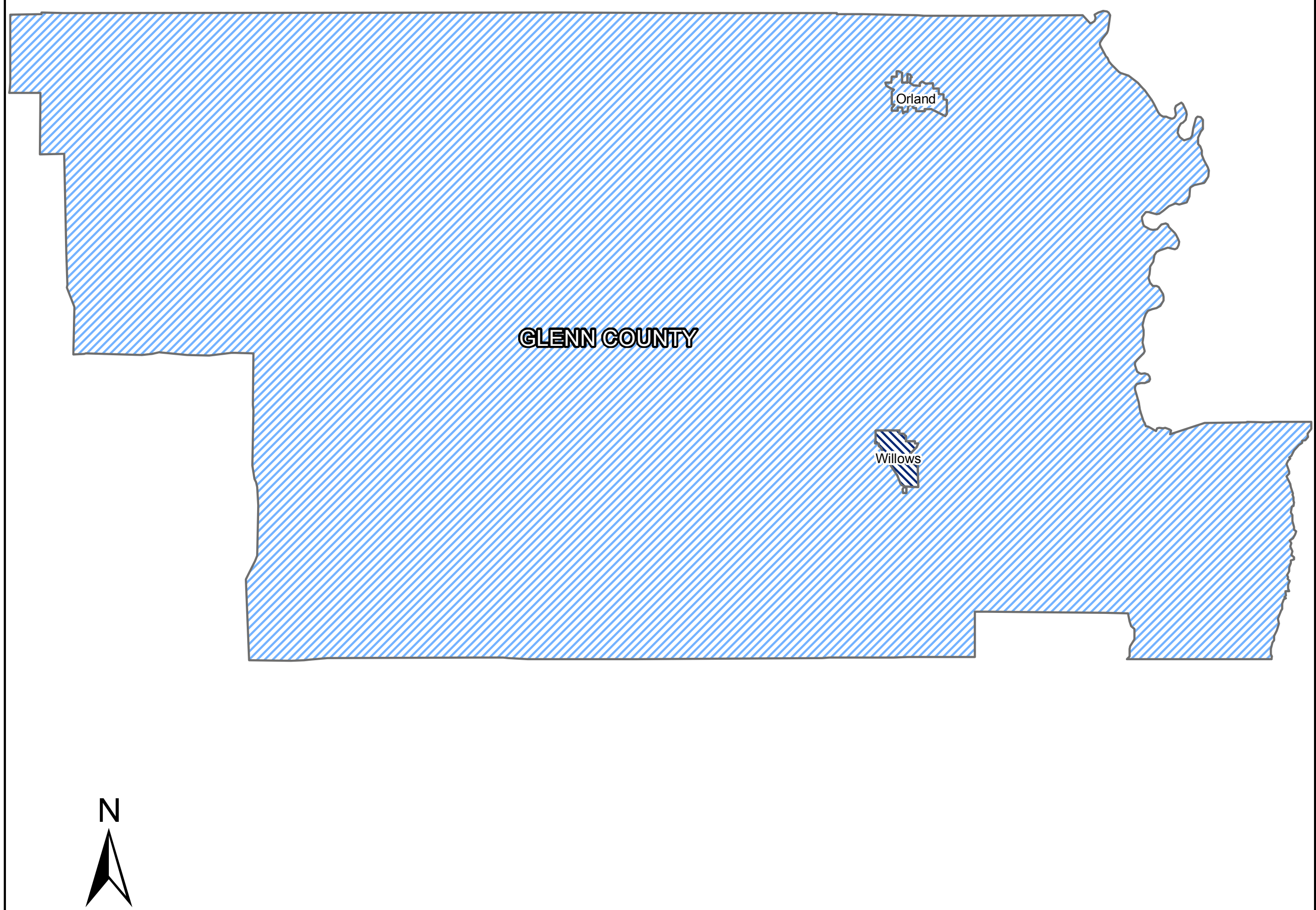


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Glenn County

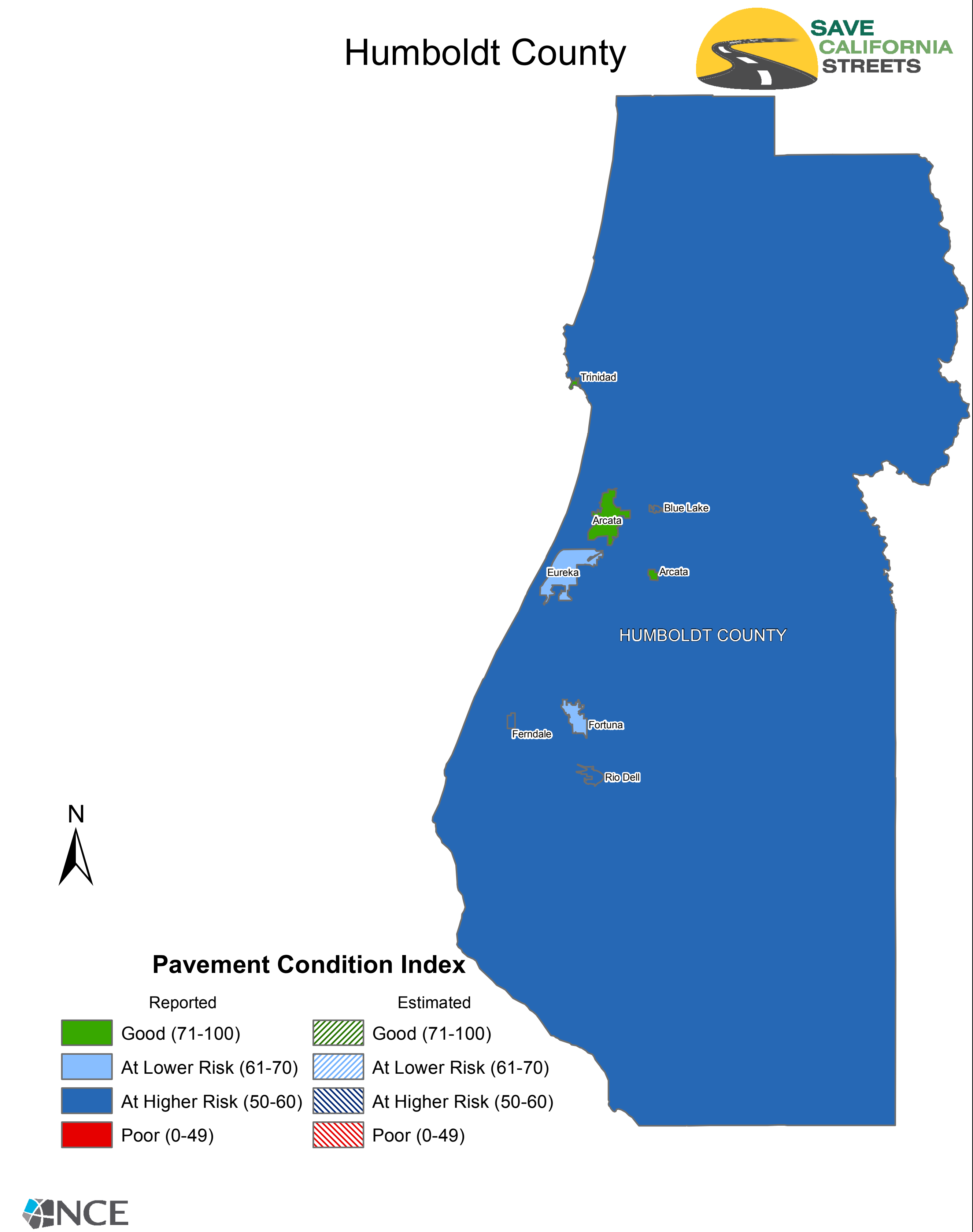


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

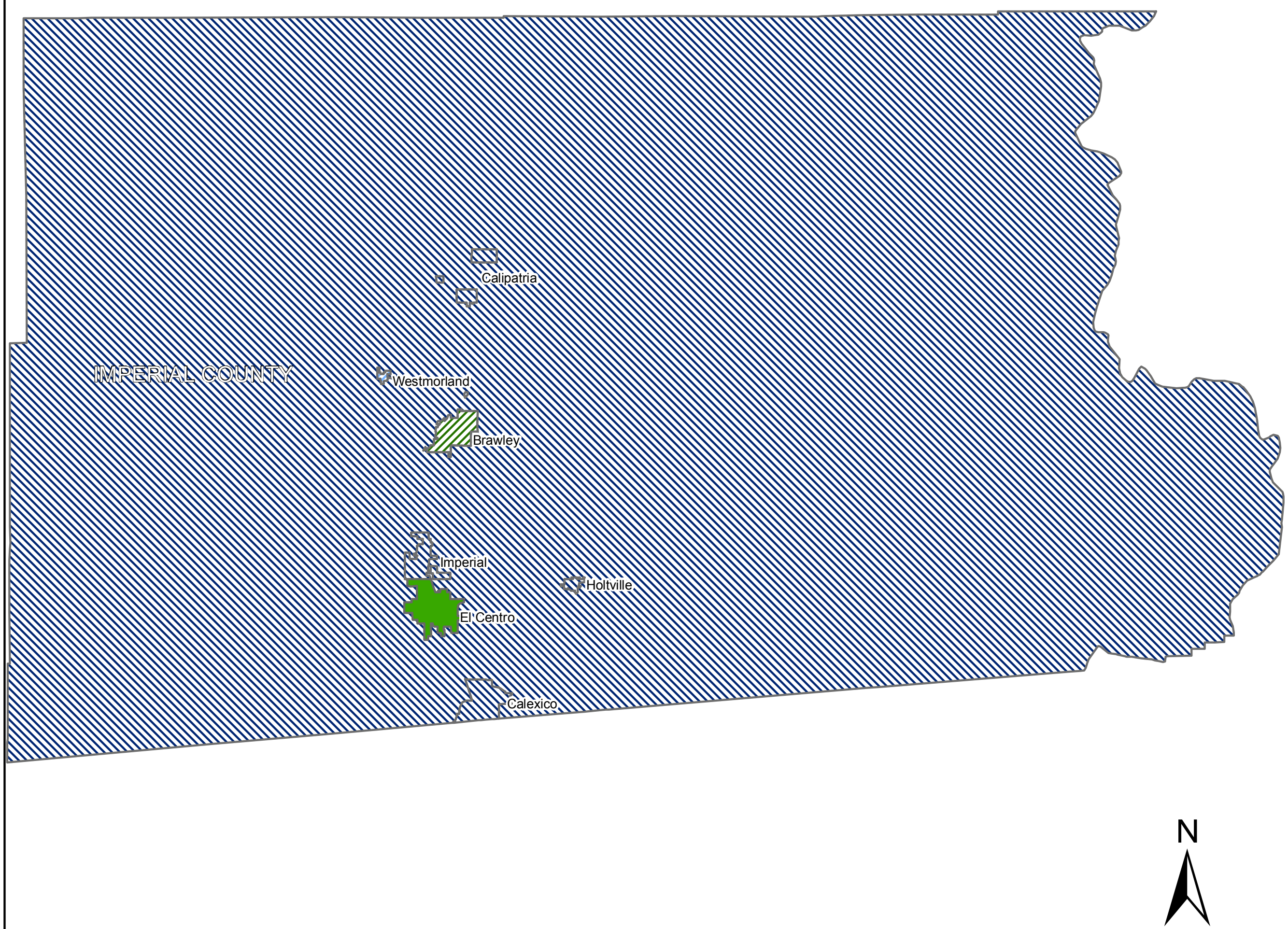
Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Humboldt County



Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Imperial County



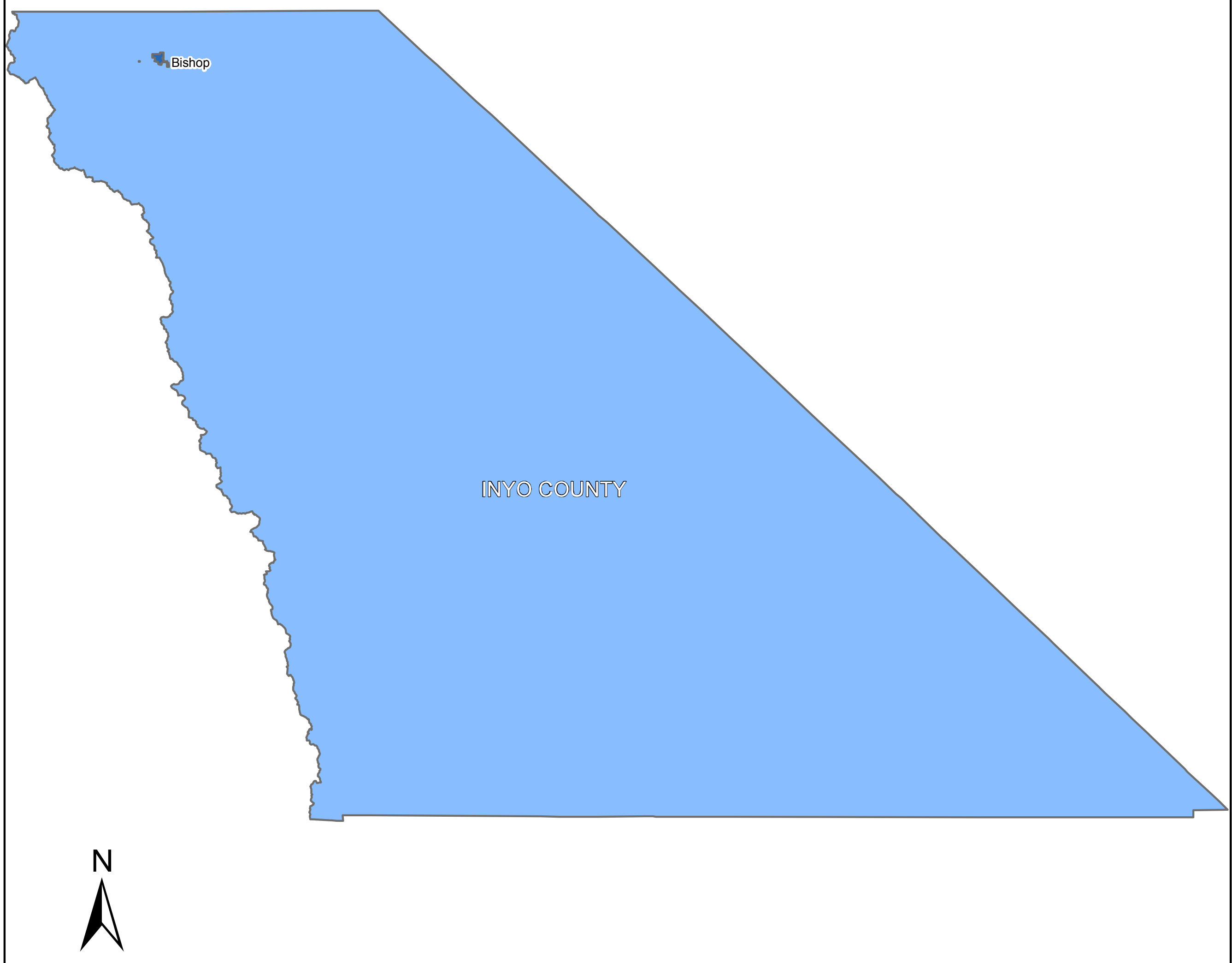
Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

NCE

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Inyo County

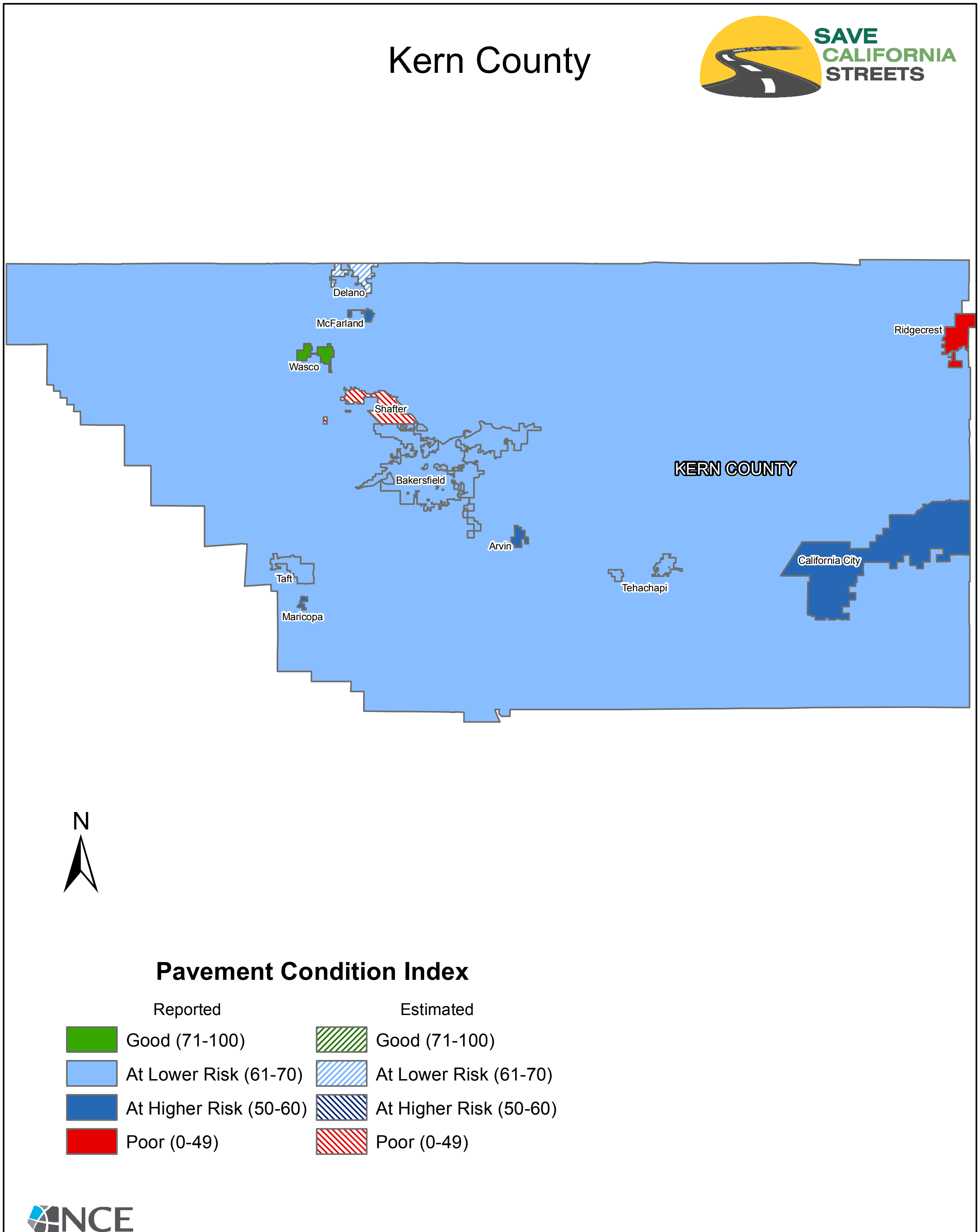


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

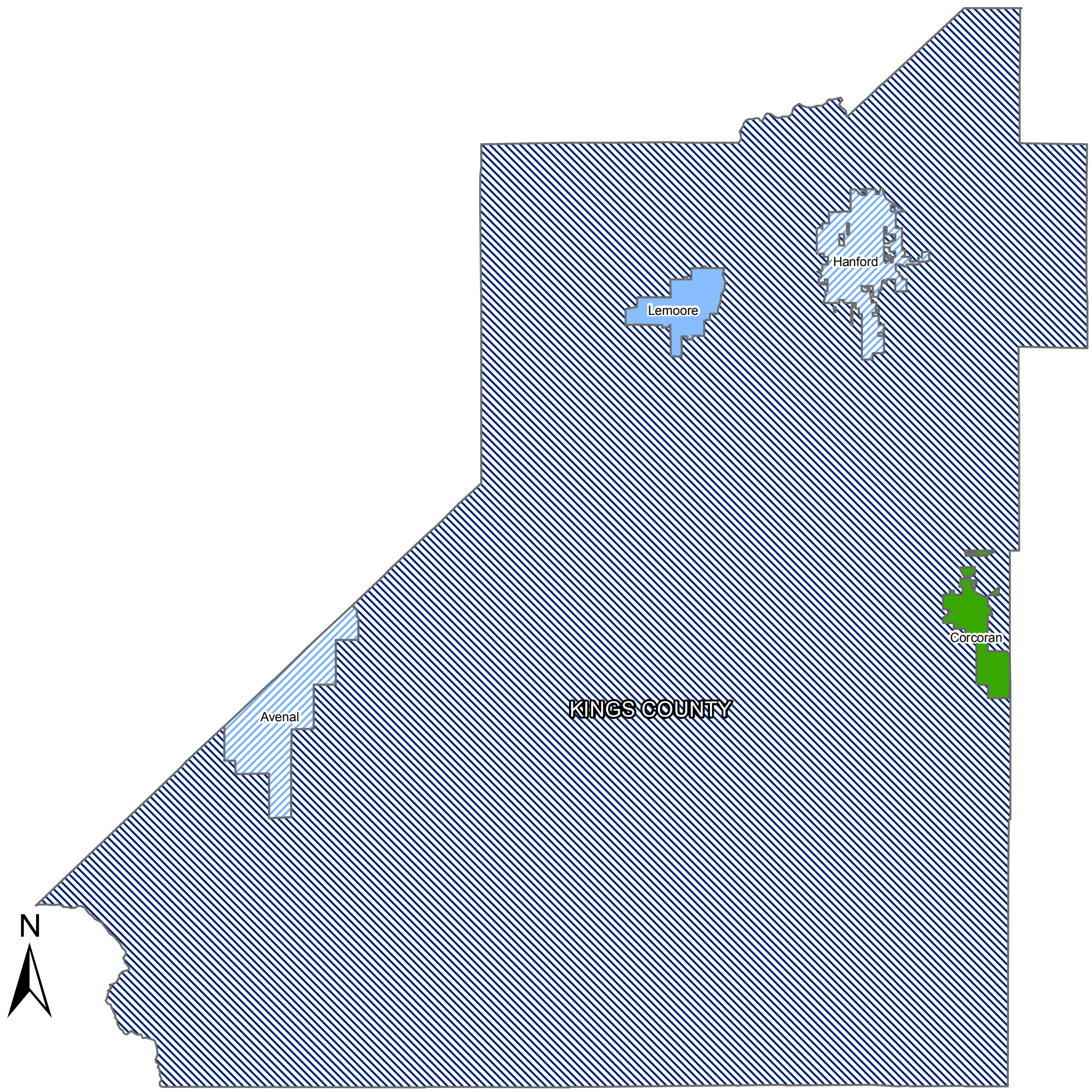
NCE

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.


Kern County
SAVE CALIFORNIA STREETS
Delano
McFarland
Wasco
Shafter
Bakersfield
Arvin
Taft
Maricopa
Tehachapi
California City
Ridgecrest
KERN COUNTY
N
Pavement Condition Index
Reported
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
Estimated
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
NCE

Kings County

SAVE CALIFORNIA STREETS

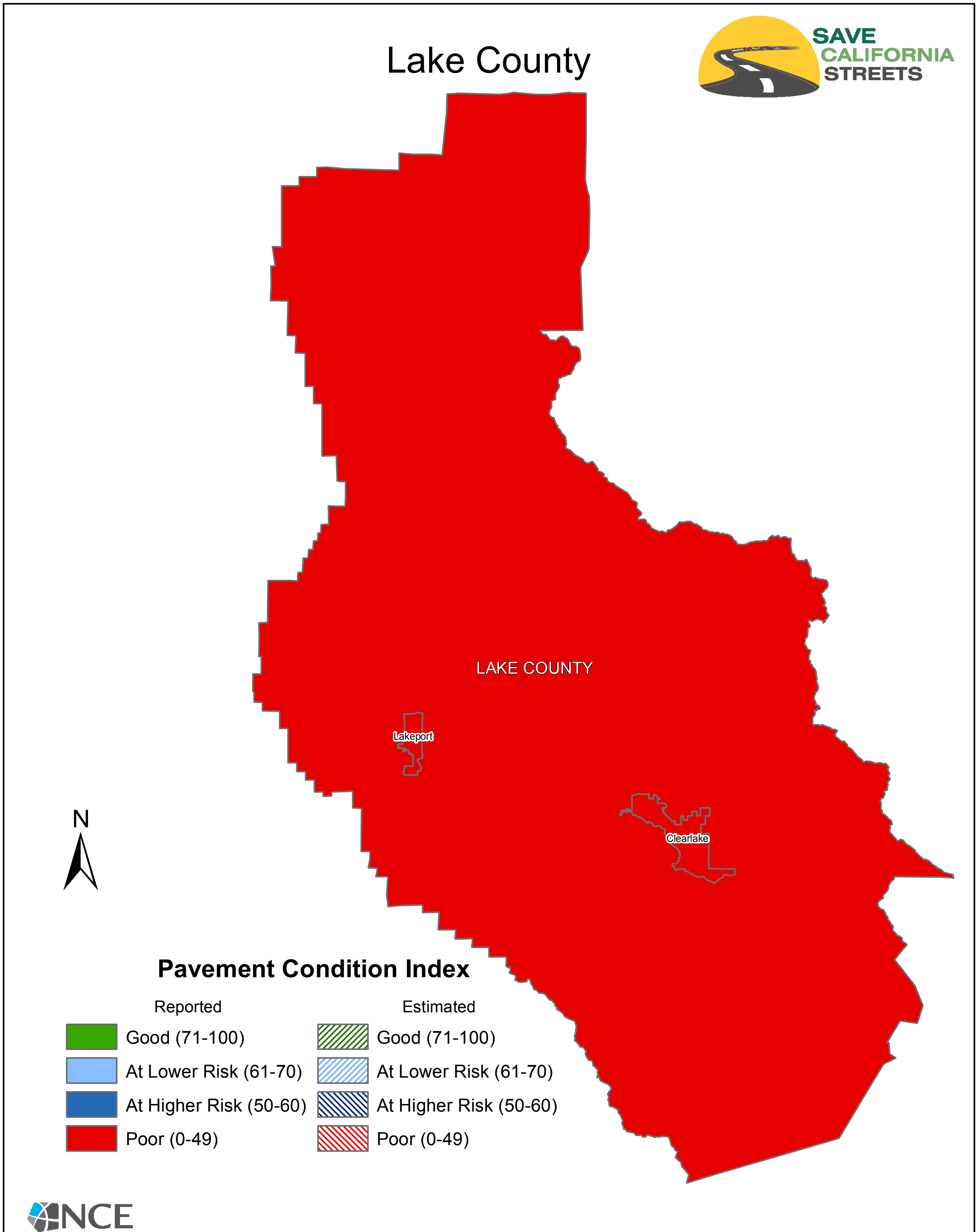


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

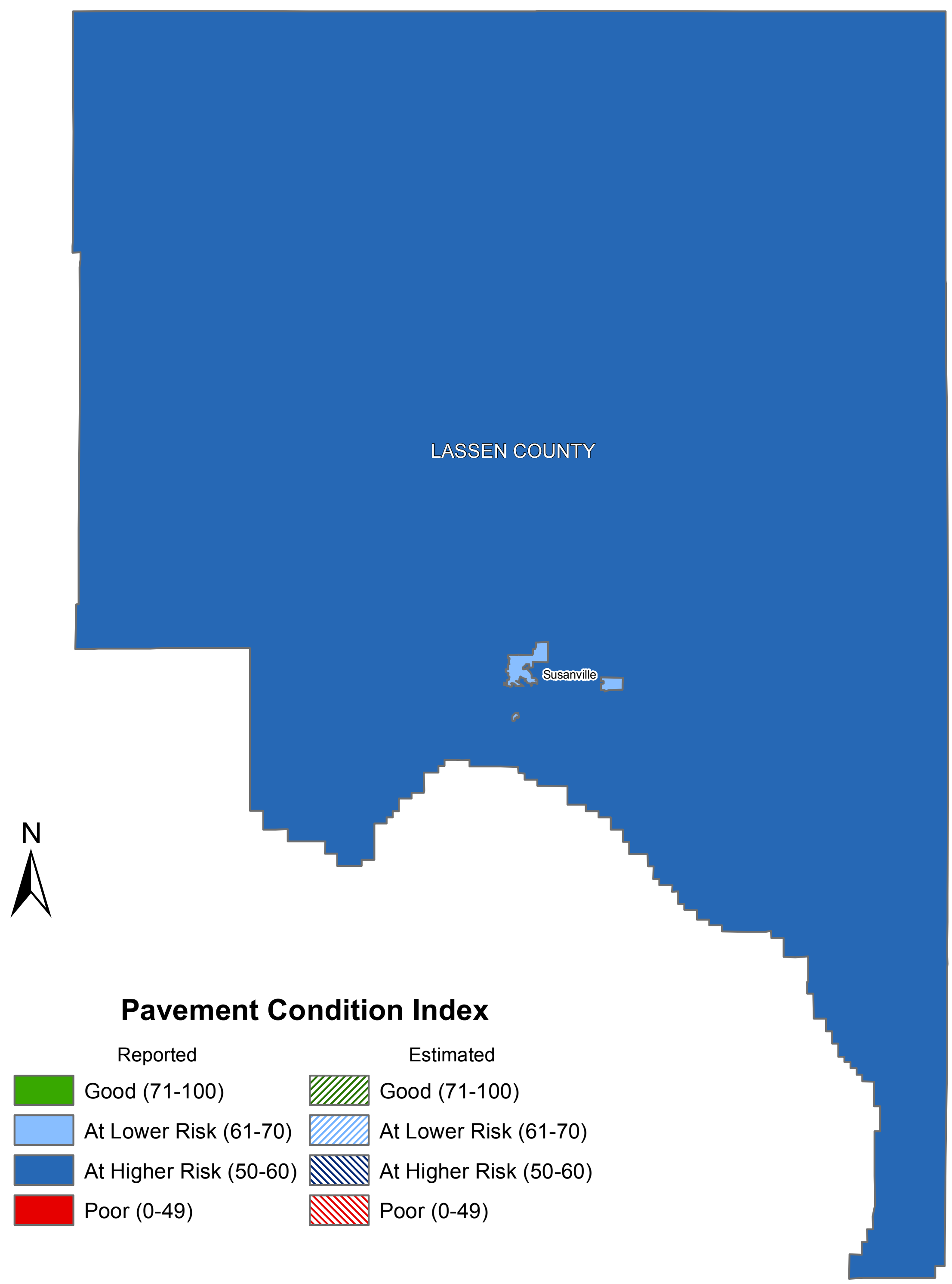
NCE

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.



