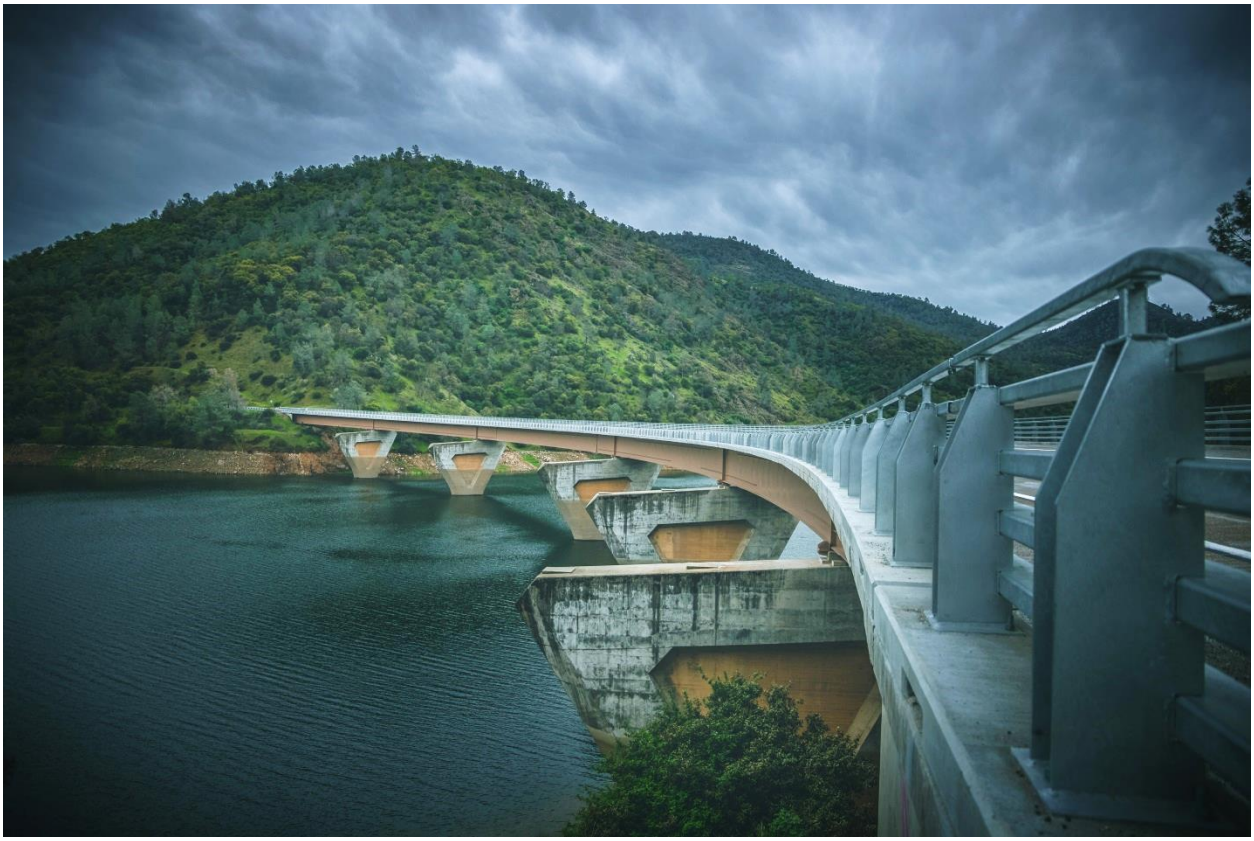
County of Tuolumne
2018 Pavement Management Report



Ethan Billigmeier (Photographer). (2018, March 20). *James E. Roberts Bridge, Highway 120* [digital image]. Retrieved from https://www.instagram.com/otto_eb/

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March 2018

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Executive Summary

Since 2007, the County has maintained a Pavement Management Program (PMP) by using StreetSaver software for documenting road conditions, forecasting pavement maintenance and scheduling maintenance funds for the road network.

An effective PMP allows the County to optimize the money invested in maintaining paved roads in order to provide the greatest return on investment. StreetSaver identifies an overall condition of each individual road by rating half mile segments, which collectively rate the pavement condition of the entire