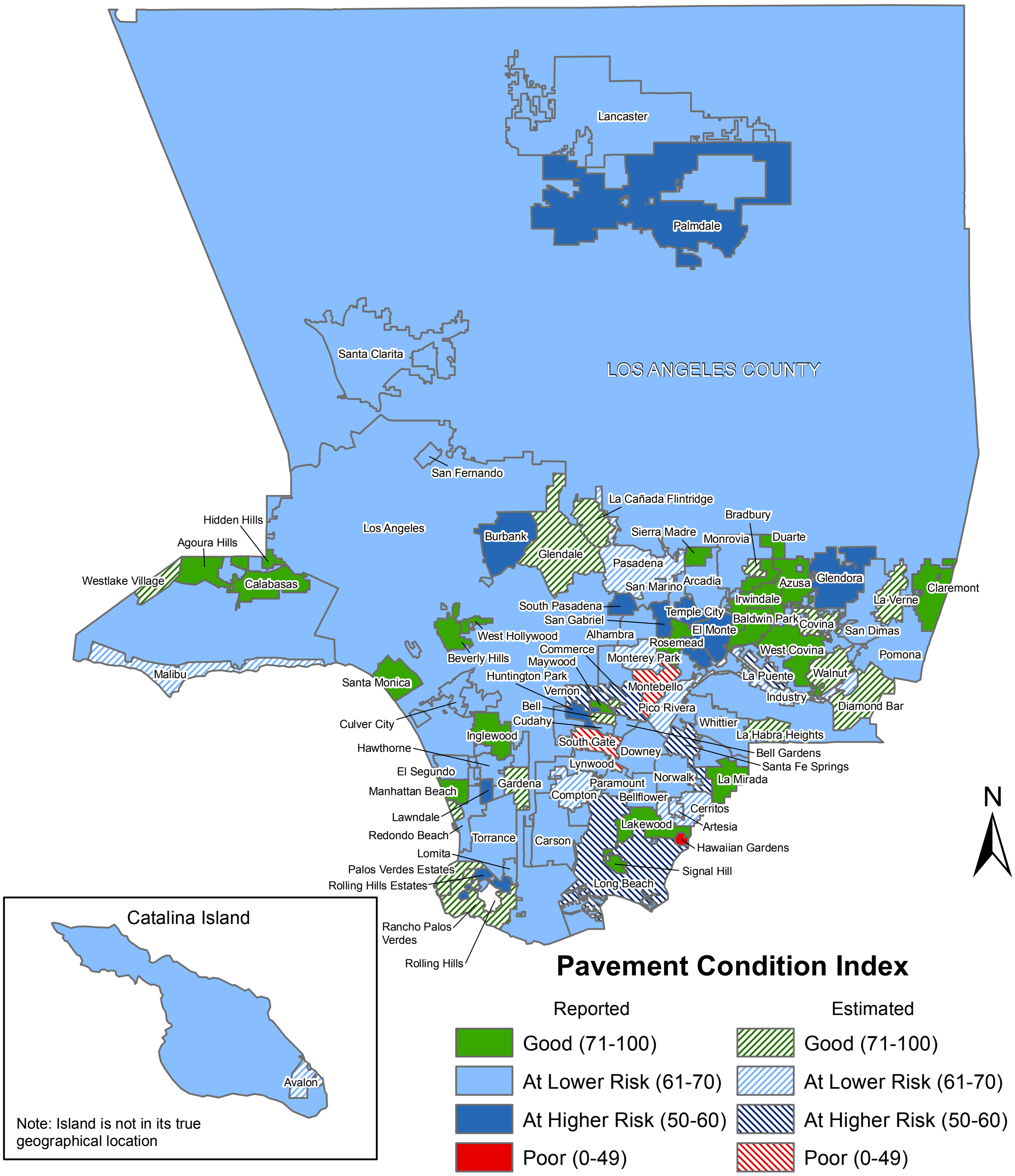
Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Lassen County

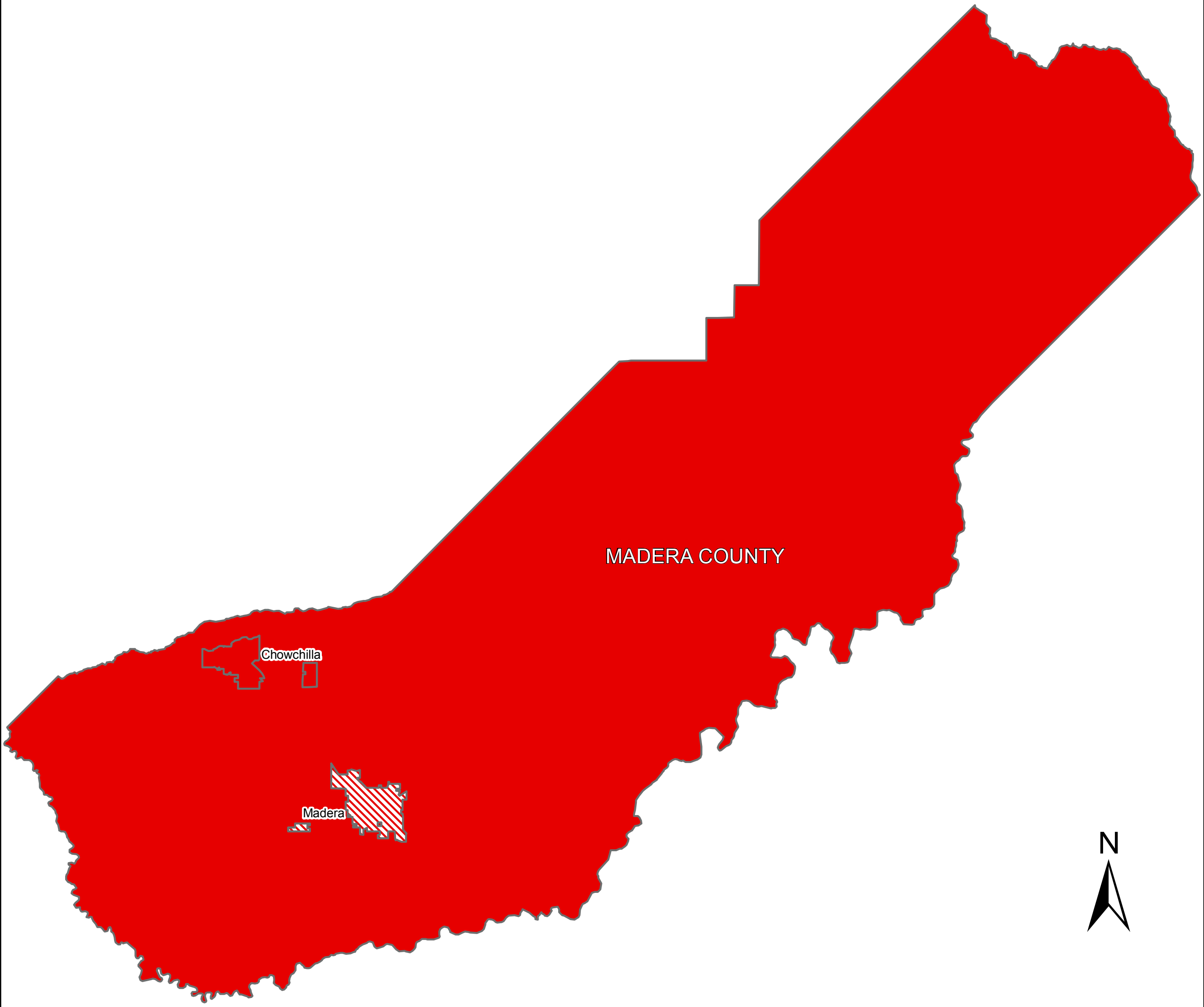


Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Los Angeles County



Madera County

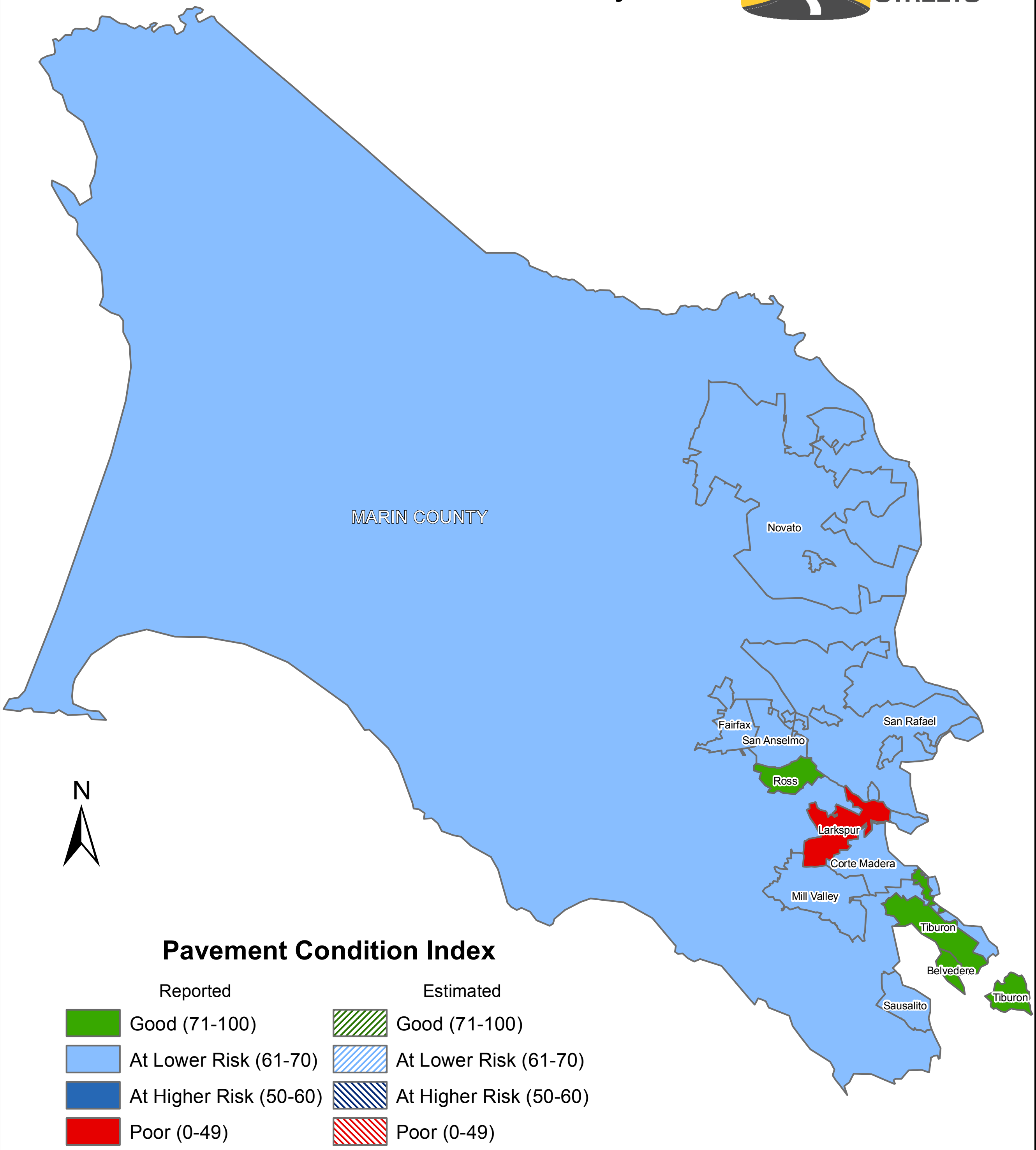


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

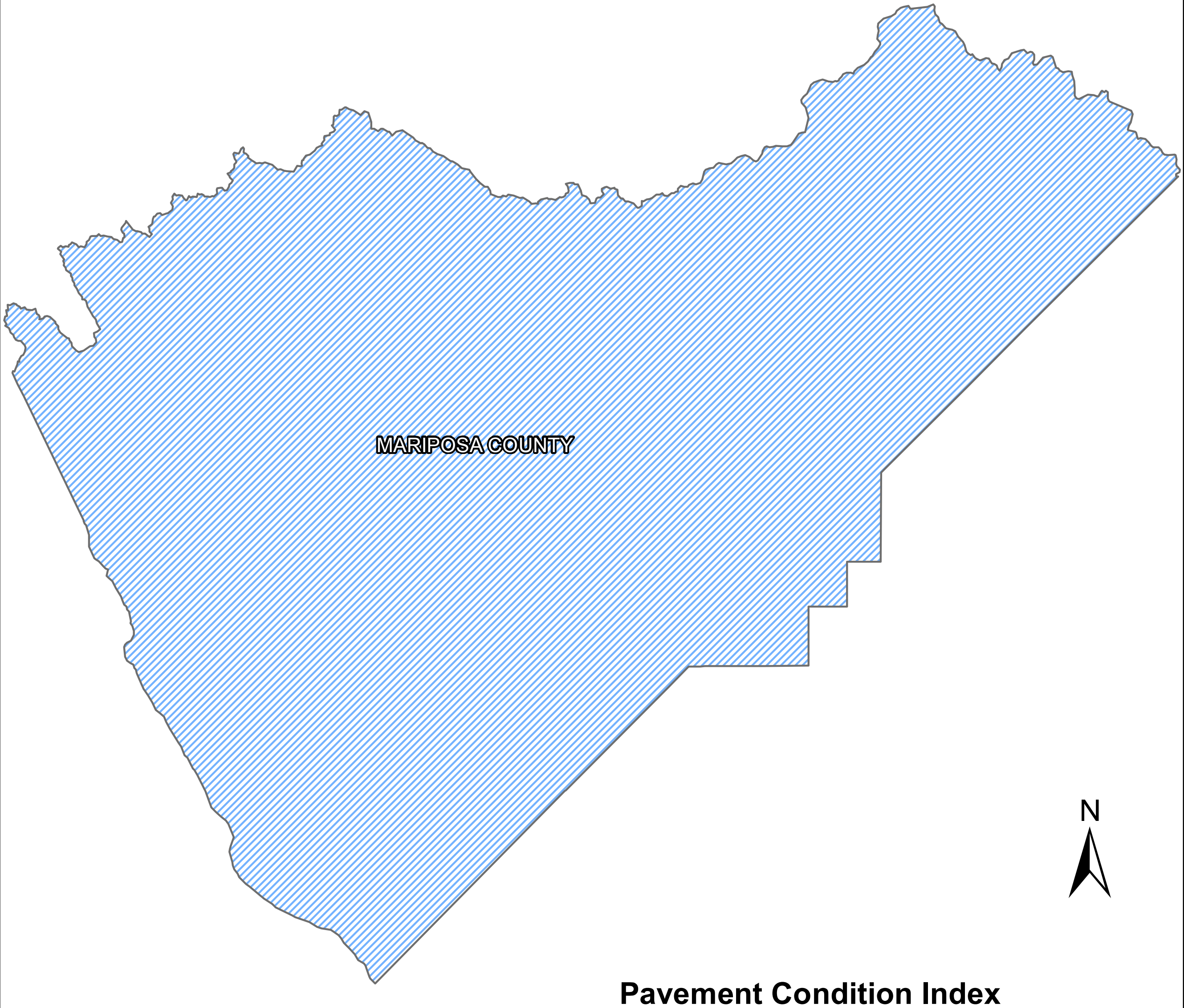
Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Marin County



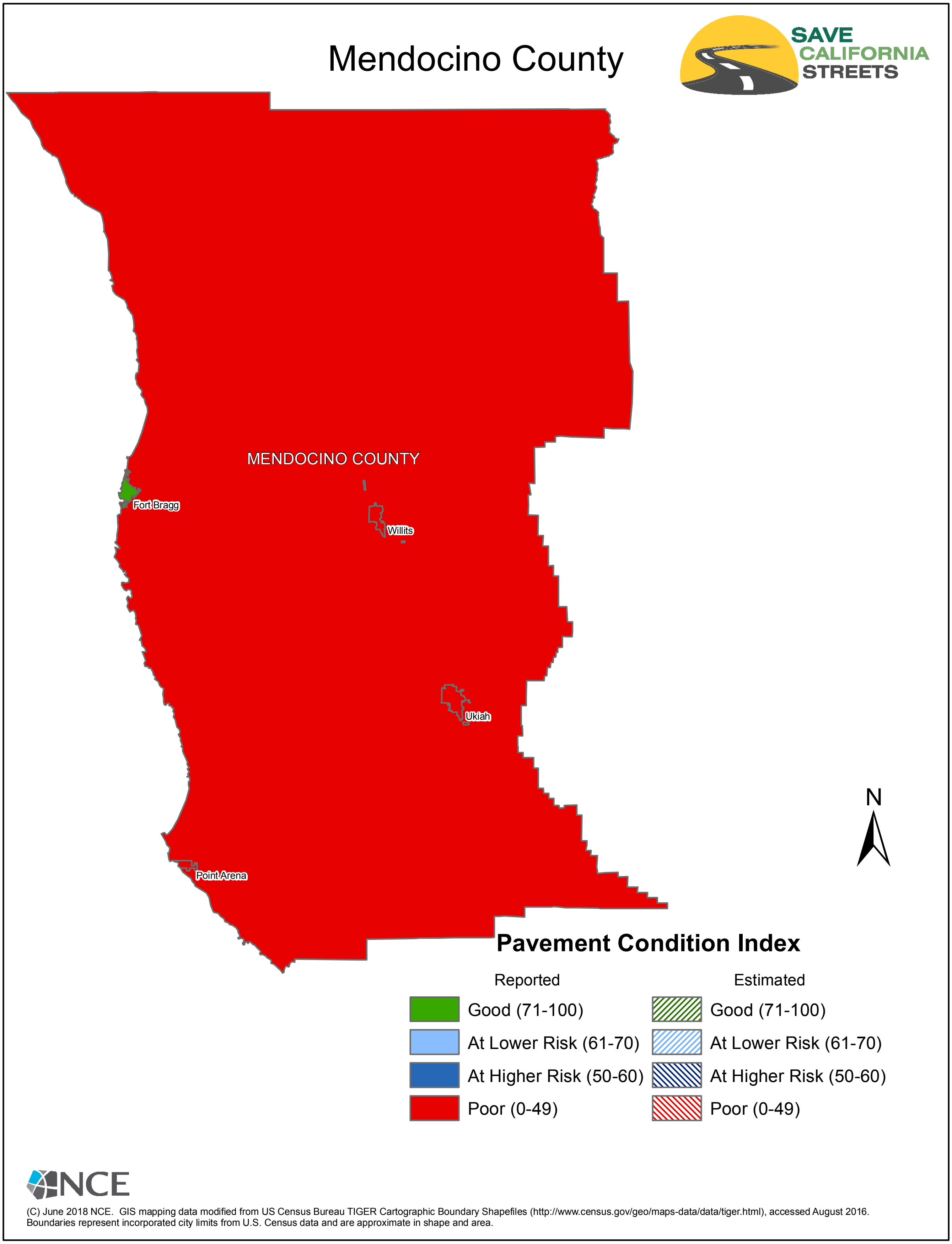
Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Mariposa County

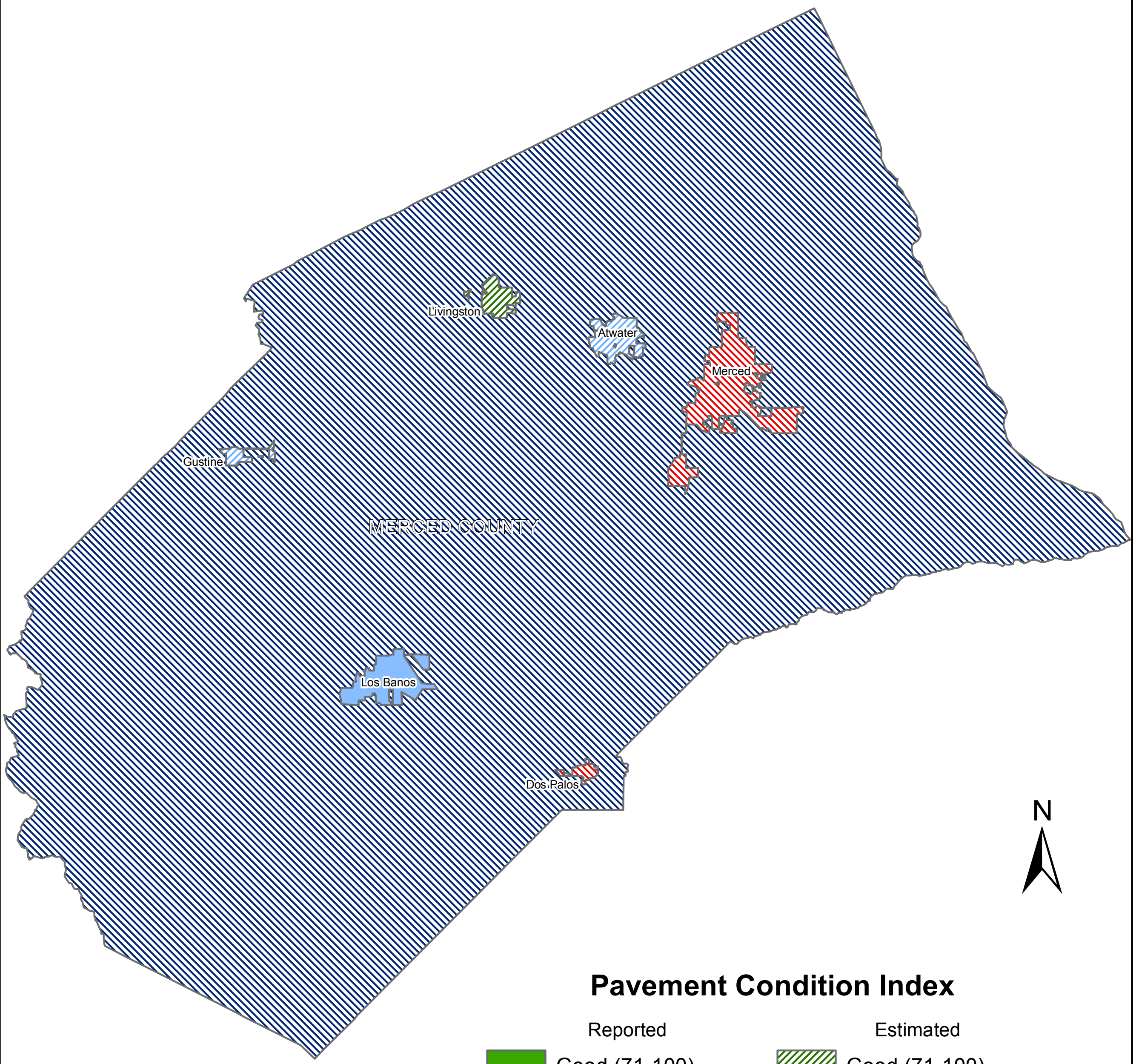


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)


Mendocino County
SAVE
CALIFORNIA
STREETS
MENDOCINO COUNTY
Fort Bragg
Willits
Ukiah
Point Arena
N
Pavement Condition Index
Reported
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
Estimated
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
NCE
(C) June 2018 NCE. GIS mapping data modified from US Census Bureau TIGER Cartographic Boundary Shapefiles (http://www.census.gov/geo/maps-data/data/tiger.html), accessed August 2016.
Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

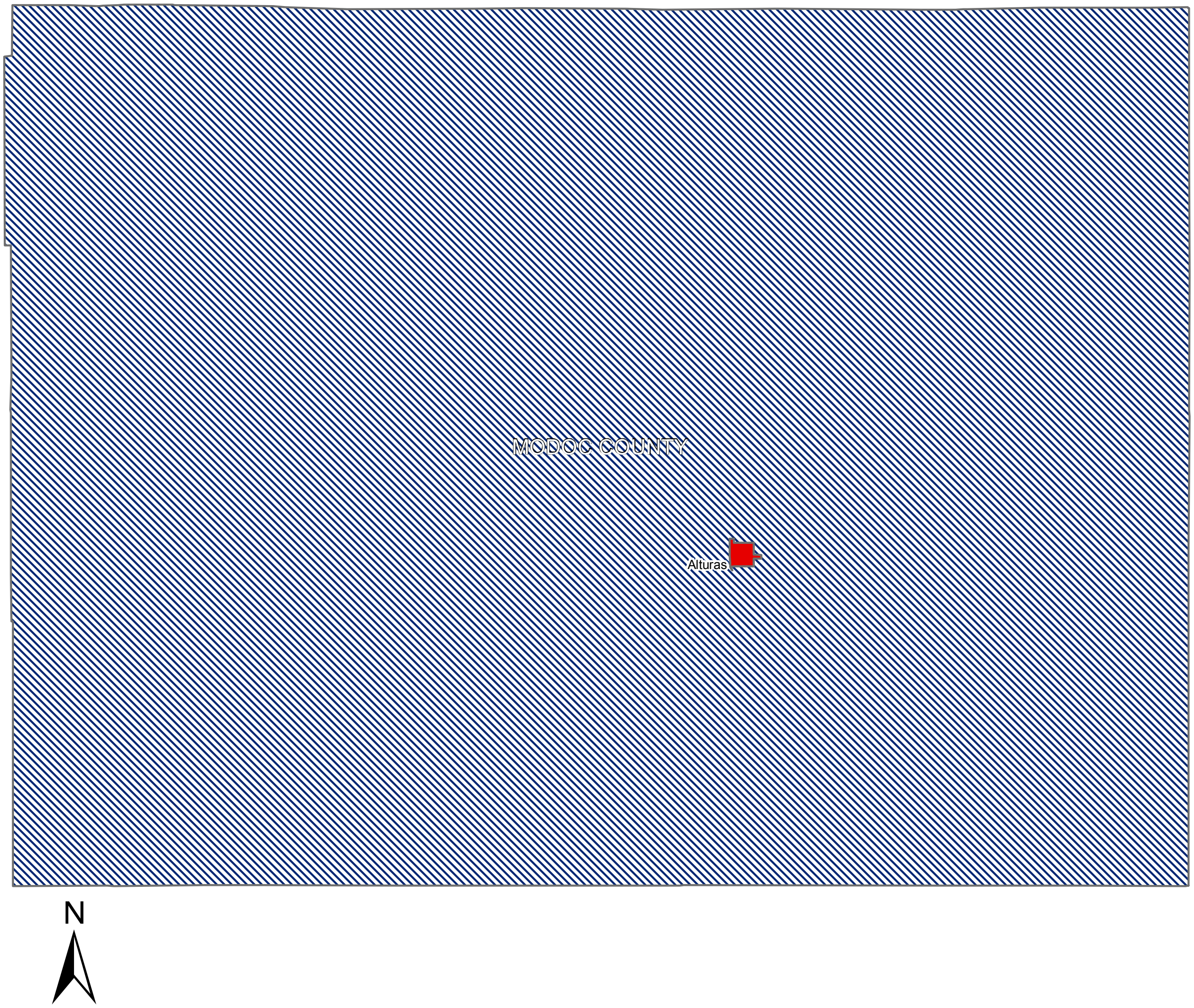
Merced County



Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

Modoc County

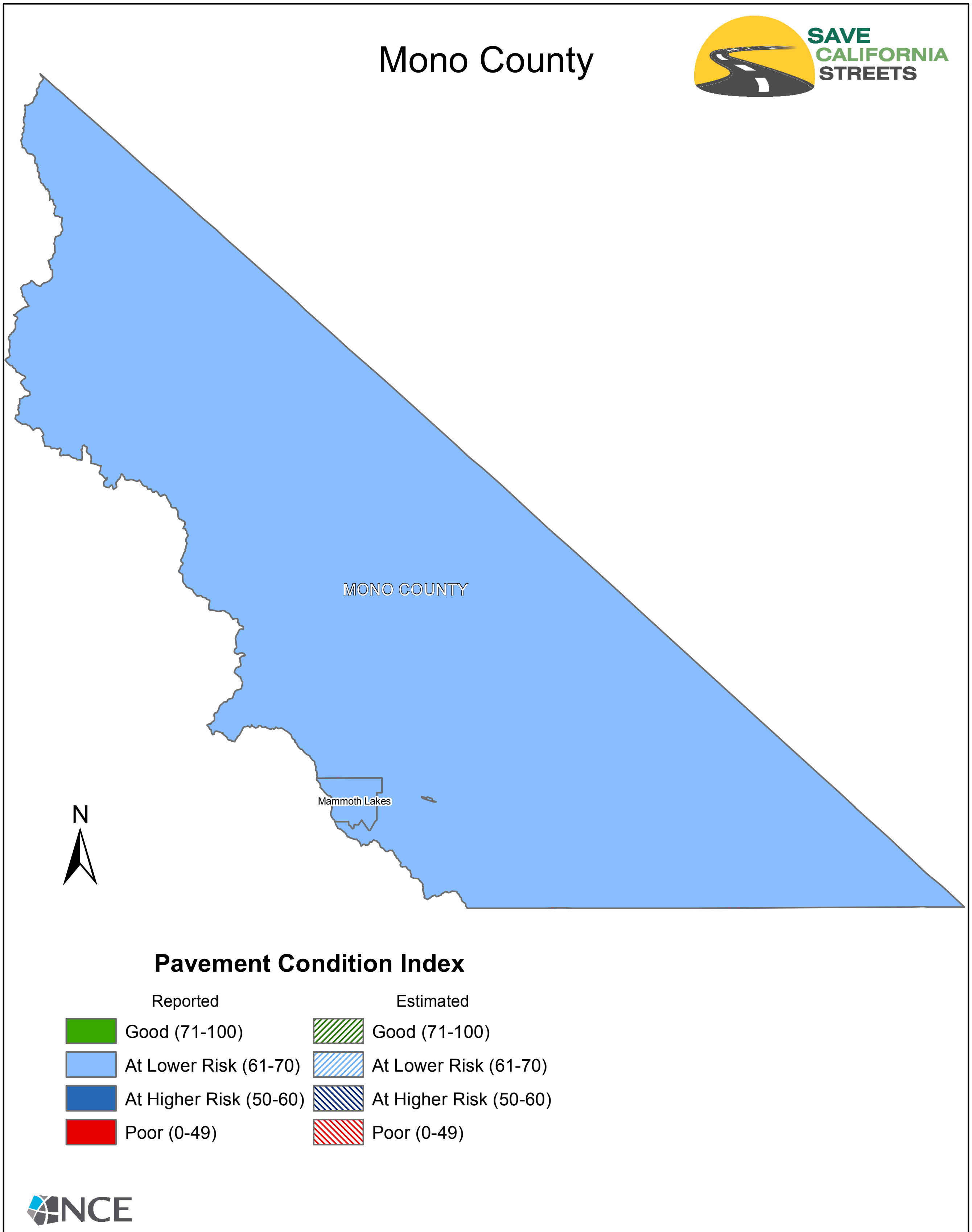


Pavement Condition Index

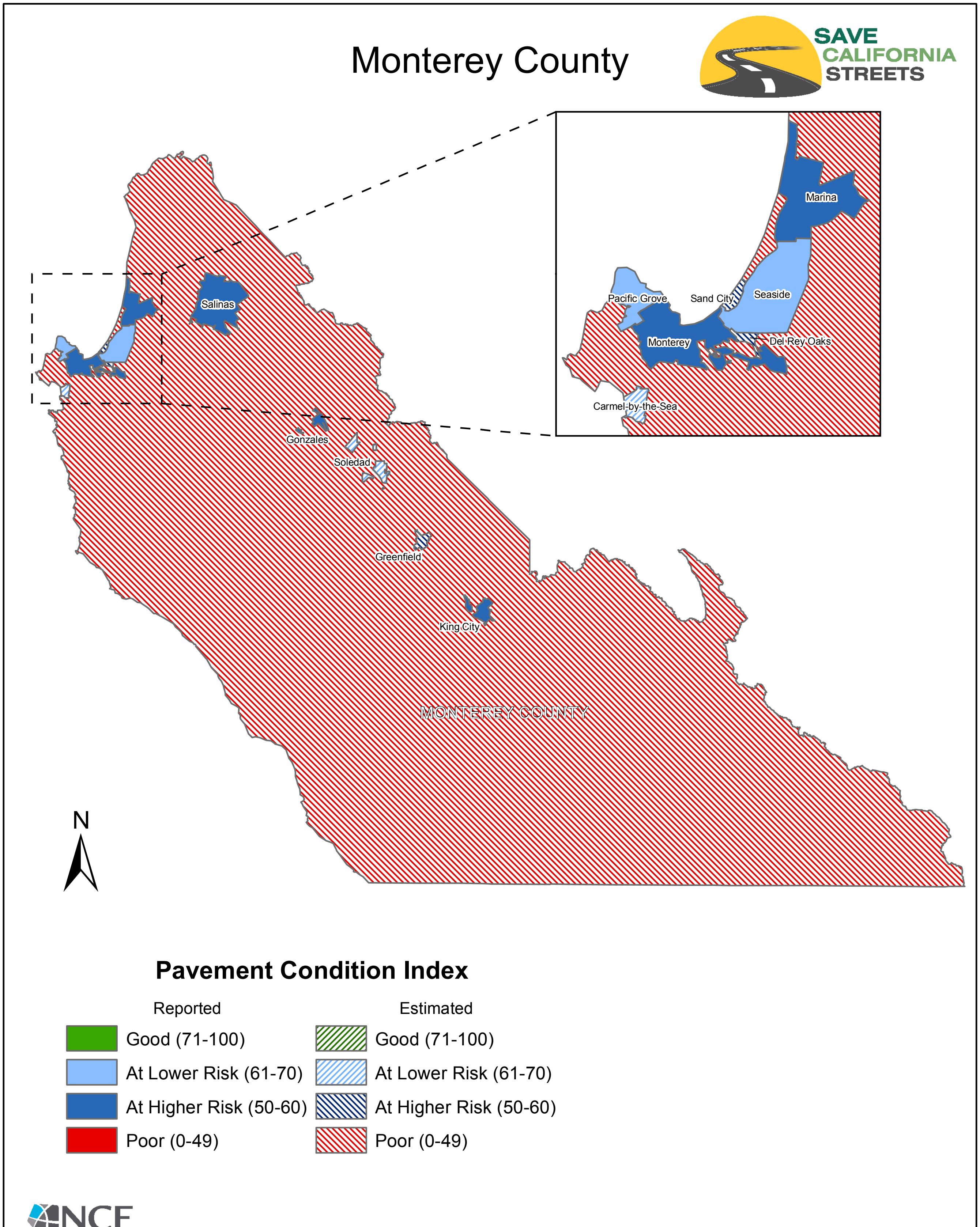
Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

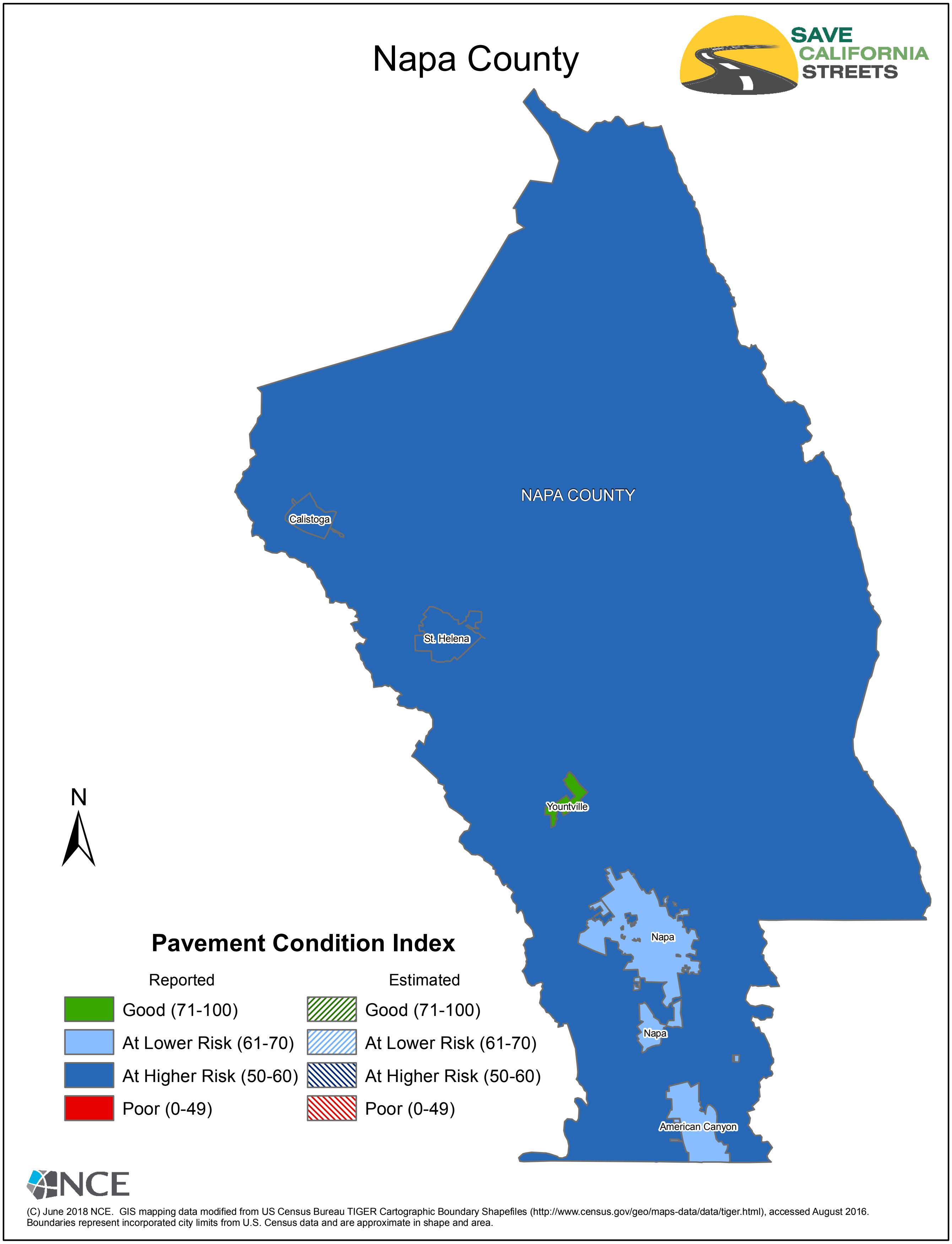
NCE

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

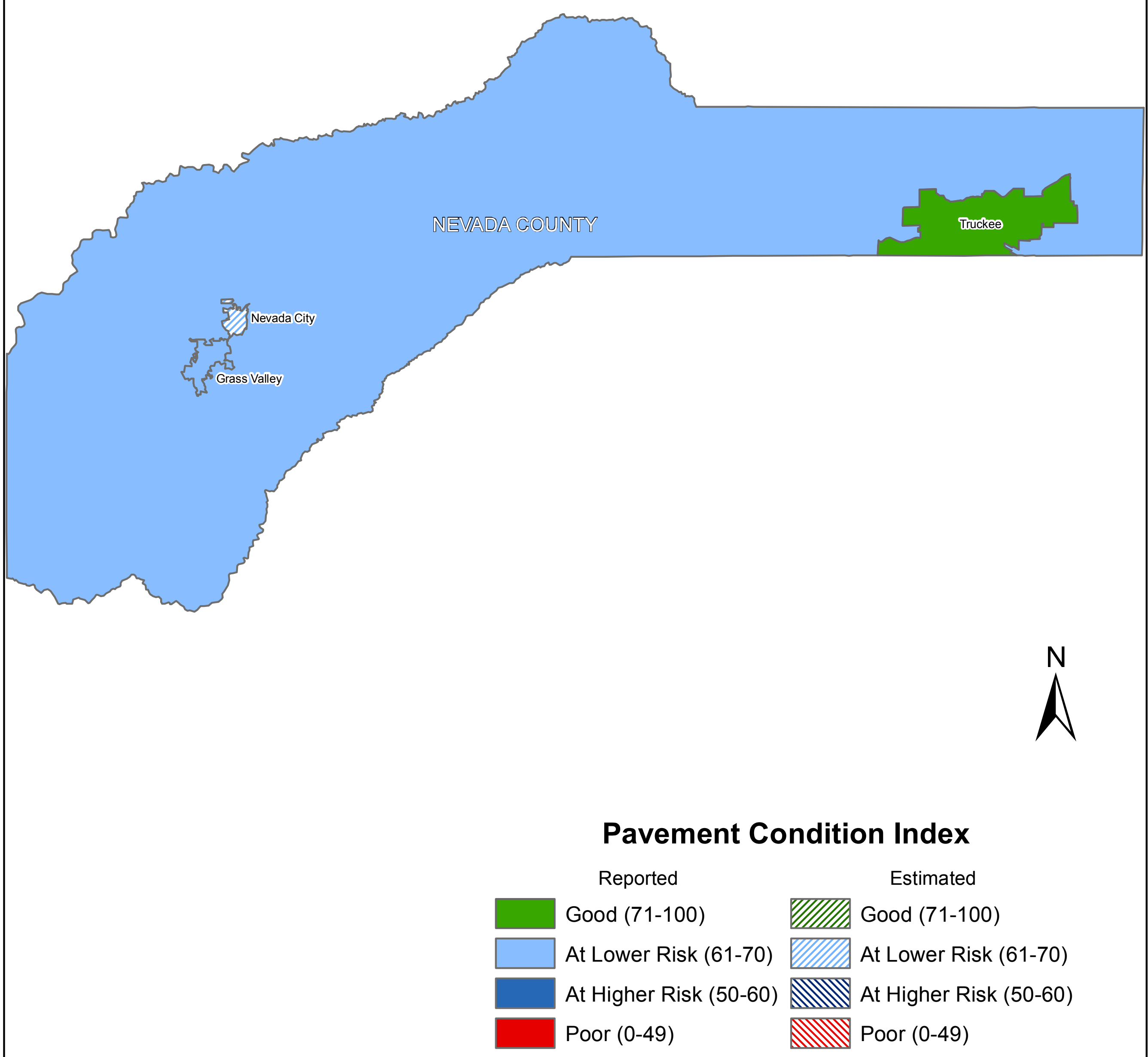


Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.


Monterey County
SAVE CALIFORNIA STREETS
Marina
Pacific Grove
Sand City
Seaside
Monterey
Del Rey Oaks
Carmel-by-the-Sea
Salinas
Gonzales
Soledad
Greenfield
King City
MONTEREY COUNTY
N
Pavement Condition Index
Reported
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
Estimated
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
NCE

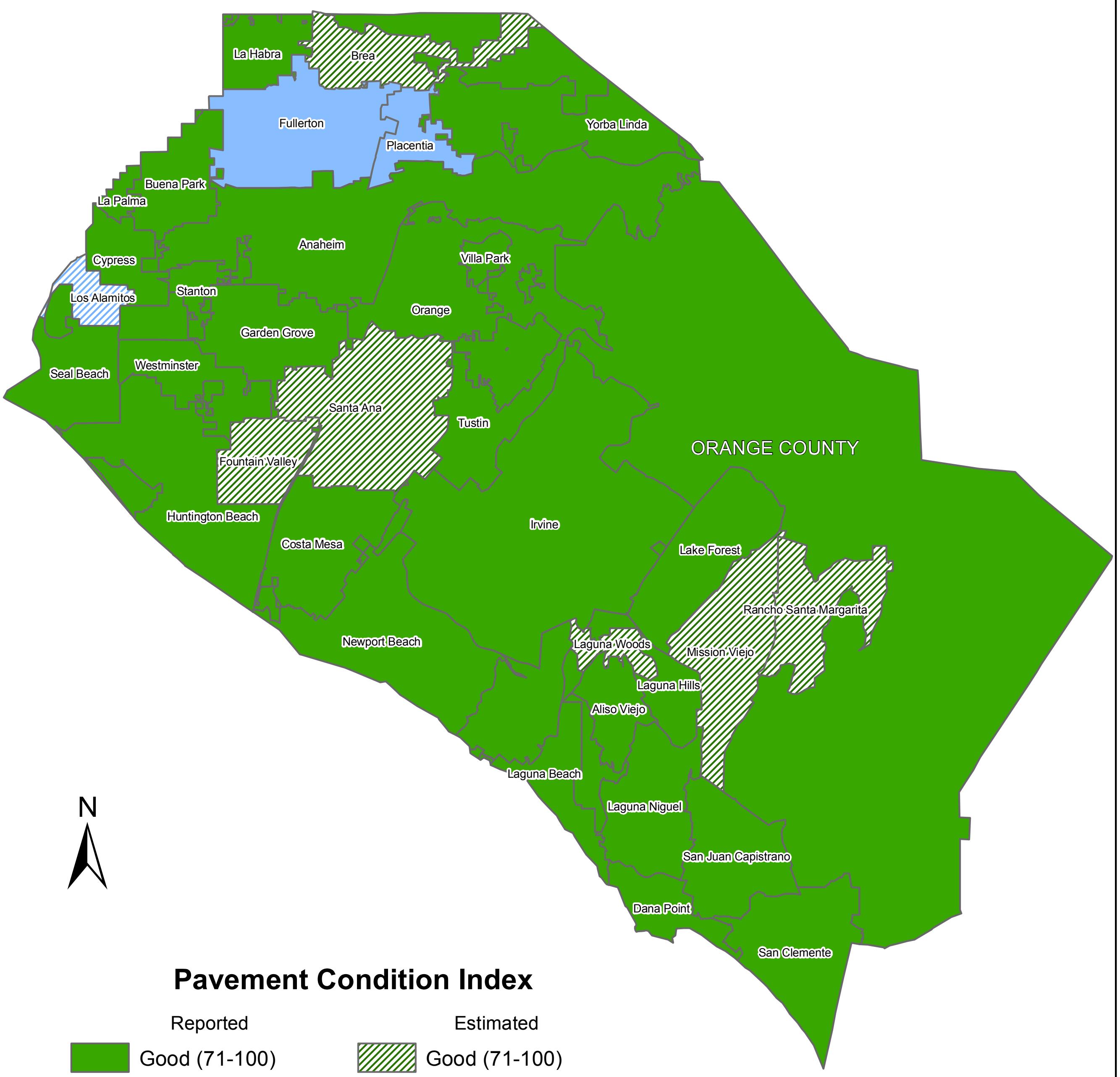

Napa County
SAVE CALIFORNIA STREETS
NAPA COUNTY
Calistoga
St. Helena
Yountville
Napa
Napa
American Canyon
N
Pavement Condition Index
Reported
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
Estimated
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
NCE
(C) June 2018 NCE. GIS mapping data modified from US Census Bureau TIGER Cartographic Boundary Shapefiles (http://www.census.gov/geo/maps-data/data/tiger.html), accessed August 2016.
Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Nevada County



Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Orange County



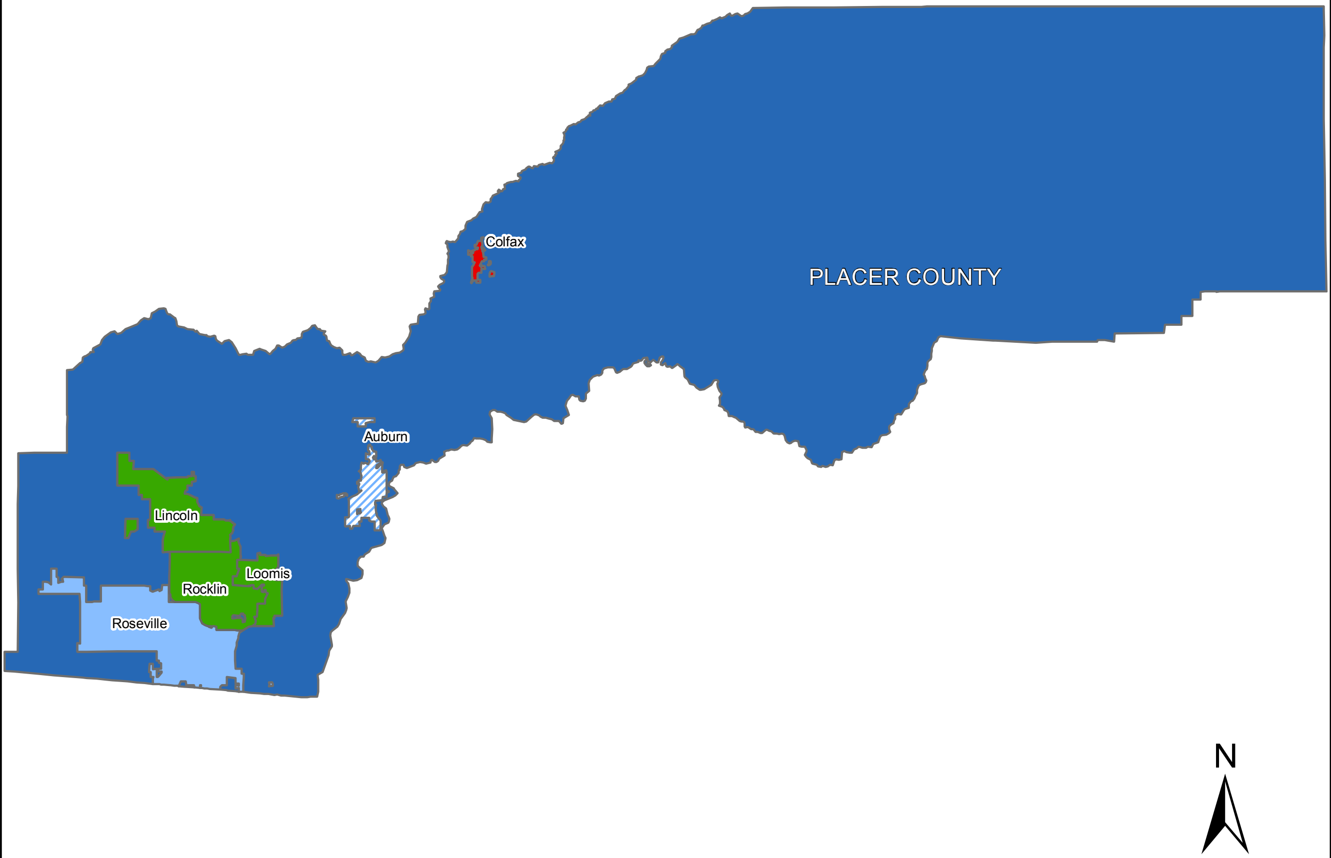
Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

NCE

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

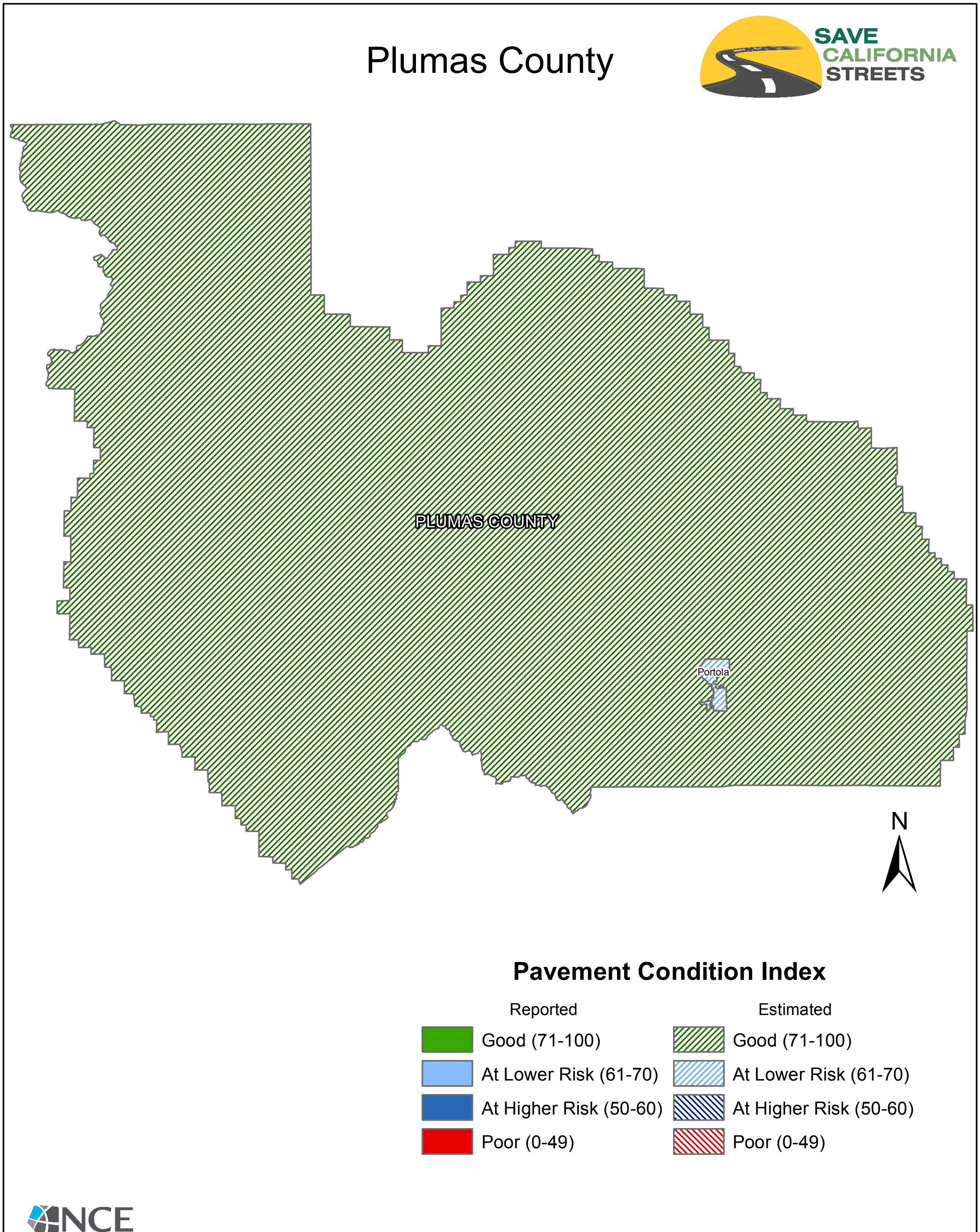
Placer County



Pavement Condition Index

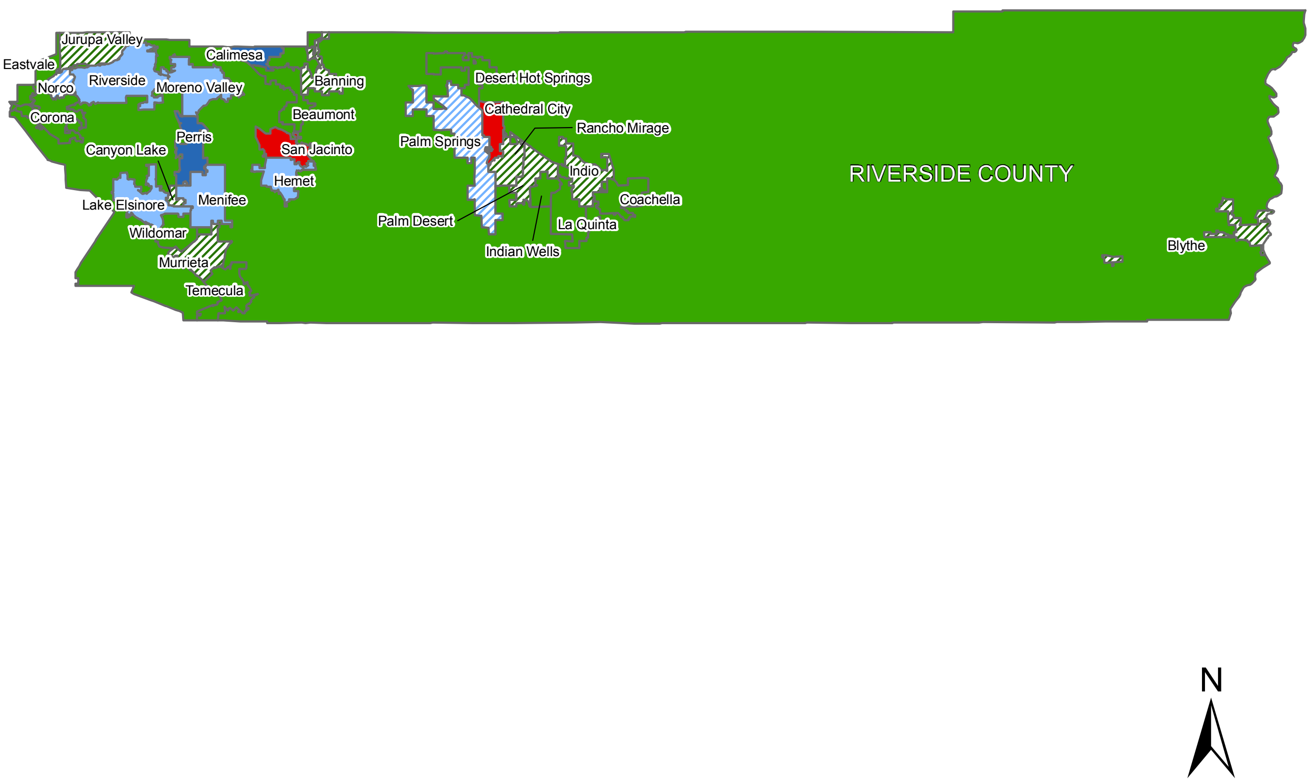
Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.



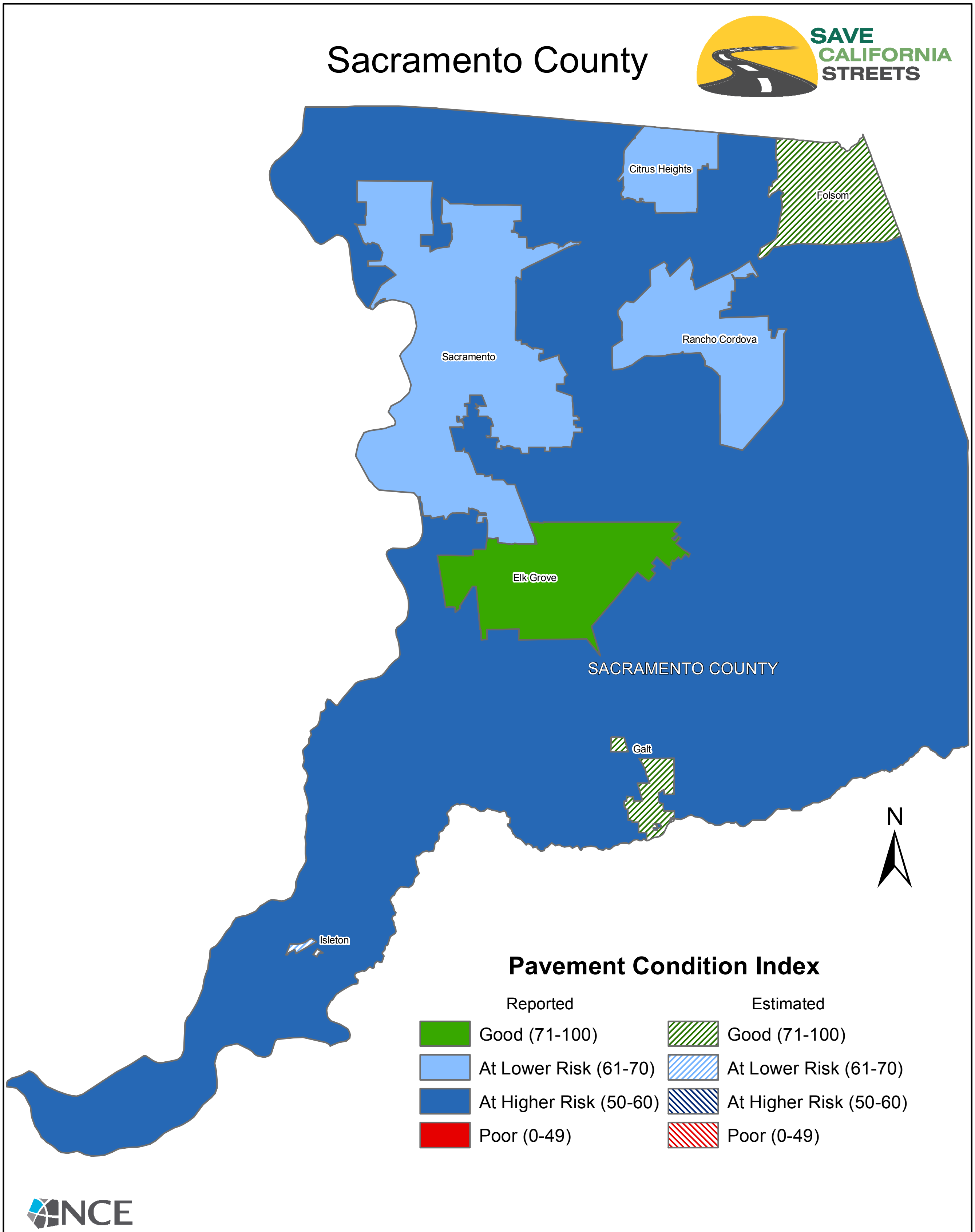
(C) June 2018 NCE. GIS mapping data modified from US Census Bureau TIGER Cartographic Boundary Shapefiles (http://www.census.gov/geo/maps-data/data/tiger.html), accessed August 2016. Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Riverside County

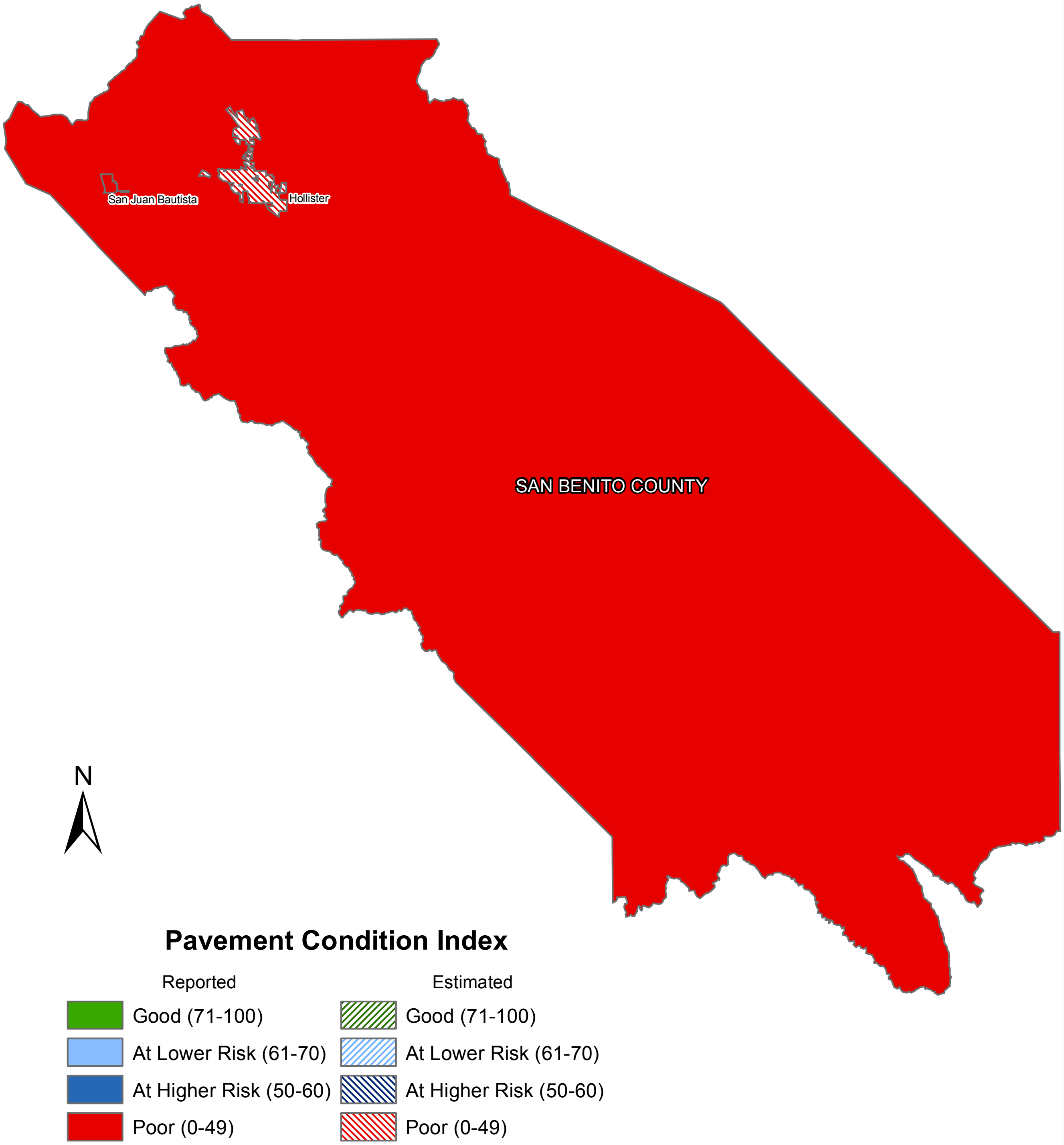


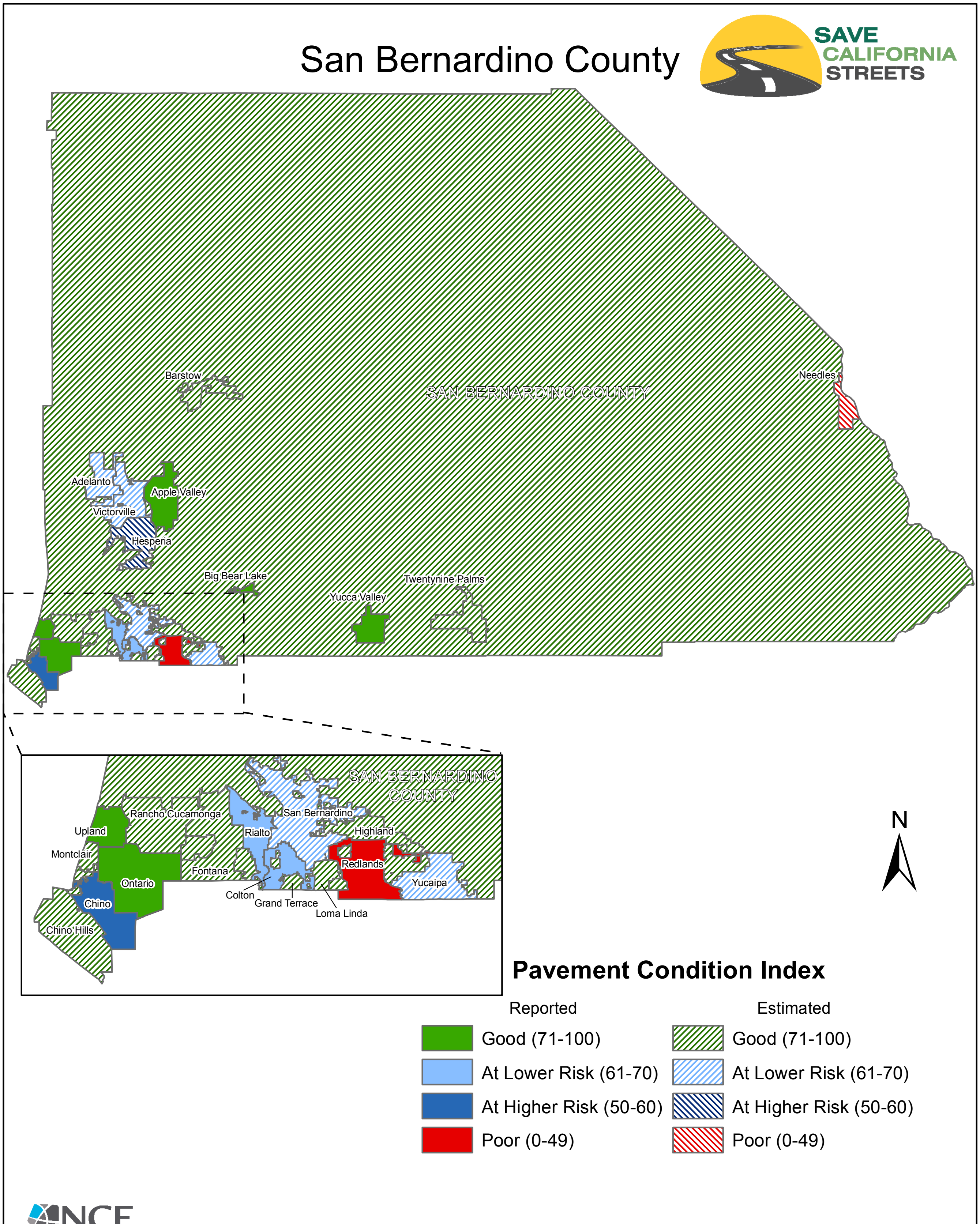
Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)


Sacramento County
SAVE CALIFORNIA STREETS
Citrus Heights
Folsom
Sacramento
Rancho Cordova
Elk Grove
SACRAMENTO COUNTY
Galt
Isleton
N
Pavement Condition Index
Reported
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
Estimated
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
NCE

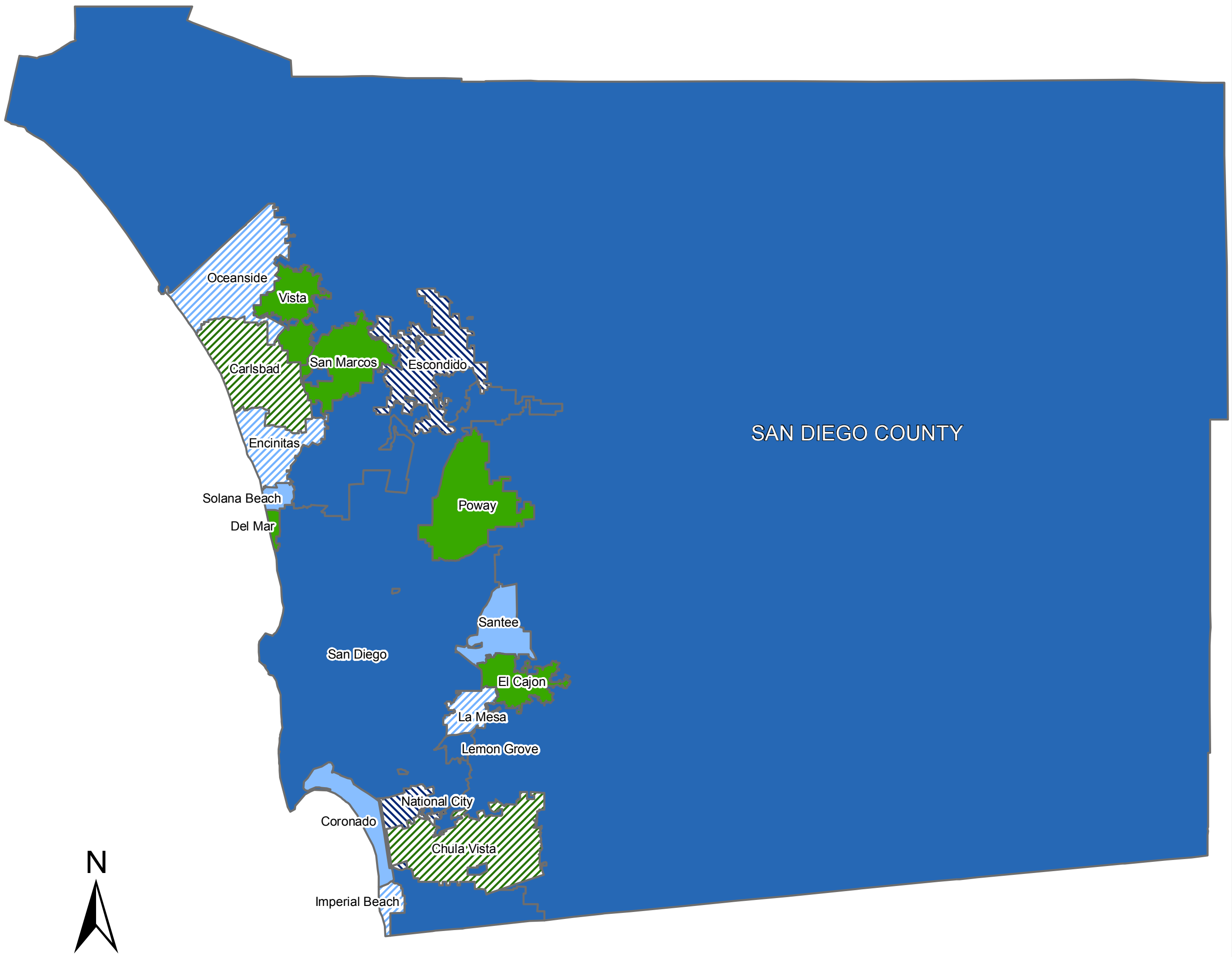
San Benito County





(C) June 2018 NCE. GIS mapping data modified from US Census Bureau TIGER Cartographic Boundary Shapefiles (http://www.census.gov/geo/maps-data/data/tiger.html), accessed August 2016. Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

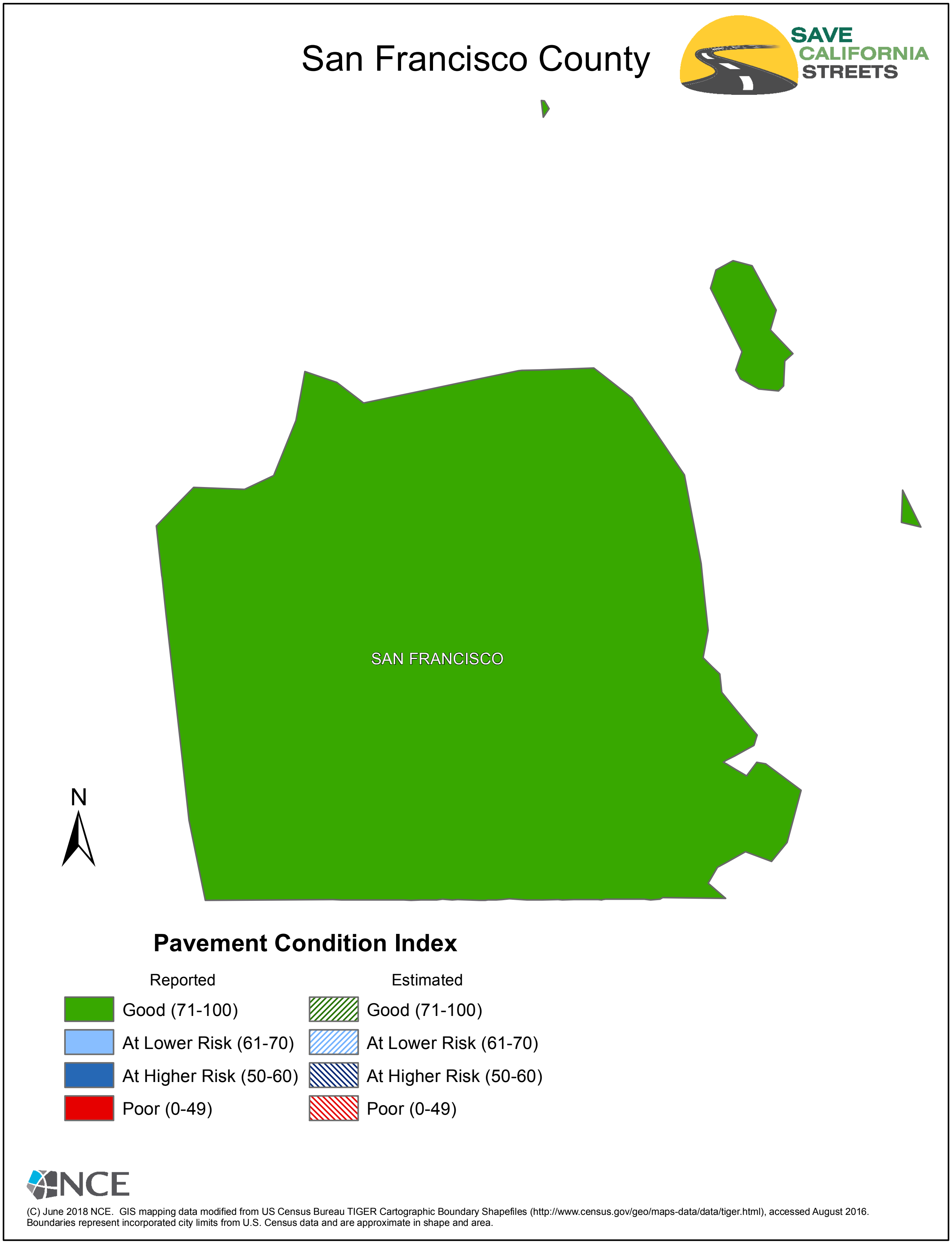
San Diego County



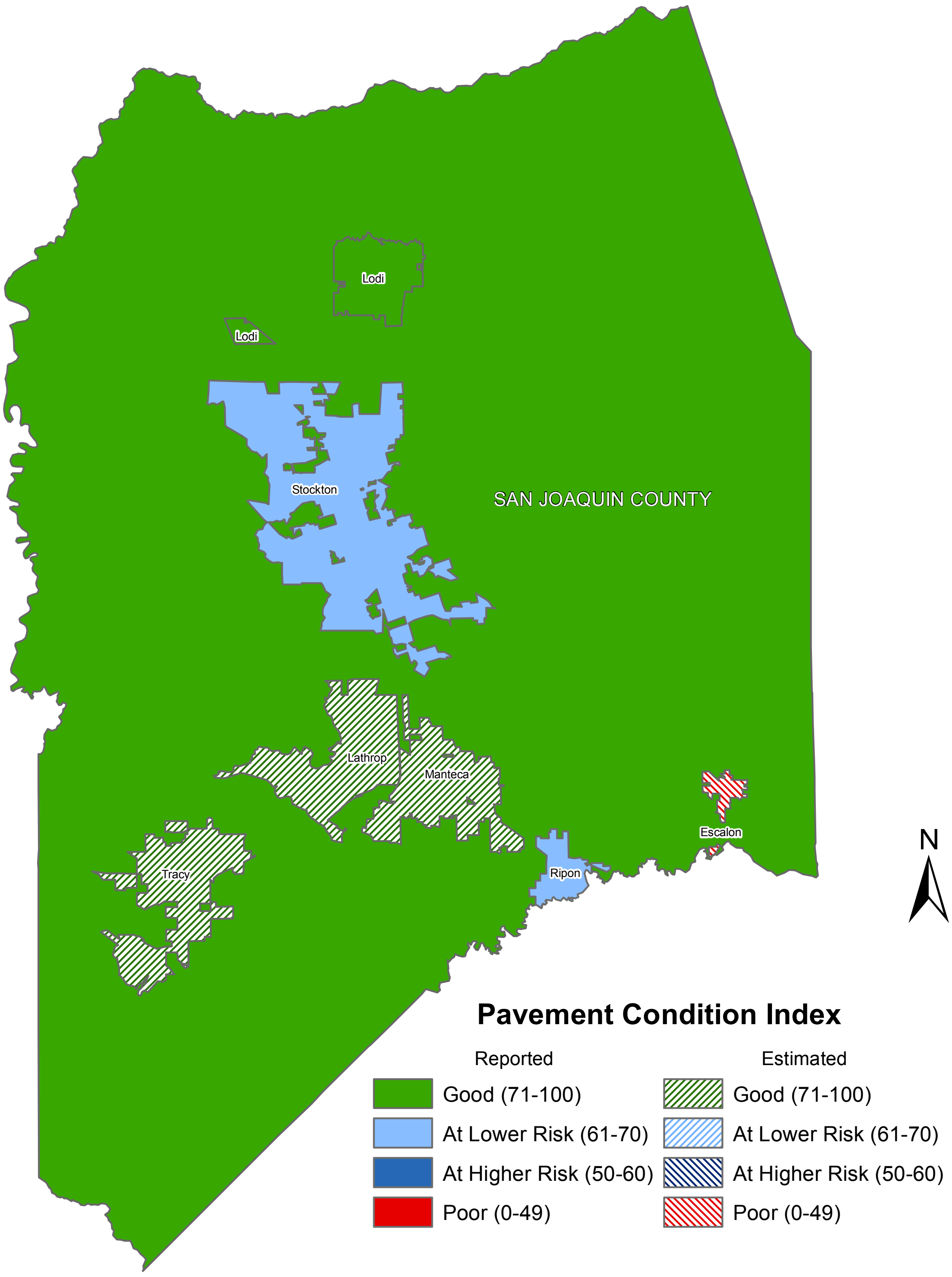
Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

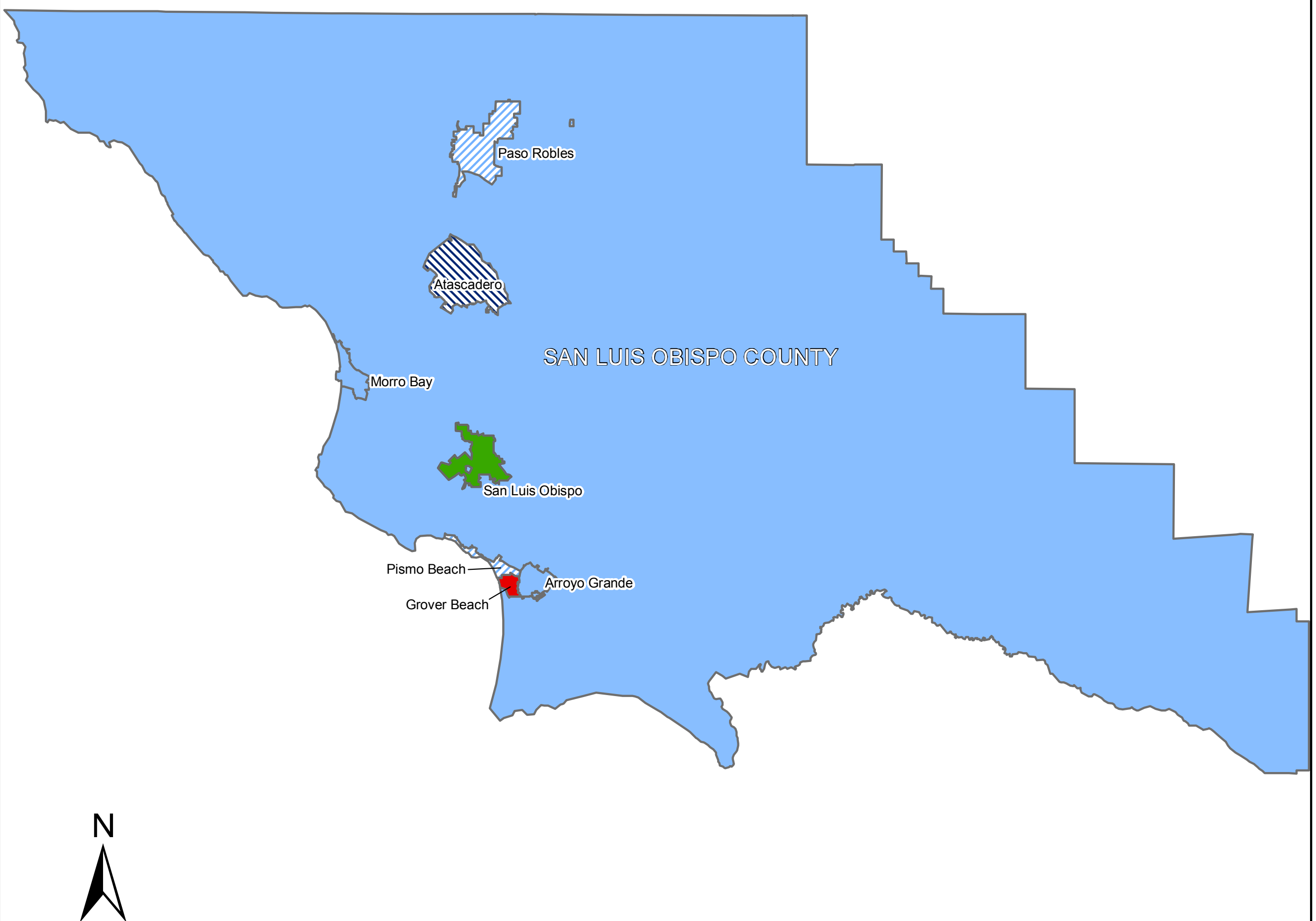

San Francisco County
SAVE CALIFORNIA STREETS
SAN FRANCISCO
N
Pavement Condition Index
Reported
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
Estimated
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
NCE
(C) June 2018 NCE. GIS mapping data modified from US Census Bureau TIGER Cartographic Boundary Shapefiles (http://www.census.gov/geo/maps-data/data/tiger.html), accessed August 2016.
Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

San Joaquin County



Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

San Luis Obispo County

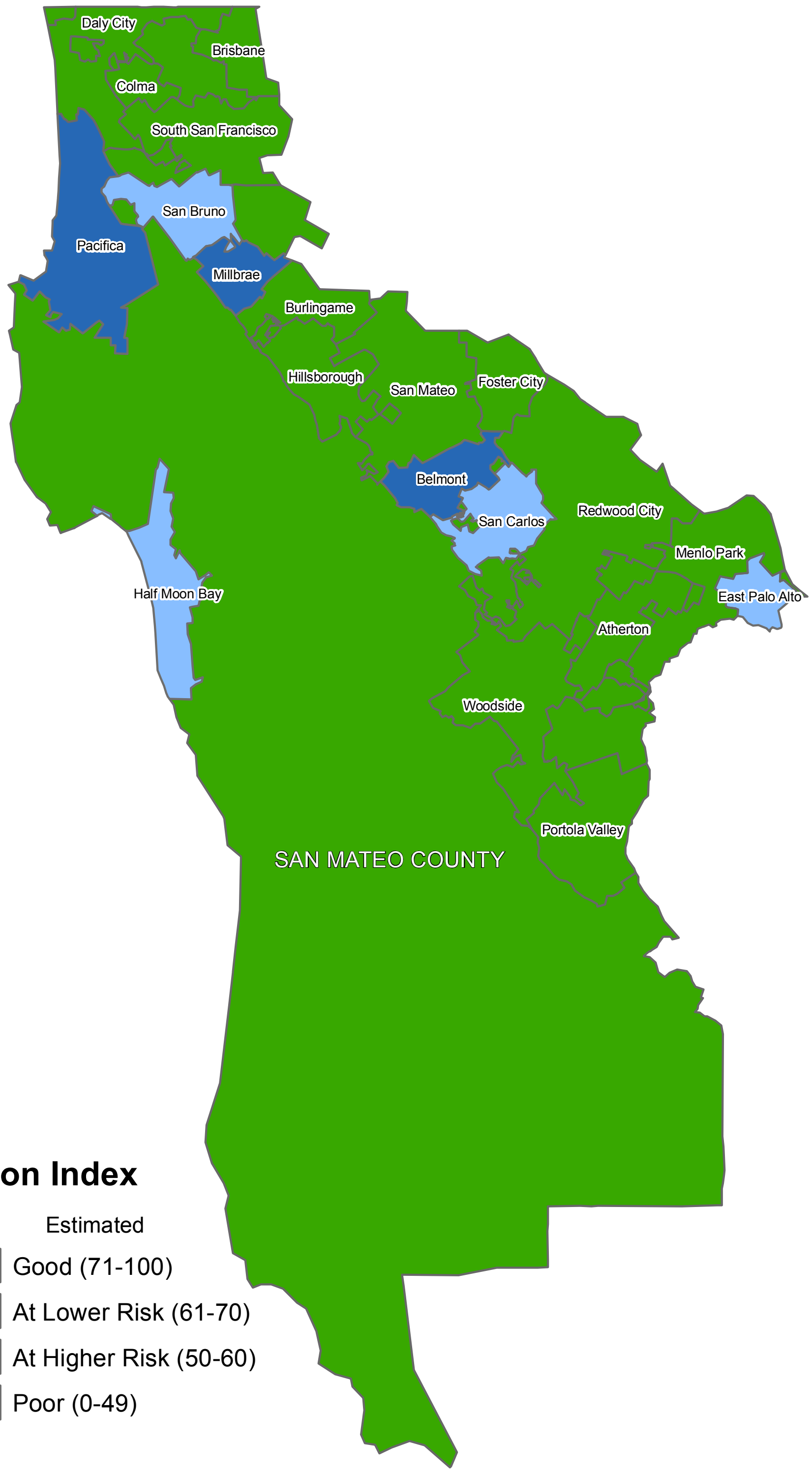


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

San Mateo County

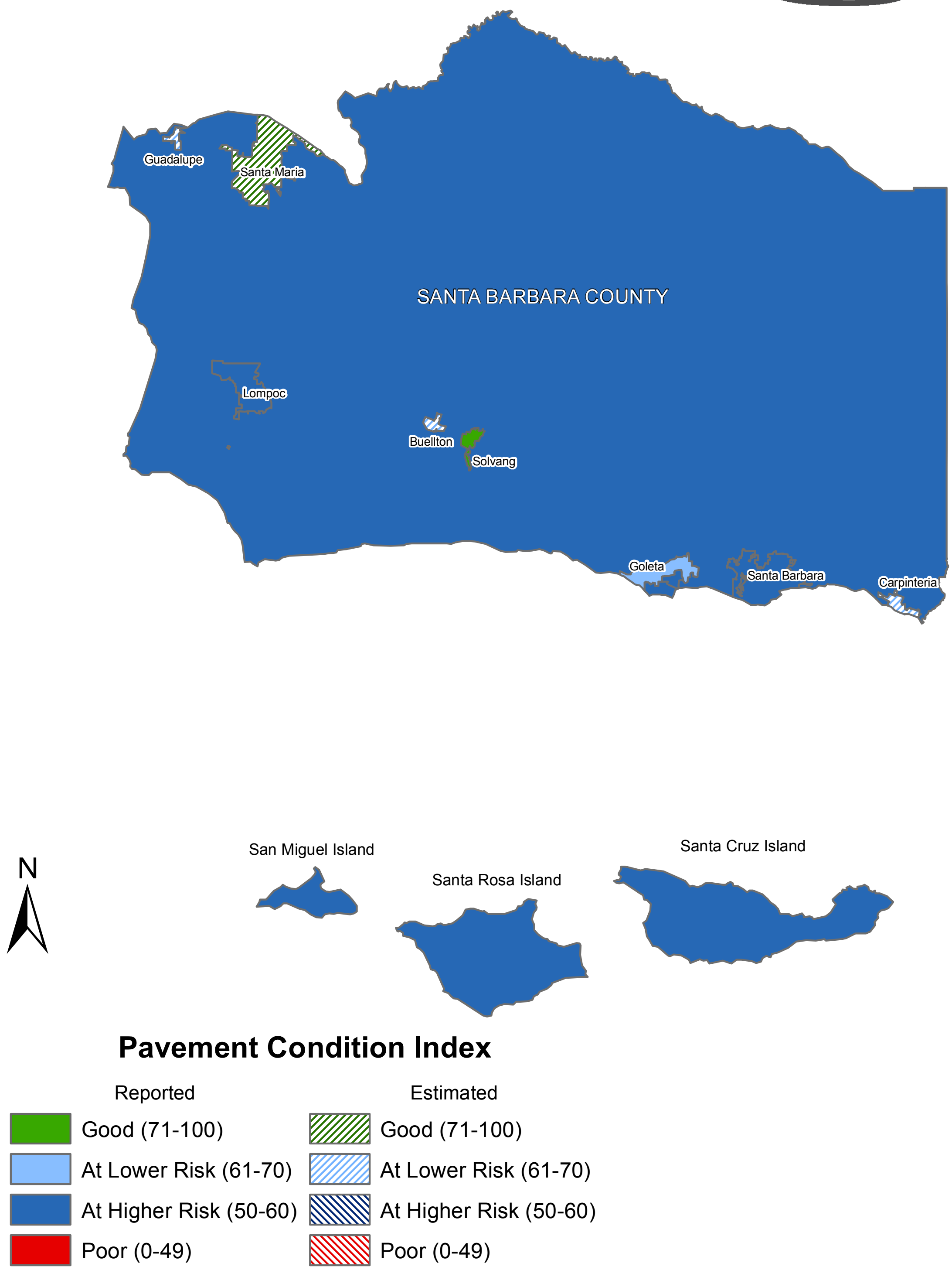


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

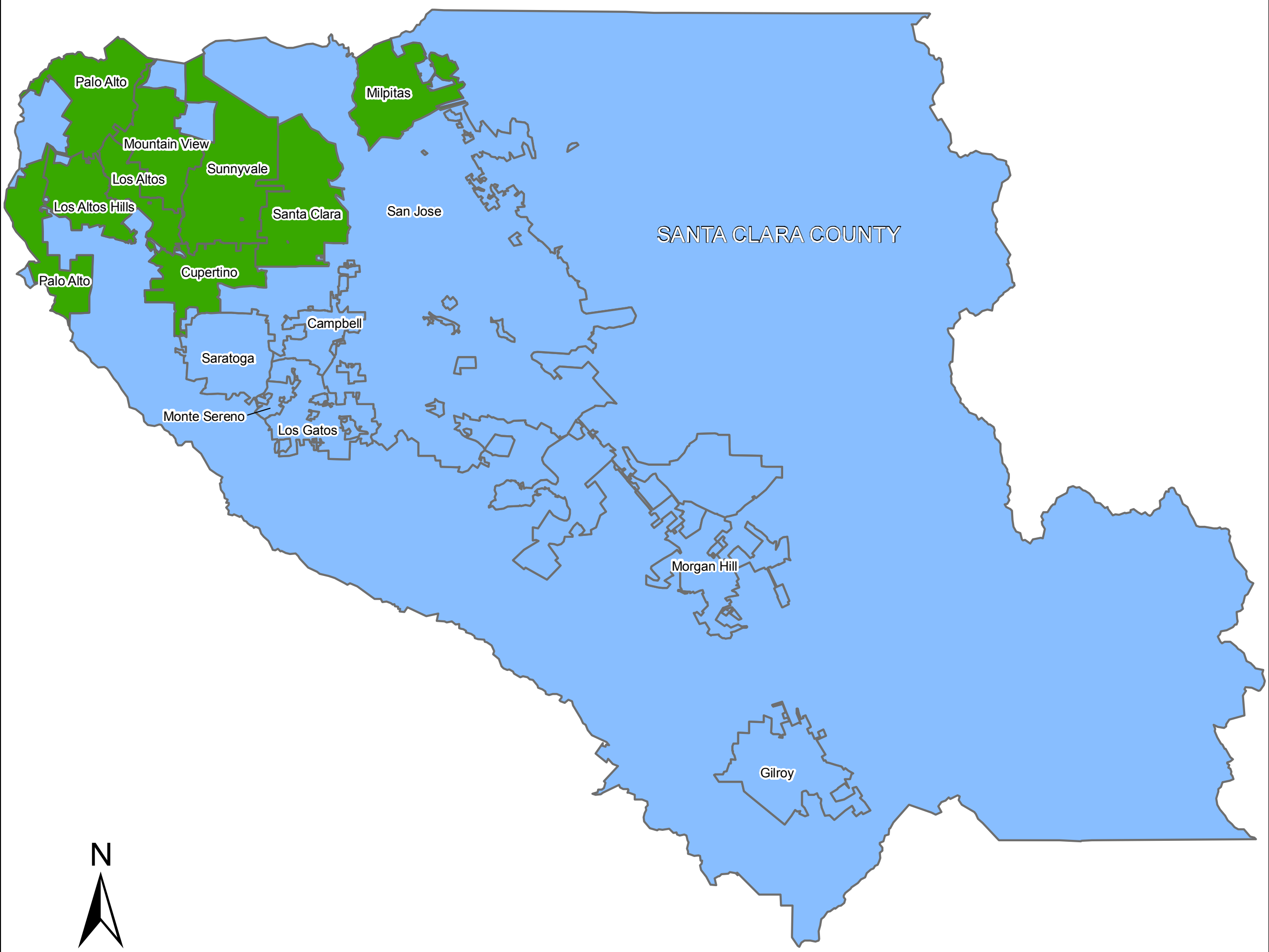
Santa Barbara County



Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Santa Clara County

SAVE CALIFORNIA STREETS



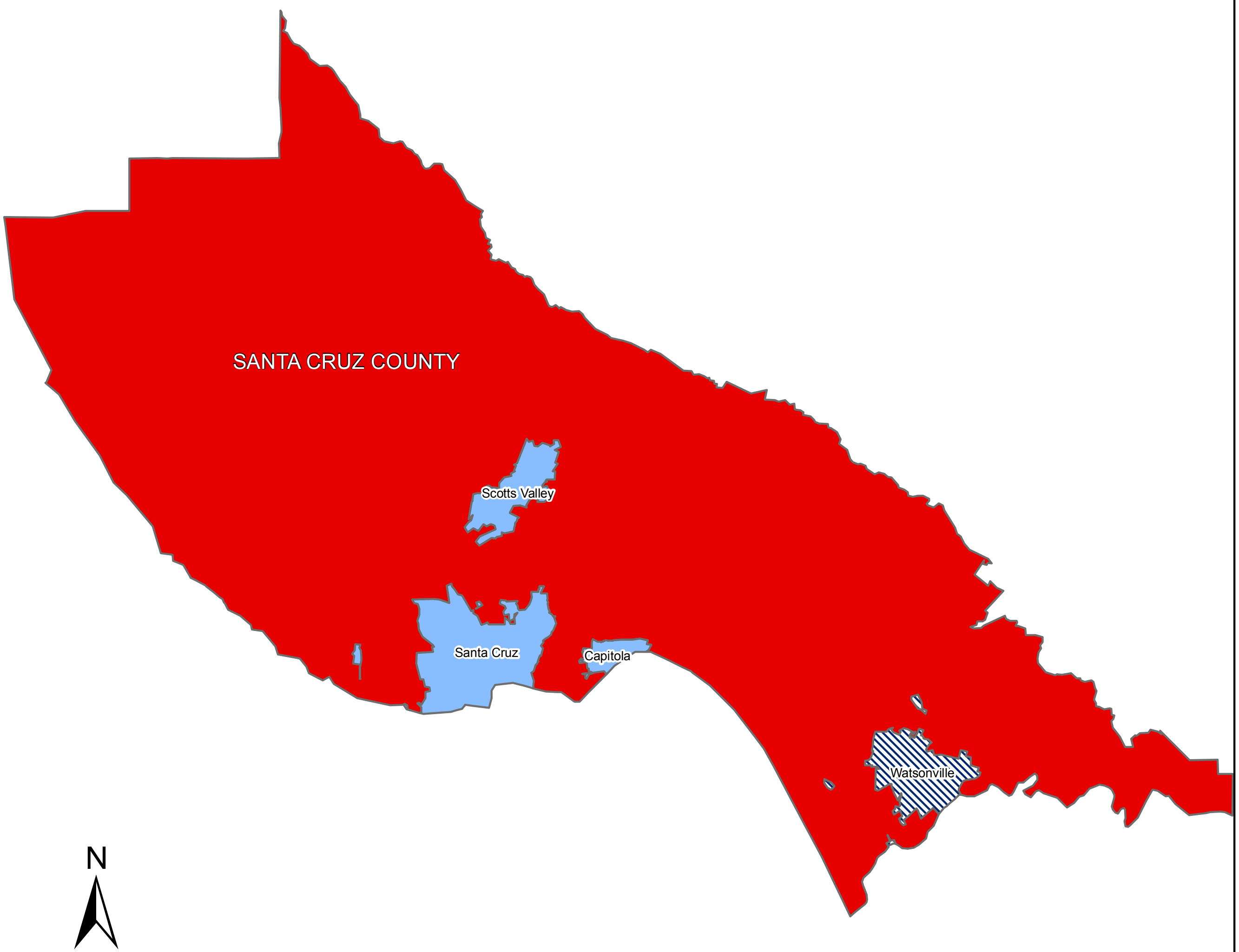
Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

NCE

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Santa Cruz County

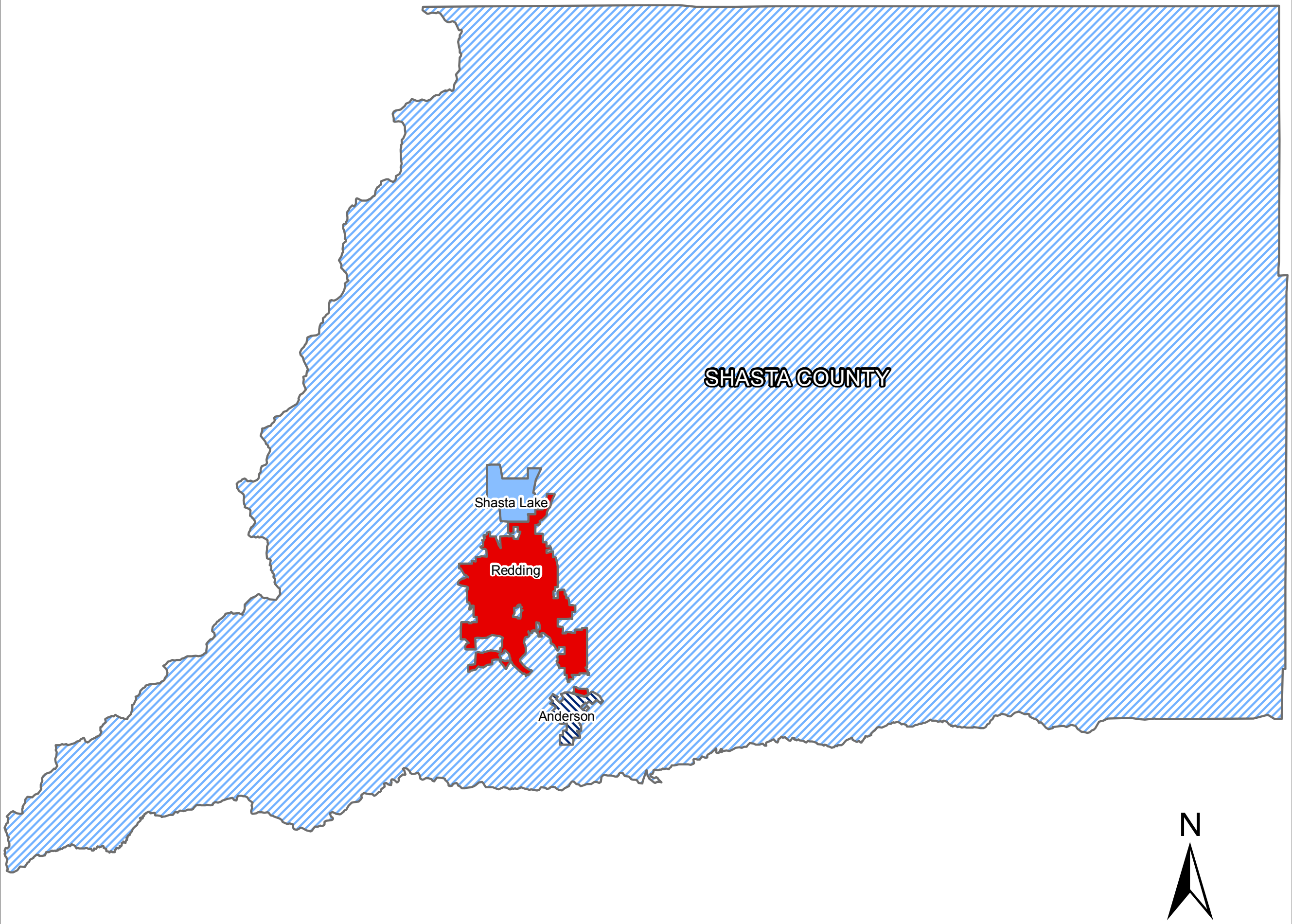


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

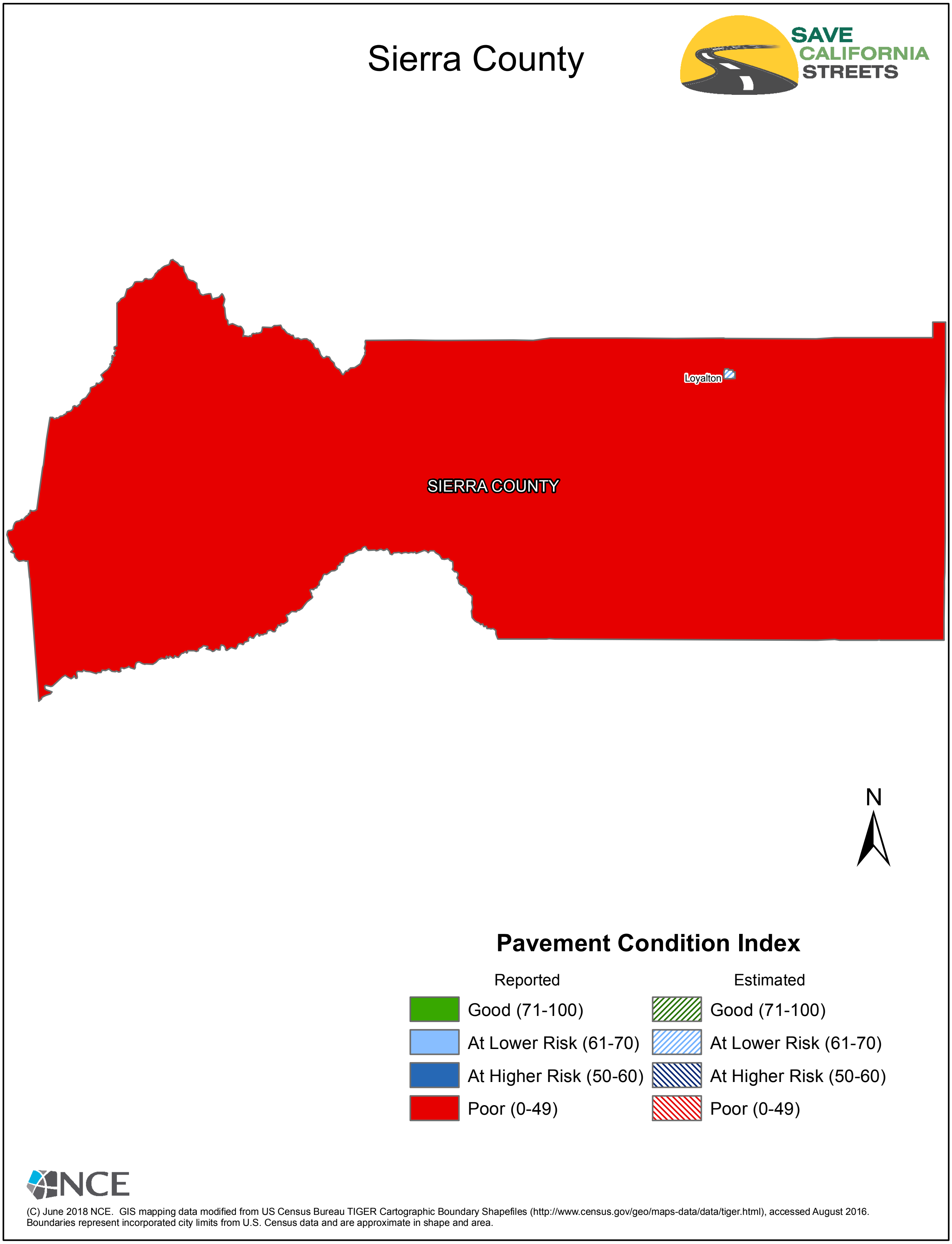
Shasta County



Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.


Sierra County
SAVE CALIFORNIA STREETS
Loyalton
SIERRA COUNTY
N
Pavement Condition Index
Reported
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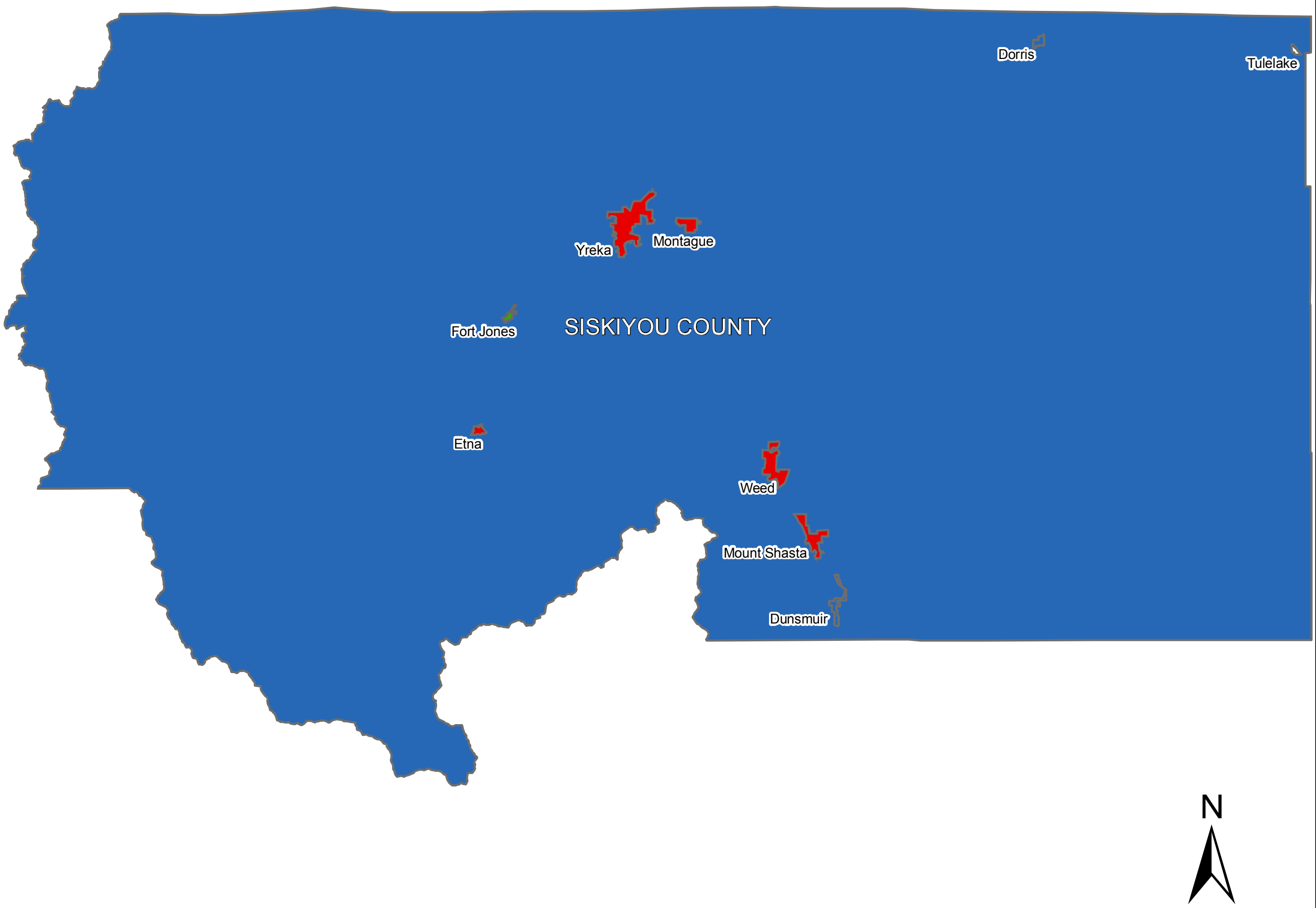
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
Estimated
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
NCE
(C) June 2018 NCE. GIS mapping data modified from US Census Bureau TIGER Cartographic Boundary Shapefiles (http://www.census.gov/geo/maps-data/data/tiger.html), accessed August 2016.
Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Siskiyou County

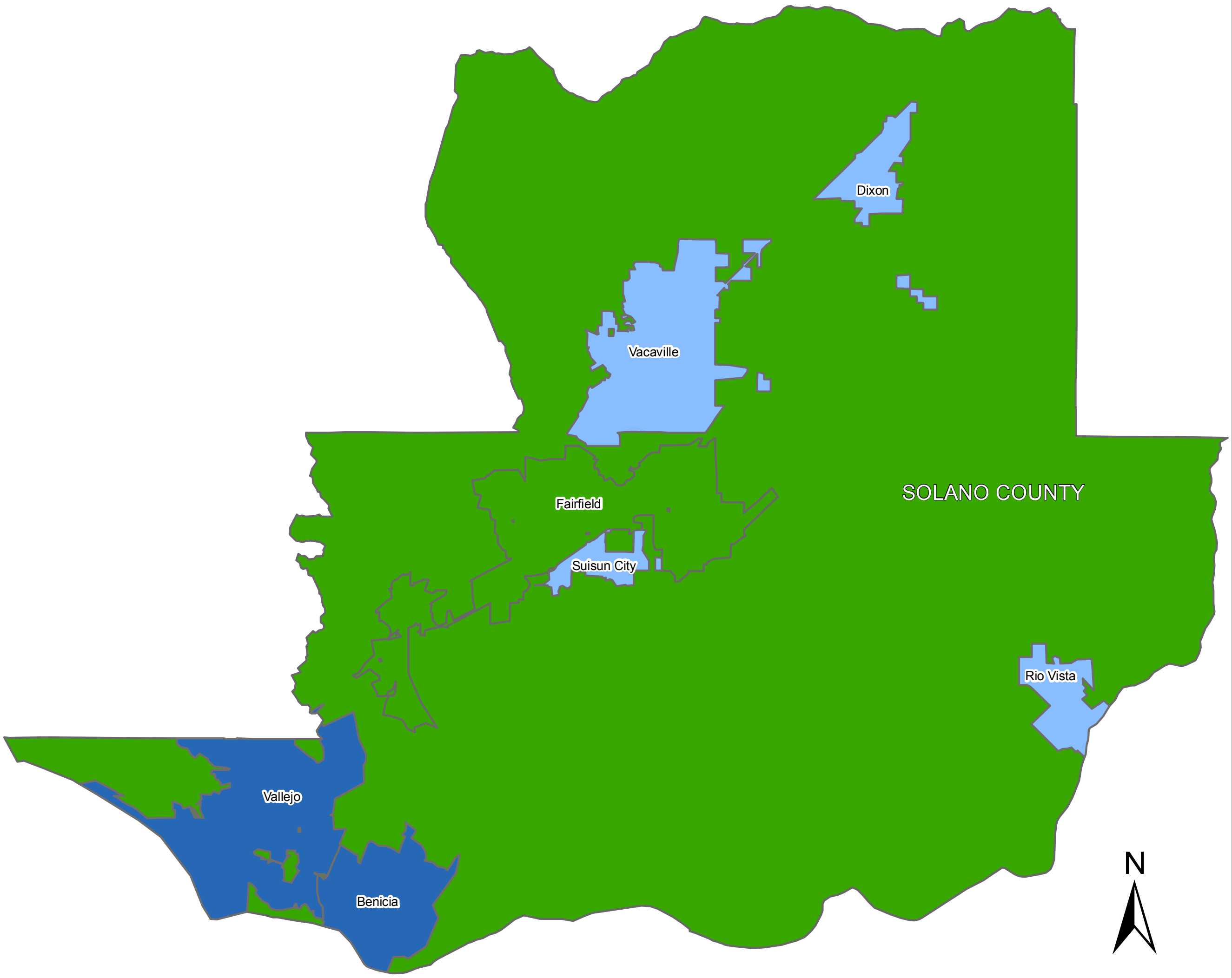


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Solano County

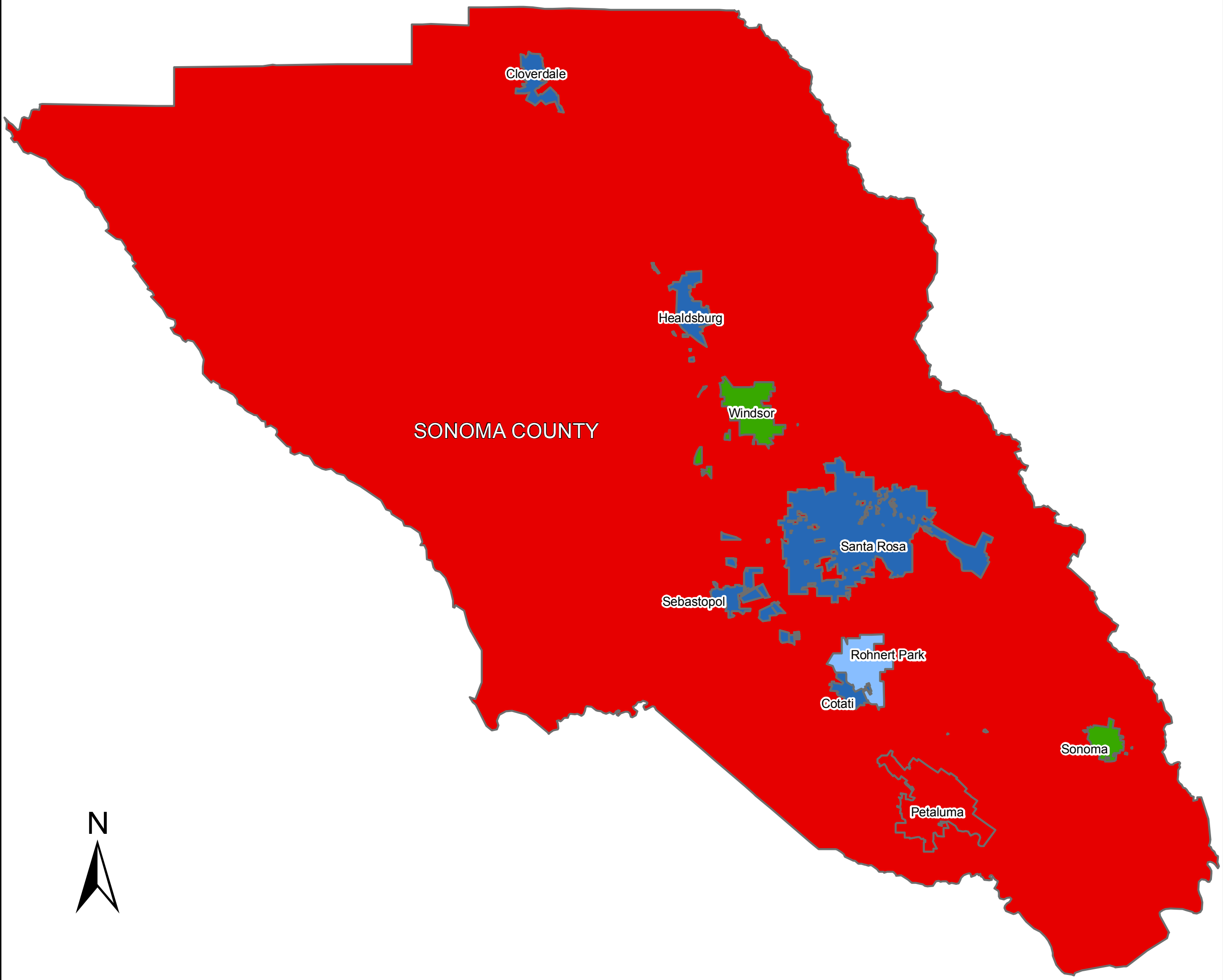


Pavement Condition Index

Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

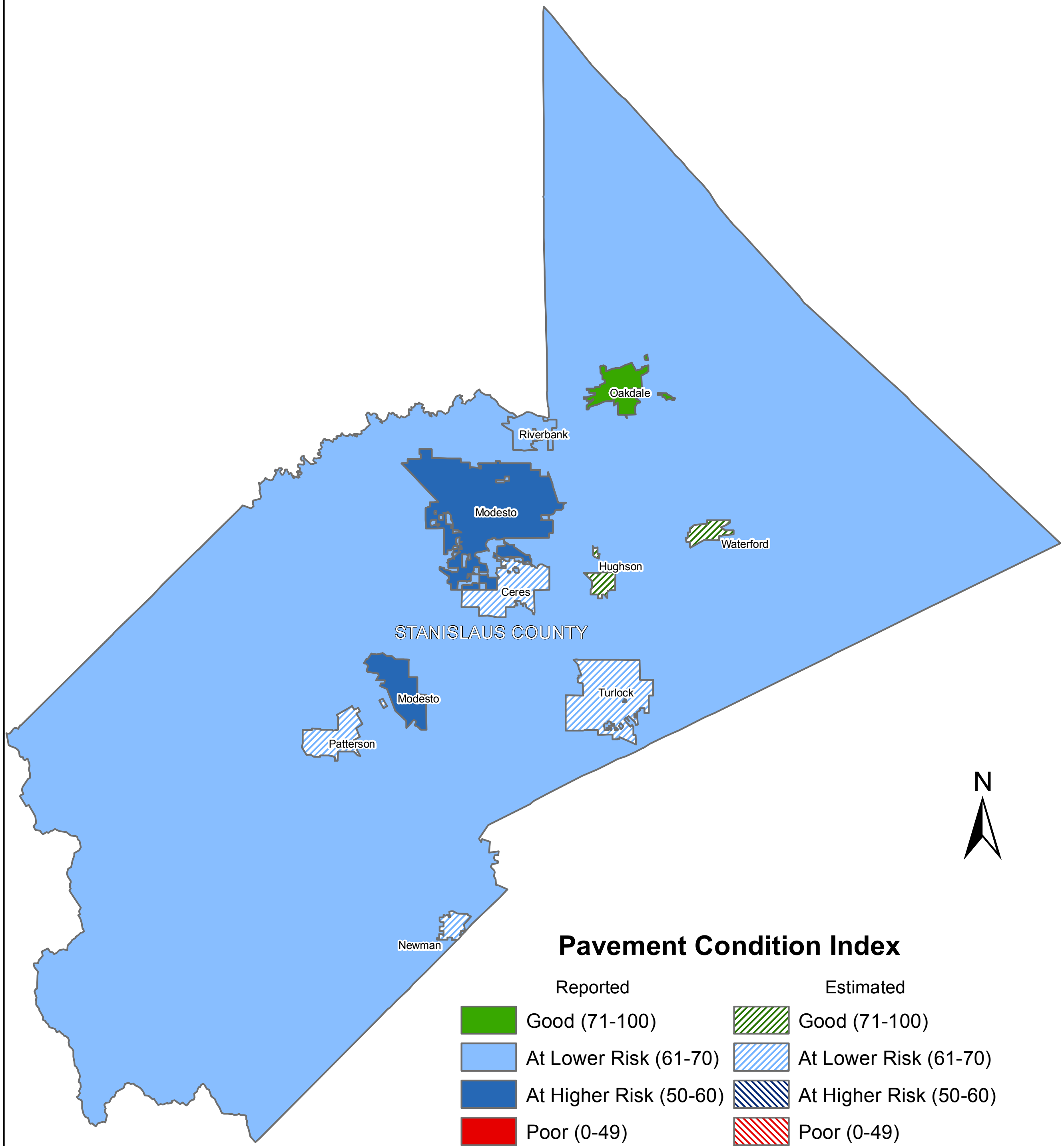
Sonoma County



Pavement Condition Index

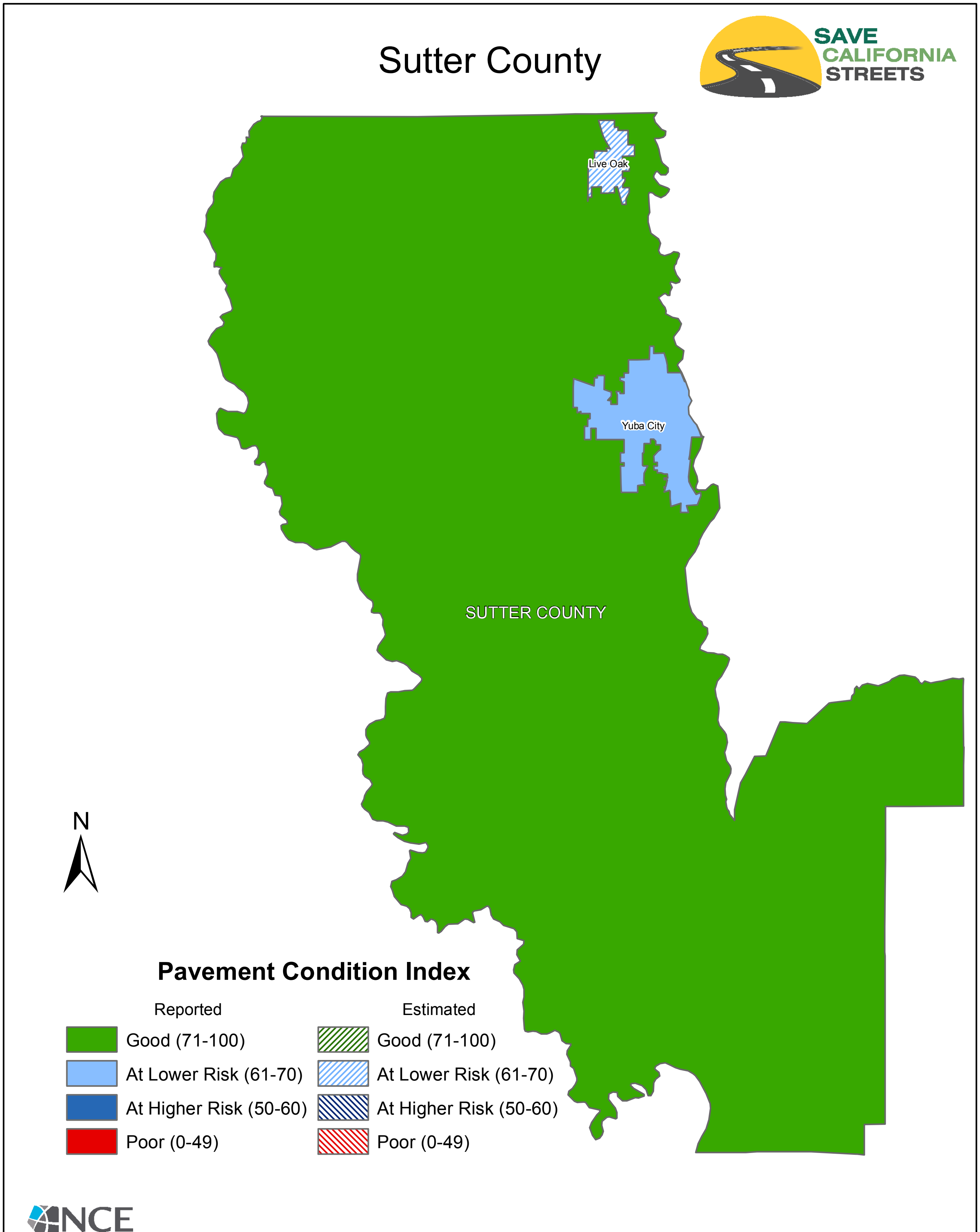
Reported	Estimated
Good (71-100)	Good (71-100)
At Lower Risk (61-70)	At Lower Risk (61-70)
At Higher Risk (50-60)	At Higher Risk (50-60)
Poor (0-49)	Poor (0-49)

Stanislaus County

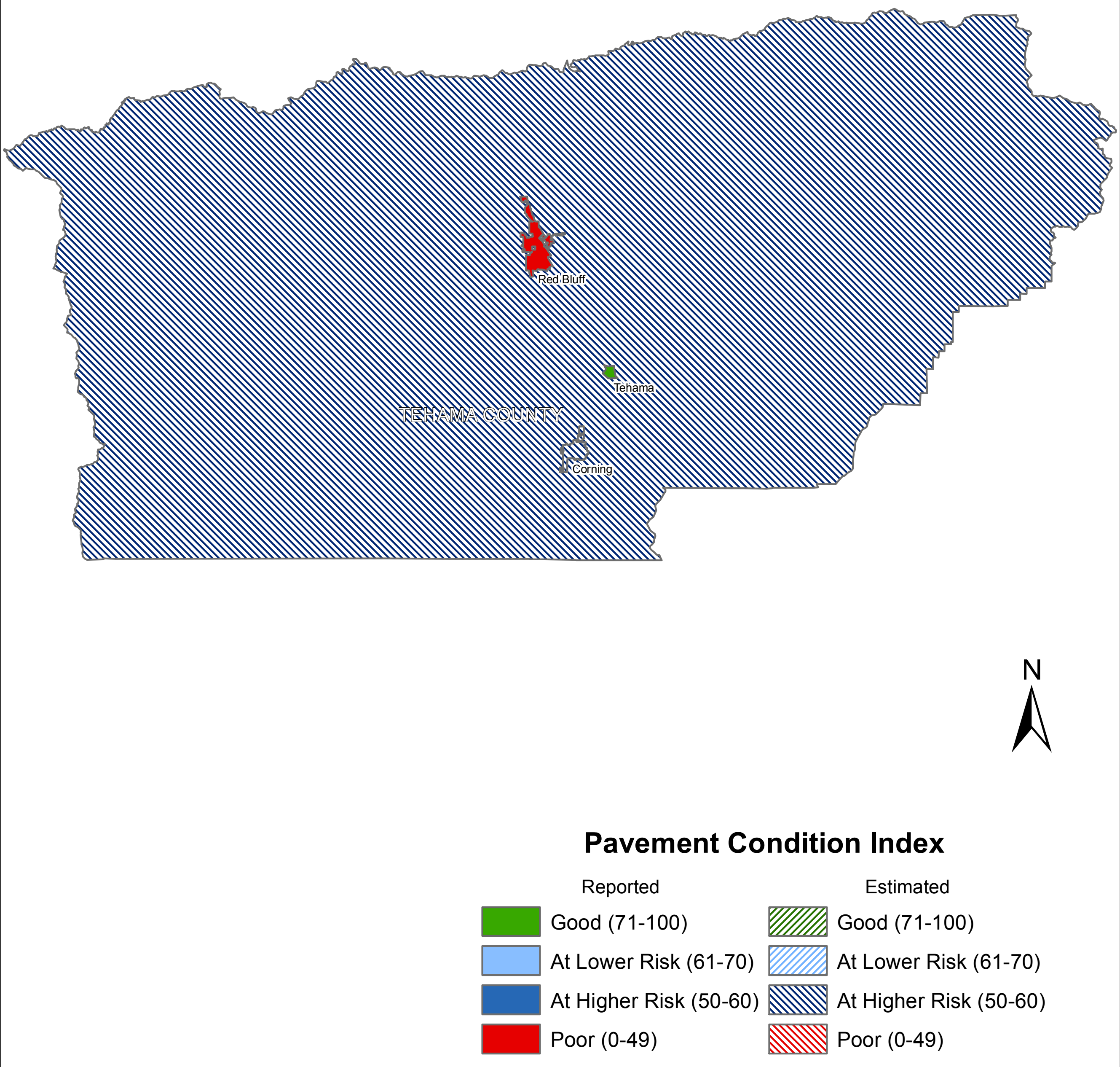


Pavement Condition Index

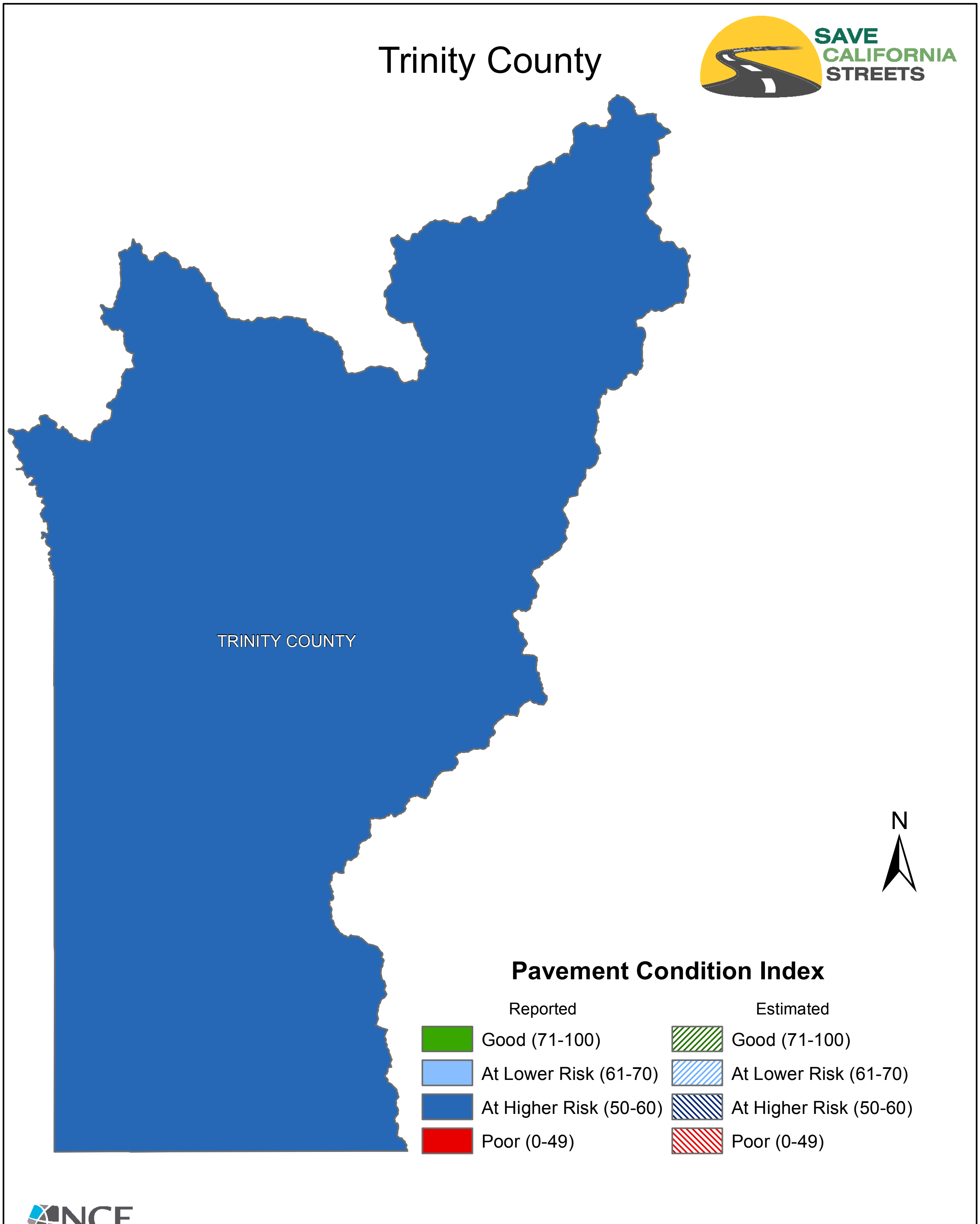
Reported		Estimated	
	Good (71-100)		Good (71-100)
	At Lower Risk (61-70)		At Lower Risk (61-70)
	At Higher Risk (50-60)		At Higher Risk (50-60)
	Poor (0-49)		Poor (0-49)

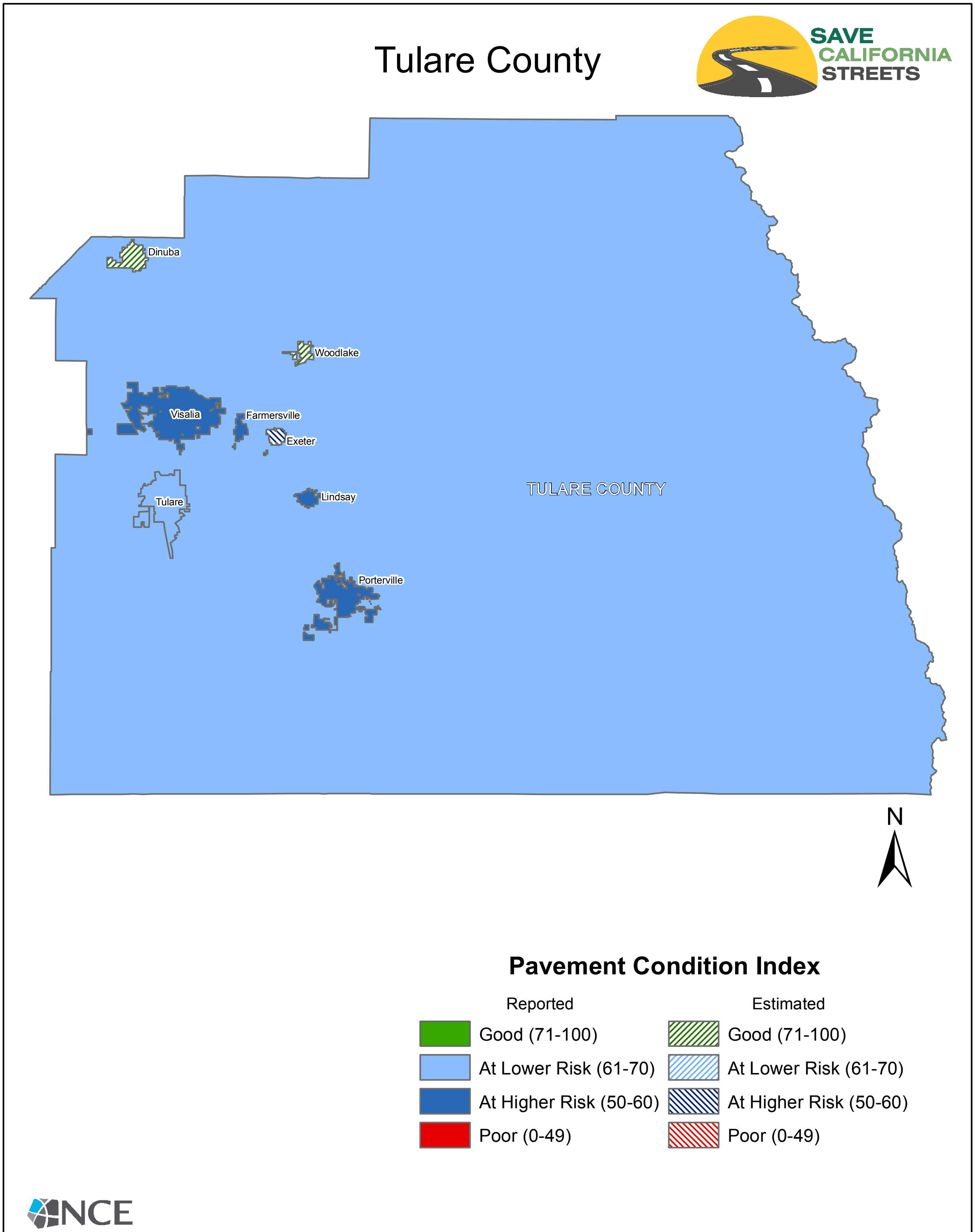

Sutter County
SAVE CALIFORNIA STREETS
Live Oak
Yuba City
SUTTER COUNTY
N
Pavement Condition Index
Reported
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
Estimated
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
NCE

Tehama County

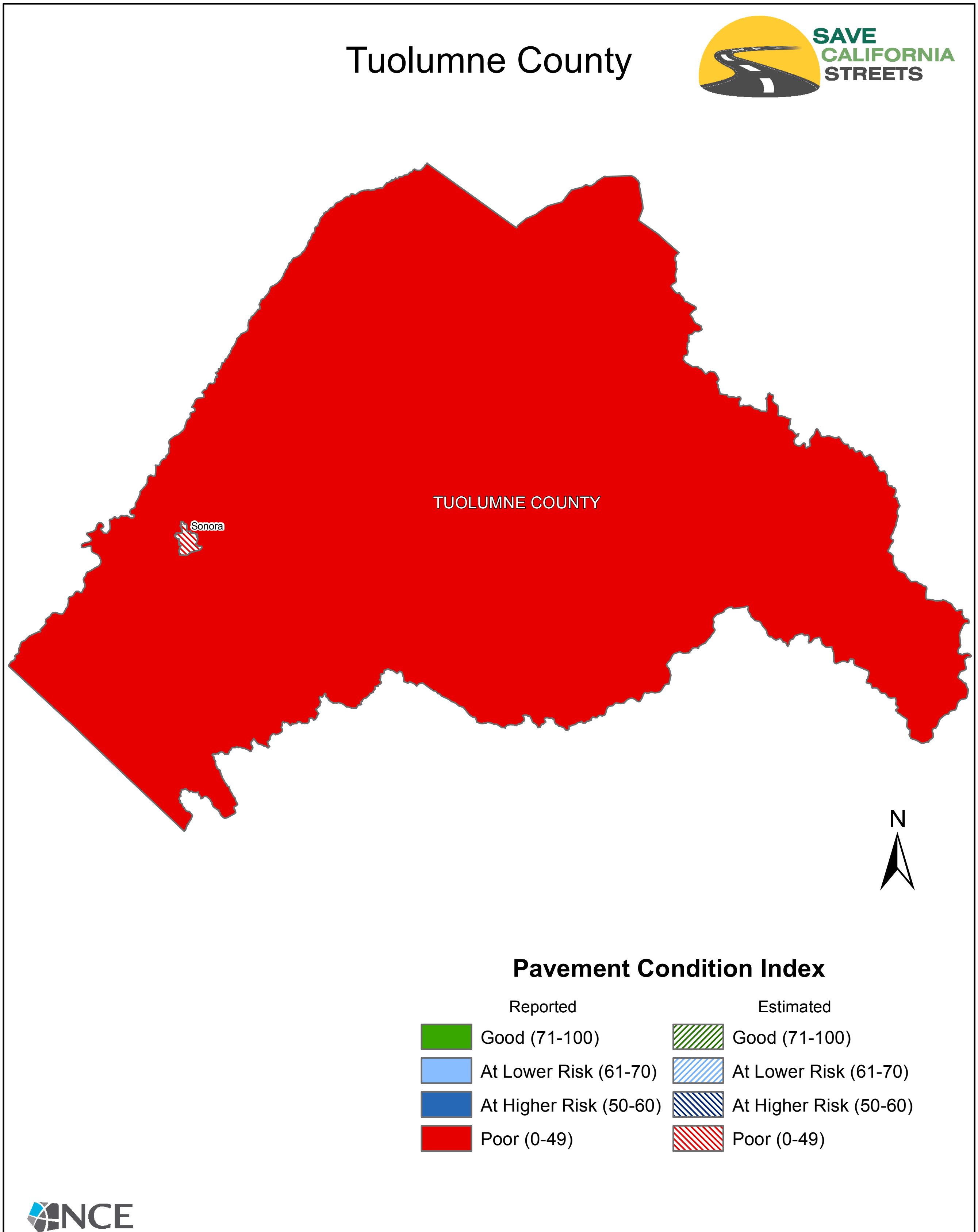


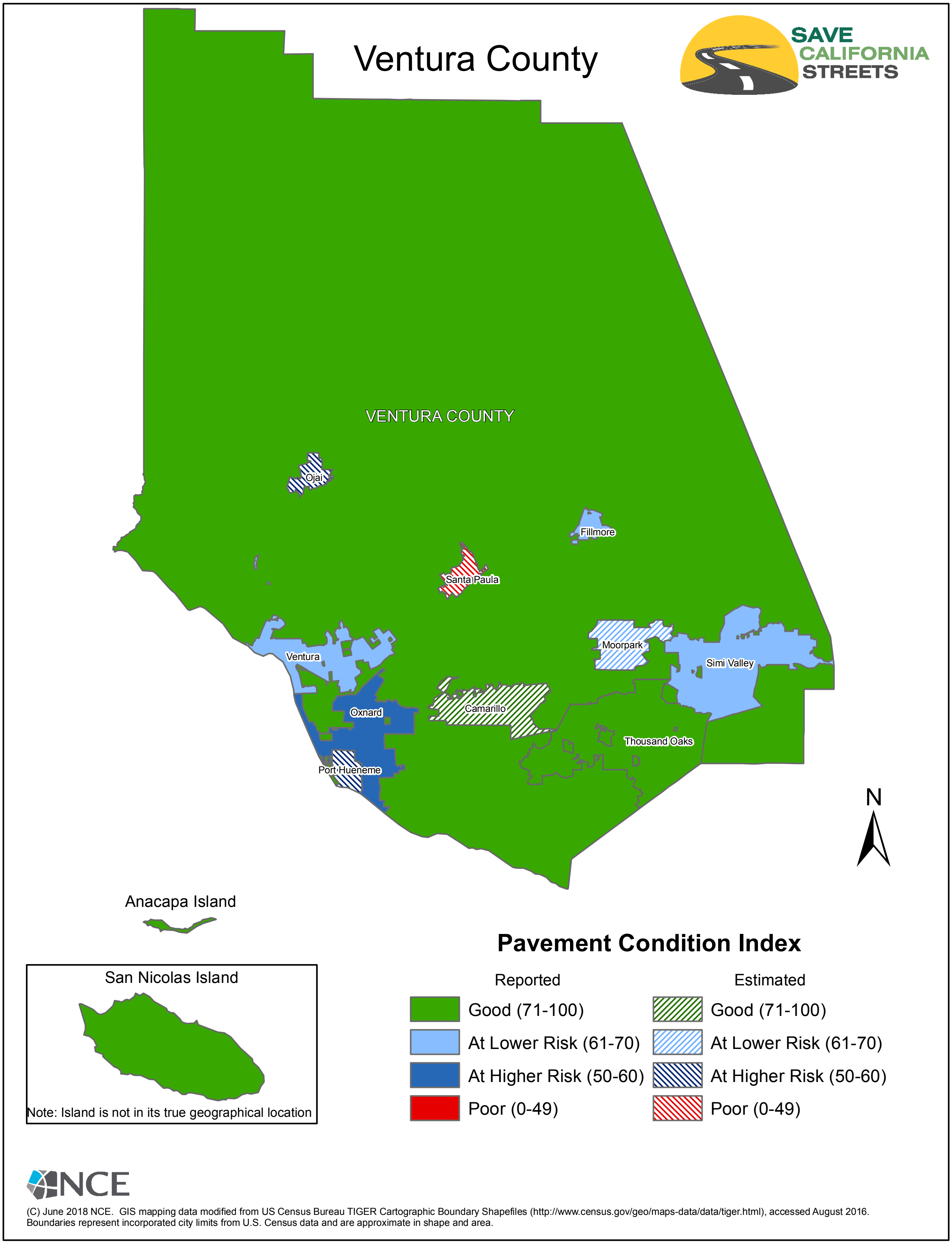
Trinity County



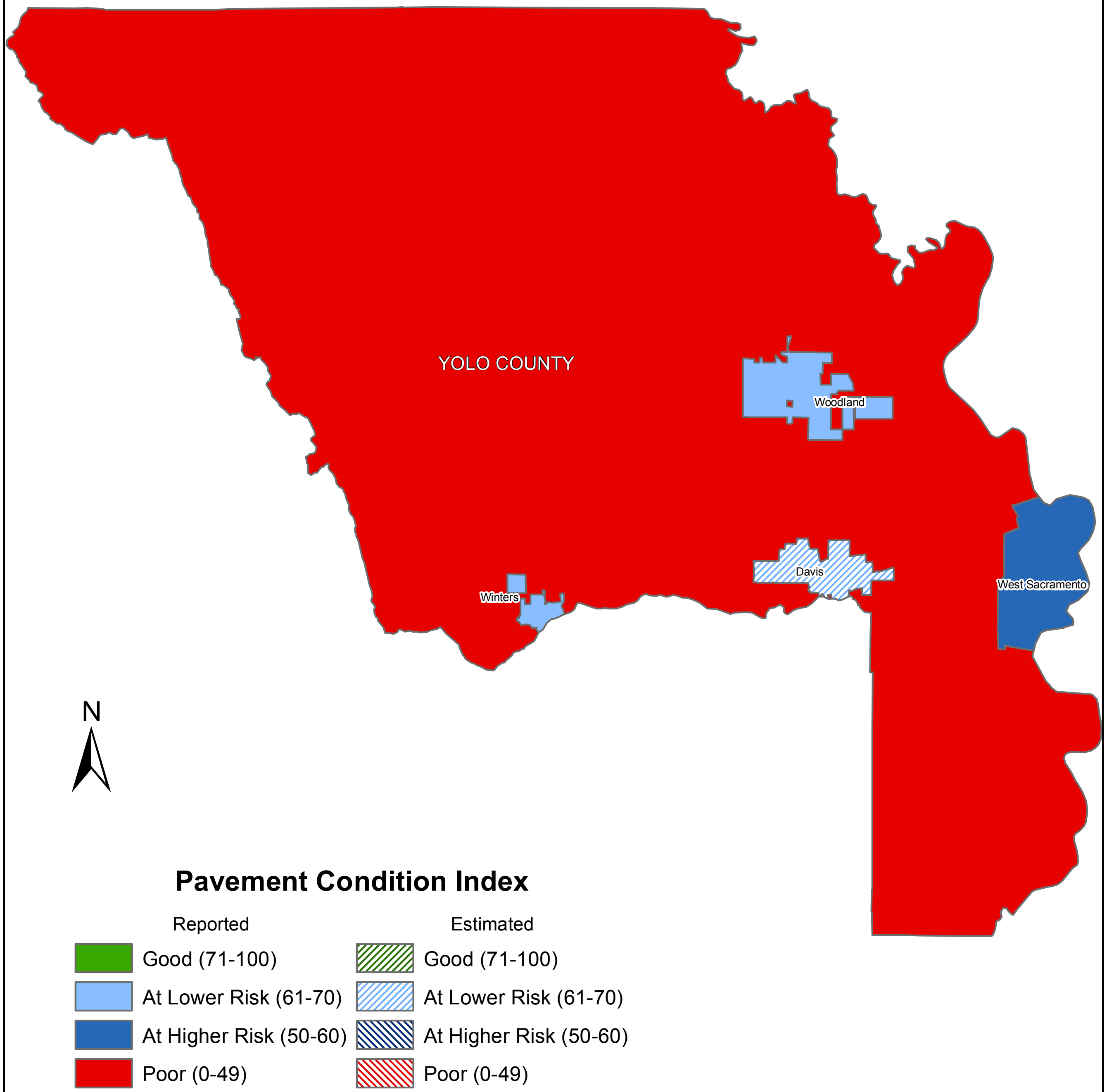


Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.


Tuolumne County
SAVE CALIFORNIA STREETS
TUOLUMNE COUNTY
Sonora
N
Pavement Condition Index
Reported
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
Estimated
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
NCE

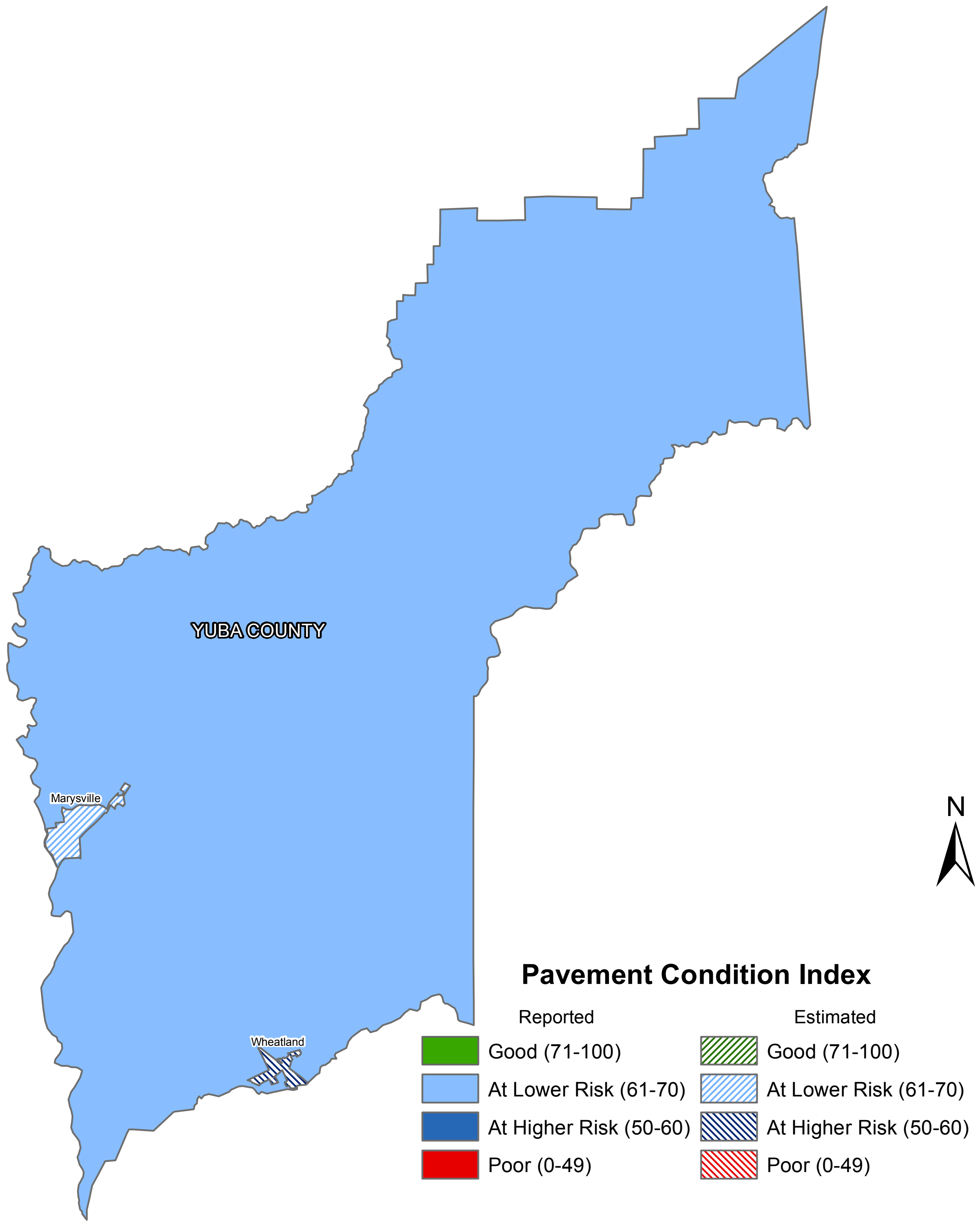

Ventura County
SAVE CALIFORNIA STREETS
VENTURA COUNTY
Ojai
Fillmore
Santa Paula
Moorpark
Simi Valley
Ventura
Camarillo
Oxnard
Thousand Oaks
Port Hueneme
N
Anacapa Island
San Nicolas Island
Note: Island is not in its true geographical location
Pavement Condition Index
Reported
Estimated
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
NCE
(C) June 2018 NCE. GIS mapping data modified from US Census Bureau TIGER Cartographic Boundary Shapefiles (http://www.census.gov/geo/maps-data/data/tiger.html), accessed August 2016.
Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Yolo County



Boundaries represent incorporated city limits from U.S. Census data and are approximate in shape and area.

Yuba County


YUBA COUNTY
Marysville
Wheatland
N
Pavement Condition Index
Reported
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)
Estimated
Good (71-100)
At Lower Risk (61-70)
At Higher Risk (50-60)
Poor (0-49)

Appendix D

Local National Highway System (NHS)

The National Highway System (NHS) is composed of approximately 160,000 miles of rural and urban roads nationwide serving major population centers, international border crossings, intermodal transportation facilities, and major travel destinations[1]. In addition to the Interstate and state highway system, all principal arterials are also included. These are roadways that are important to the nation's economy, defense, and mobility.

In California, there are 360 cities and counties that own approximately 5,100 centerline miles of local streets and roads that are designated part of the NHS. This appendix analyses their condition and funding needs, similar to that in Chapters 2 and 4 for the entire statewide system.

D.1 National Highway System (NHS) Requirements

The Moving Ahead for Progress in the 21st Century (MAP-21) transportation bill established federal regulation that require all states to utilize nationally defined performance measures for pavement and bridges on the NHS. The Bridge and Pavement Performance Management final rules[2] were adopted in May 2017. Table D.1 briefly summarizes the data to be collected on all NHS pavements.

Table D.1 Data Needed for NHS Performance Measures

Pavement Type	Data Collected
Asphalt Concrete	International Roughness Index (IRI)
	Cracking
	Rutting
Jointed Concrete Pavement (JCP)	IRI
	Cracking
	Faulting
Continuously Reinforced Concrete Pavement (CRCP)	IRI
	Cracking

In this report, the online survey asked cities and counties for their current data collection practices with respect to the local NHS.

D.2 Survey Responses

As previously noted, there are 360 agencies who own a total of 5,100 miles of NHS network. Out of 360 agencies, 135 agencies responded to the survey and this was compiled into a database. Data were collected on approximately 1,836 miles of local NHS streets and roads (36% of local NHS network). The following information was requested in the survey:

[1] http://dot.ca.gov/hq/tsip/hseb/nhs.html
[2] https://www.federalregister.gov/documents/2017/01/18/2017-00550/national-performance-management-measures-assessing-pavement-condition-for-the-national-highway

- Street name and limits
- Dimensions (lengths and pavement areas)
- Surface type
- Posted speed limit (mile/hour)
- Pavement data collected, e.g.:
  - International Roughness Index (IRI)
  - Pavement Serviceability Rating (PSR)
  - Percent Cracking
  - Rutting
  - Faulting
  - PCI

In general, less than ten percent of the cities and counties indicate that they collect data as per MAP-21. Table D.2 summarizes the number of agencies who collect this information. Only eight agencies provided some of the data required; they were the Cities of Willows, Carson, Hawaiian Gardens, Paramount, Corona, Colton, Solana Beach and the County of Los Angeles.

As a side note, recent discussions with Caltrans indicate that they will be collecting this data for the local NHS as a more cost-efficient implementation of the new rules.

Table D.2 Agencies Who Collect Local NHS Performance Measures Data

NHS Performance Measures	No. of Agencies Collect Data	No. of Agencies Provided Data
International Roughness Index (IRI)	20	3
Percent Cracking	49	6
Rutting	56	5
Faulting	20	4

D.3 Pavement Condition

Based on the results of the data submitted in the survey, the average PCI (as of March 2018) for the local NHS is 73 which is considered to be in "good to excellent" condition. It should not be surprising that this is significantly higher than the statewide average of 65, as principal arterials typically have higher priorities for funding. Figure D.1 illustrates the local NHS PCI compared with the statewide PCI.

The average PCI for the local NHS is 73. This is in the "Good to Excellent" condition category.

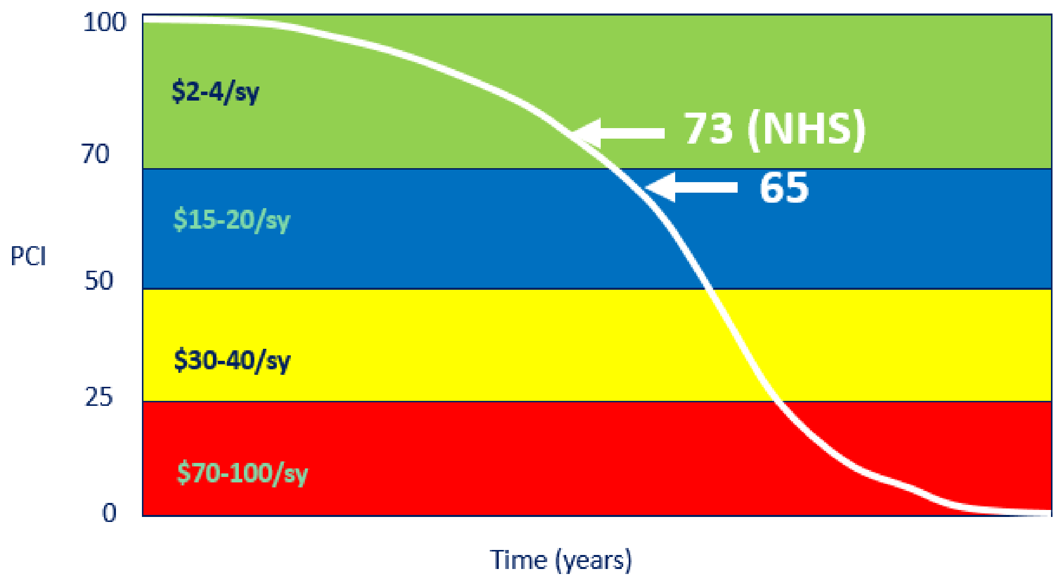


Figure D.1 Generalized Pavement Life Cycle Curve

Table D.3 summarizes a list of all the counties where local NHS streets have been identified. However, only data were submitted by 135 cities and counties; therefore, the weighted average PCI for each county (including cities within the county) is based only on the data submitted. For example, agencies in Alameda County provided data on 178 miles and the average PCI is 75. However, San Benito County, although they own local NHS roads, did not submit any data. The hyphen (-) indicates that there were no data submitted from agencies in those counties.

Table D.3 Summary of PCI Data by County (includes Cities) for 2018

County (Cities Included)	Center Line Miles Submitted	2018 PCI
Alameda	178	75
Butte	15	67
Contra Costa	217	75
El Dorado	1	41
Fresno	16	73
Glenn	2	62
Humboldt	-	-
Imperial	-	-
Kern	3	83
Kings	-	-
Lassen	-	-
Los Angeles	304	69
Madera	2	70
Marin	26	75
Merced	-	-
Monterey	-	-
Napa	14	68
Orange	238	77
Placer	45	80

County (Cities Included)	Center Line Miles Submitted	2018 PCI
Riverside	36	76
Sacramento	20	44
San Benito	-	-
San Bernardino	9	68
San Diego	51	74
San Francisco	121	76
San Joaquin	7	70
San Luis Obispo	-	-
San Mateo	17	78
Santa Barbara	43	65
Santa Clara	348	78
Santa Cruz	1	73
Shasta	-	-
Solano	67	76
Sonoma	17	67
Stanislaus	5	67
Tulare	3	-
Ventura	28	64
Yolo	2	80

D.4 Pavement Needs

Similar to the process described in Chapters 2 and 4, the pavement needs for the local NHS were determined (see Table D.4). A total of $3.3 billion is required to achieve the BMP goal in 10 years.

Pavement needs for the local NHS are estimated at $3.3 billion over the next ten years.

Table D.4 Cumulative Pavement Needs

Year	Reach BMP Goal in 10 Years ($ Million)
2019	$330
2020	$660
2021	$990
2022	$1,320
2023	$1,650
2024	$1,980
2025	$2,310
2026	$2,640
2027	$2,970
2028	$3,300

D.5 Funding Analysis

Chapter 4 determined the total funding level for the pavement network with and without SB1 as $3.083 billion and $2.090 billion annually, respectively. Since the local NHS needs are approximately 5.35 percent of the total, our funding analysis for the NHS assumed the same ratio for the available funding. This results in approximately $165 million and $112 million annually, respectively.

It should be noted that this is probably a conservative estimate, since principal arterials are generally higher in priority for cities and counties and therefore are likely to receive a higher percentage of the total funding dollars.

Four funding scenarios were performed for the local NHS:

1) Existing funding, estimated at $165 million per year with SB1;
2) Existing funding, estimated at $112 million per year without SB1
3) Funding to maintain current pavement condition at PCI = 73; and
4) Funding to achieve best management practices (BMP) in ten years.

Scenario NHS1: Existing funding with SB1 ($165 million annually)

In this scenario, the most cost-effective treatments are funded first, and these are typically preventive maintenance or preservation strategies, such as seals. This approach generally treats a larger percent of pavement network resulting in optimizing the use of limited funds. At the existing funding of $165 million per year, the pavement condition is expected to deteriorate to 67 by 2028, and the unfunded backlog will increase by more than 50 percent to $2.3 billion. Figure D.2 graphically illustrates these two trends.

Scenario NHS2: Existing funding without SB1 ($112 million annually)

If SB1 funding is lost, the budget is reduced to $112 million per year; the overall PCI will be reduced to 62 and the deferred maintenance will increase to $2.8 billion by 2028 (Figure D.3).

Scenario NHS3: Maintain PCI at 73 ($242 million annually)

In order to maintain the pavement condition at existing conditions (i.e., PCI = 73), an annual funding level of $242 million is required (see Figure D.4). This funding level is significantly higher than the current funding level of $165 million/year. The unfunded backlog is also stable at $1.4 billion.

Scenario NHS4: Reach Best Management Practices ($374 million annually)

In order to reach a pavement condition where best management practices can be applied, $374 million per year is required. The PCI will reach 83 by 2028 and the unfunded backlog is eliminated by 2028 (see Figure D.5). **Once eliminated, the cost of maintenance thereafter is significantly lower, requiring only $158 million a year.**

Once the backlog has been eliminated, only $158 million per year is required to maintain the local NHS at BMP levels.

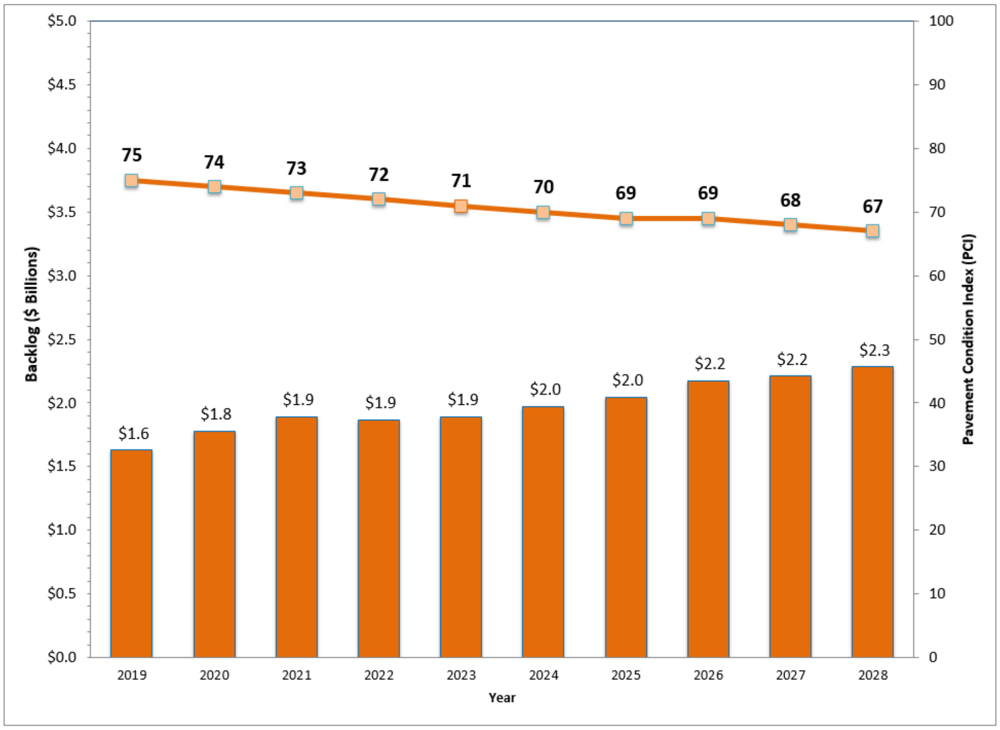


Figure D.2 Results of Scenario NHS1: Existing Budget with SB1 ($165 million/year)

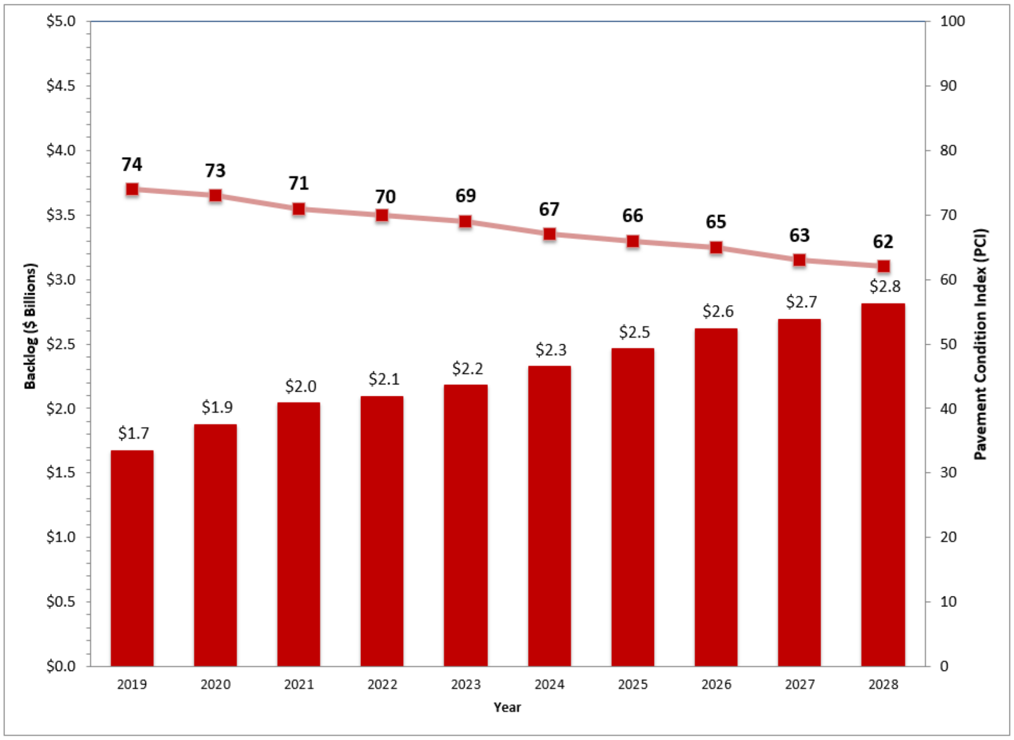


Figure D.3 Results of Scenario NHS2: Existing Budget without SB1 ($112 million/year)

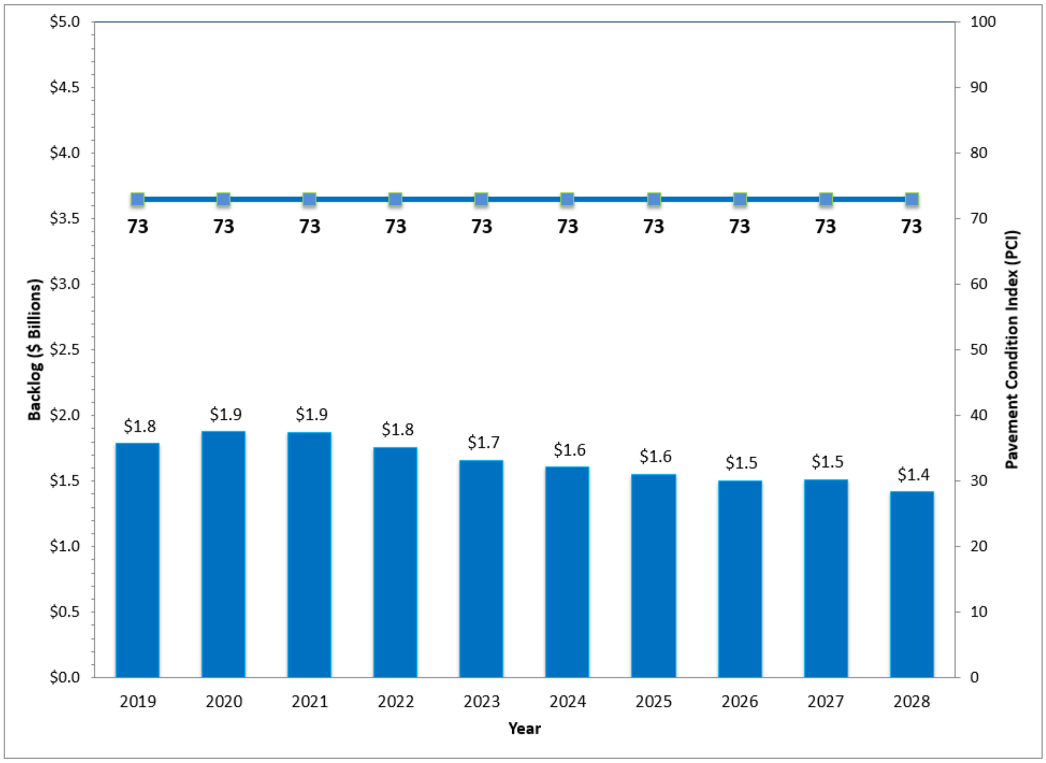


Figure D.4 Results of Scenario NHS3 (BMP in 10 years = $242 million/year)

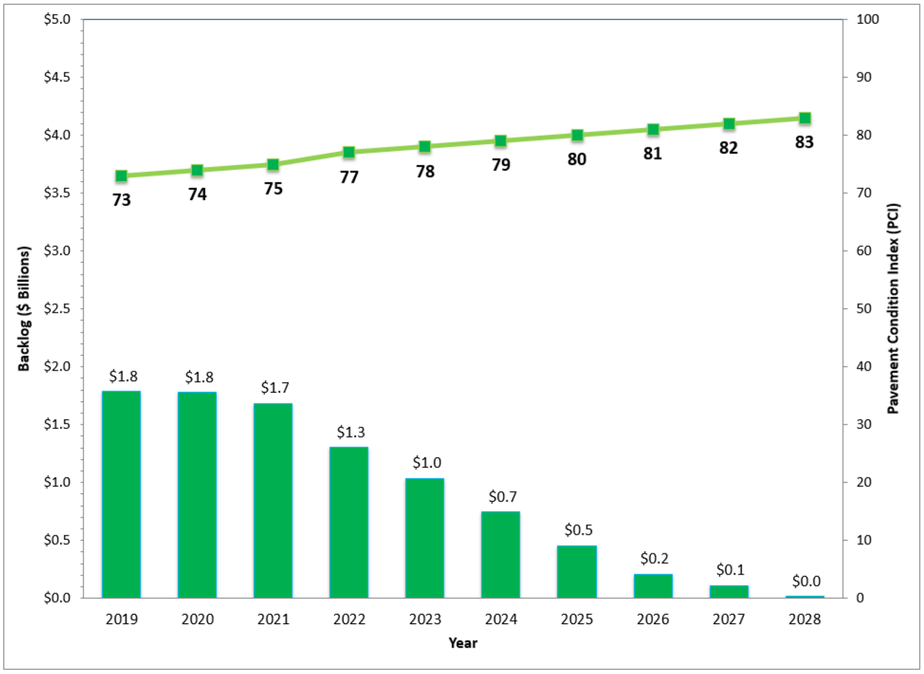


Figure D.5 Results of Scenario NHS4 (BMP in 10 years = $374 million/year)

D.6 Other Performance Measures

Although both PCI and the unfunded backlog are common performance measure for cities and counties, there are others that may be used. One such measure is the percentage of pavement area in different condition categories. Table D.5 illustrates the breakdown in condition categories for each funding scenario.

Scenario NHS1 indicates that almost two-thirds will continue to be in good/excellent condition; if SB1 is repealed, then this will drop to about half the network. Similarly, the 20 percent of pavements in poor/failed condition will be unchanged with SB1, but will increase to almost a third without SB1. Finally, Scenarios NHS3 and NHS4 will improve the local NHS network across all metrics.

Table D.5 Breakdown of Condition Category for Each Scenario (2028)

Condition Category	Current Breakdown (2018)	Scenario NHS1 Existing Budget ($165 M/yr)	Scenario NHS2 Existing Budget w/o SB1 ($112 M/yr)	Scenario NHS3 Maintain PCI at 73 ($242 M/yr)	Scenario NHS4 BMP in 10 Years ($374 M/yr)
PCI 70-100 (Good to Excellent)	65.0%	64.0%	51.5%	80.1%	98.4%
PCI 50-69 (At Risk)	14.5%	15.6%	16.7%	3.6%	1.2%
PCI 0-49 (Poor)	20.5%	20.4%	31.8%	16.3%	0.4%
Totals	100%	100%	100%	100%	100%

D.7 Summary

A few conclusions may be drawn from this analysis of the local NHS:

- The local NHS comprises approximately 5,100 miles, which is approximately 3.5 percent of the local statewide network.
- The average PCI is 73, significantly better than the network average of 65.
- Total available funding for local NHS pavements is projected at $165 million annually over the next ten years; this includes funding from SB1. This is a conservative estimate and if accurate, will result in the PCI deteriorating to 67 and the unfunded backlog growing to $2.3 billion.
- If SB1 is repealed, the PCI will decrease from 73 to 62 and the unfunded backlog will increase to almost $2.8 billion.
- In order to maintain the existing pavement condition (Scenario NHS3), a funding level of $242 million annually is required.
- The best management practice scenario would require approximately $374 million annually to eliminate the backlog of work and raise the PCI to 83. Once the BMP goal has been reached, it will only require $158 million/year to maintain the condition of the pavement network.

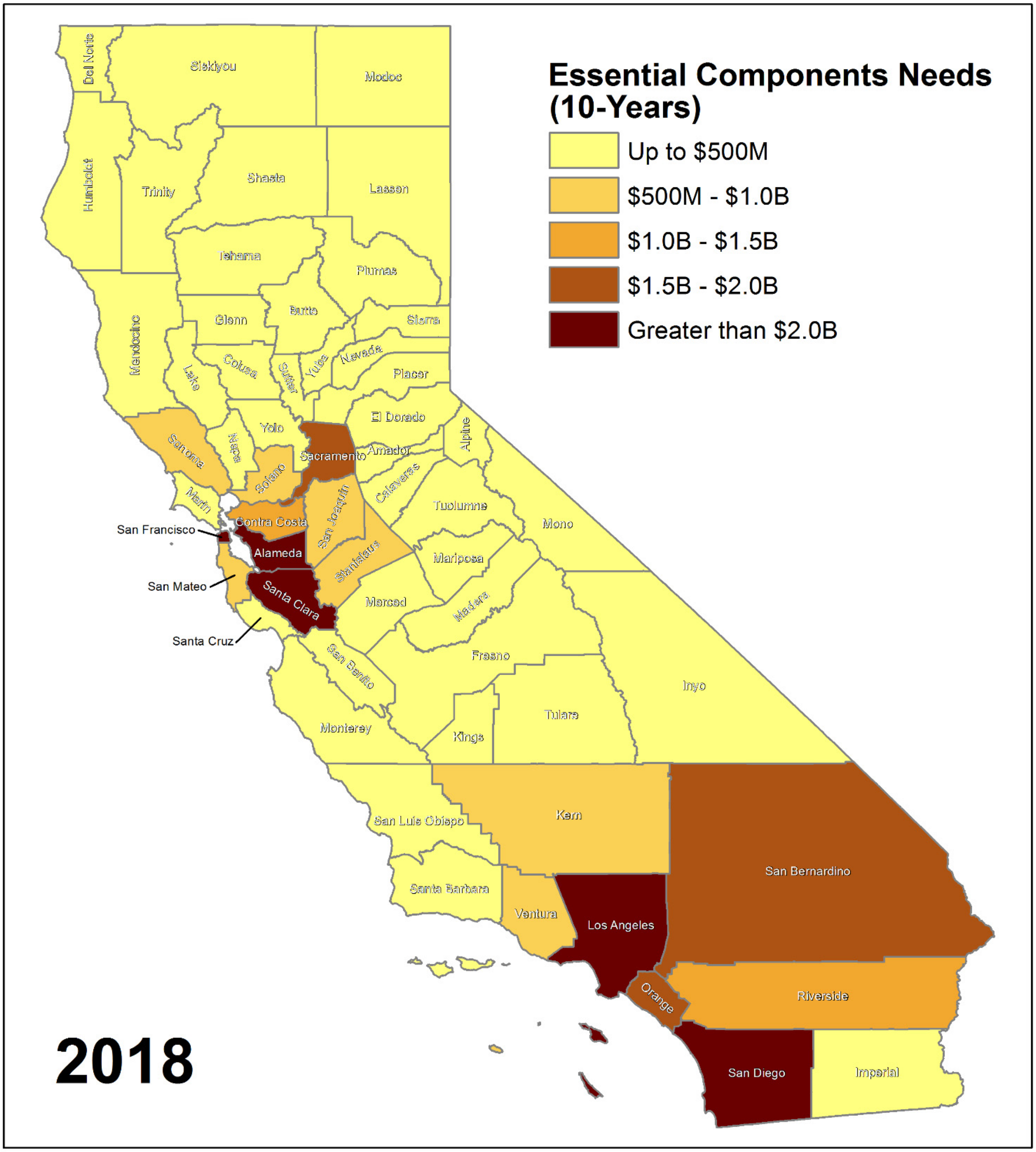
Appendix E

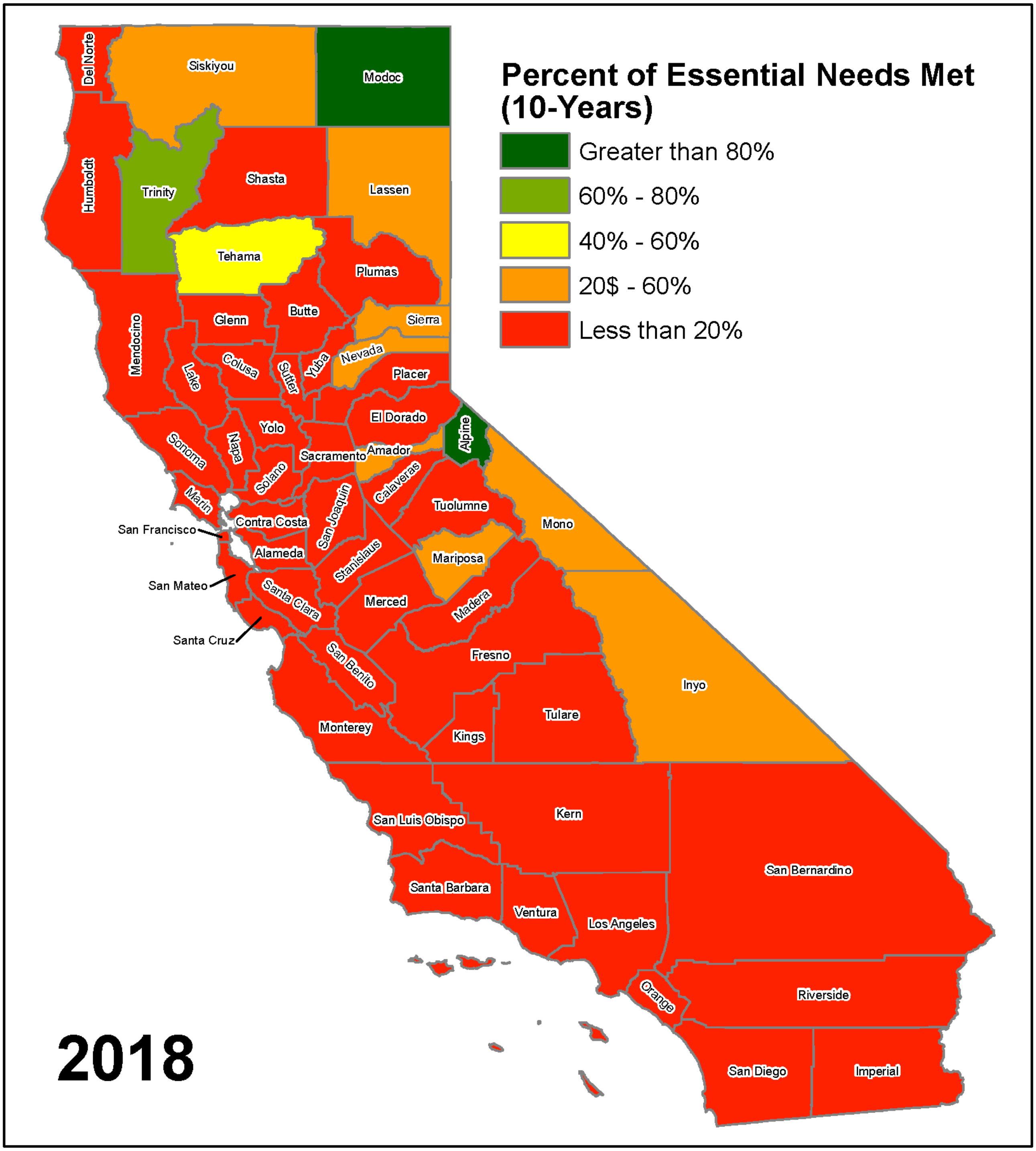
Essential Component Needs by County

Table E.1 Summary of Essential Components Needs by County*

County	10 year Needs ($M)	County	10 year Needs ($M)
Alameda	$2,320	Orange	$1,950
Alpine	$0.03	Placer	$340
Amador	$8	Plumas	$26
Butte	$165	Riverside	$1,579
Calaveras	$7	Sacramento	$1,746
Colusa	$19	San Benito	$9
Contra Costa	$1,454	San Bernardino	$1,750
Del Norte	$27	San Diego	$2,057
El Dorado	$47	San Francisco	$2,888
Fresno	$451	San Joaquin	$706
Glenn	$23	San Luis Obispo	$275
Humboldt	$167	San Mateo	$791
Imperial	$115	Santa Barbara	$333
Inyo	$8	Santa Clara	$3,088
Kern	$527	Santa Cruz	$93
Kings	$92	Shasta	$170
Lake	$20	Sierra	$6
Lassen	$6	Siskiyou	$23
Los Angeles	$6,246	Solano	$521
Madera	$98	Sonoma	$801
Marin	$340	Stanislaus	$687
Mariposa	$6	Sutter	$110
Mendocino	$122	Tehama	$8
Merced	$102	Trinity	$7
Modoc	$3	Tulare	$374
Mono	$7	Tuolumne	$4
Monterey	$245	Ventura	$786
Napa	$174	Yolo	$182
Nevada	$14	Yuba	$26
		Totals	**$34,149**

* Includes Cities within County


Essential Components Needs (10-Years)
Up to $500M
$500M - $1.0B
$1.0B - $1.5B
$1.5B - $2.0B
Greater than $2.0B
2018
Del Norte
Siskiyou
Modoc
Humboldt
Trinity
Shasta
Lassen
Tehama
Plumas
Mendocino
Glenn
Butte
Sierra
Lake
Colusa
Sutter
Yuba
Nevada
Placer
Yolo
El Dorado
Sonoma
Napa
Solano
Sacramento
Amador
Alpine
Marin
Calaveras
Tuolumne
Mono
San Francisco
Contra Costa
San Joaquin
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Madera
Santa Cruz
San Benito
Fresno
Inyo
Monterey
Tulare
Kings
San Luis Obispo
Kern
San Bernardino
Santa Barbara
Ventura
Los Angeles
Orange
Riverside
San Diego
Imperial


Percent of Essential Needs Met (10-Years)
Greater than 80%
60% - 80%
40% - 60%
20$ - 60%
Less than 20%
2018
Del Norte
Siskiyou
Modoc
Humboldt
Trinity
Shasta
Lassen
Tehama
Plumas
Glenn
Butte
Sierra
Mendocino
Colusa
Lake
Sutter
Yuba
Nevada
Placer
El Dorado
Yolo
Alpine
Sonoma
Napa
Sacramento
Amador
Solano
Calaveras
Marin
San Joaquin
Tuolumne
Contra Costa
Mono
San Francisco
Alameda
Mariposa
Stanislaus
San Mateo
Santa Clara
Merced
Madera
Santa Cruz
Fresno
San Benito
Inyo
Tulare
Monterey
Kings
Kern
San Luis Obispo
San Bernardino
Santa Barbara
Ventura
Los Angeles
Orange
Riverside
San Diego
Imperial

Appendix F

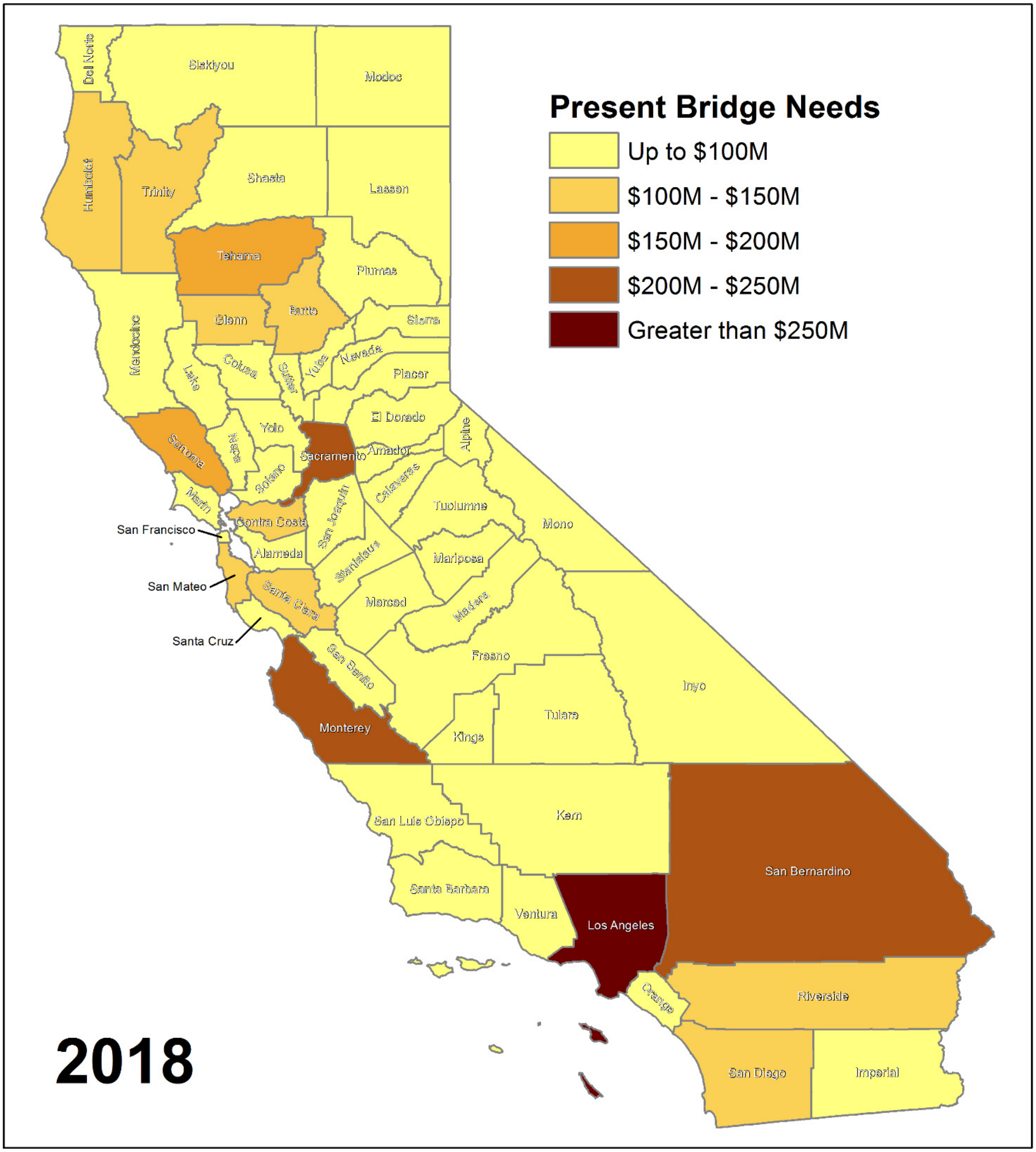
Local Bridge Needs by County

Table F.1 Present Bridge Needs by County* (2018 $)

County Name	Number of Bridges	Average Sufficiency Rating, SR	Structures with SR <=80	Structures with SR <=50	Total Bridge Need
	EA	unit less	unit less	unit less	$ Million
Alameda	205	83	58	7	$60 M
Alpine	11	74	6	1	$2 M
Amador	39	69	19	8	$7 M
Butte	293	75	100	40	$125 M
Calaveras	68	73	24	12	$21 M
Colusa	148	85	28	10	$14 M
Contra Costa	294	83	86	14	$118 M
Del Norte	28	76	9	4	$13 M
El Dorado	86	68	47	14	$40 M
Fresno	494	80	164	33	$85 M
Glenn	168	77	56	24	$116 M
Humboldt	167	72	59	33	$140 M
Imperial	134	77	43	20	$31 M
Inyo	34	82	10	2	$1 M
Kern	283	87	65	2	$31 M
Kings	99	87	28	0	$2 M
Lake	80	72	28	14	$27 M
Lassen	65	75	26	7	$15 M
Los Angeles	1,470	84	456	38	$1,252 M
Madera	155	83	37	14	$63 M
Marin	113	75	45	12	$36 M
Mariposa	53	67	24	11	$21 M
Mendocino	139	74	56	21	$84 M
Merced	298	80	117	15	$34 M
Modoc	49	88	9	2	$1 M
Mono	12	78	5	1	$2 M
Monterey	137	69	53	32	$222 M
Napa	103	73	48	14	$43 M
Nevada	62	75	16	11	$23 M
Orange	514	83	174	17	$66 M
Placer	177	79	51	23	$45 M
Plumas	91	73	34	15	$50 M
Riverside	438	87	91	8	$146 M
Sacramento	403	85	87	21	$201 M

County Name	Number of Bridges	Average Sufficiency Rating, SR	Structures with SR <=80	Structures with SR <=50	Total Bridge Need
	EA	unit less	unit less	unit less	$ Million
San Benito	45	75	18	5	$23 M
San Bernardino	487	79	159	53	$238 M
San Diego	527	87	112	13	$147 M
San Francisco	24	73	11	3	$25 M
San Joaquin	324	85	85	11	$56 M
San Luis Obispo	201	77	90	15	$35 M
San Mateo	140	76	69	12	$107 M
Santa Barbara	188	80	52	20	$64 M
Santa Clara	458	81	128	39	$126 M
Santa Cruz	99	68	40	22	$46 M
Shasta	283	80	101	15	$70 M
Sierra	32	77	12	5	$18 M
Siskiyou	178	82	39	17	$37 M
Solano	201	88	42	6	$47 M
Sonoma	440	77	166	44	$183 M
Stanislaus	247	78	121	13	$94 M
Sutter	90	79	35	8	$7 M
Tehama	305	76	96	47	$178 M
Trinity	92	78	21	12	$105 M
Tulare	400	81	153	9	$41 M
Tuolumne	55	68	25	12	$24 M
Ventura	182	82	65	6	$89 M
Yolo	123	77	49	12	$24 M
Yuba	74	74	29	10	$29 M

* Cities included within County


Present Bridge Needs
Up to $100M
$100M - $150M
$150M - $200M
$200M - $250M
Greater than $250M
2018
Del Norte
Siskiyou
Modoc
Humboldt
Trinity
Shasta
Lassen
Tehama
Plumas
Glenn
Butte
Sierra
Mendocino
Lake
Colusa
Sutter
Yuba
Nevada
Placer
El Dorado
Yolo
Napa
Sonoma
Sacramento
Amador
Alpine
Solano
Marin
Calaveras
Tuolumne
Mono
San Francisco
Contra Costa
San Joaquin
Alameda
Stanislaus
Mariposa
San Mateo
Santa Clara
Merced
Madera
Santa Cruz
Fresno
San Benito
Inyo
Monterey
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Kings
San Luis Obispo
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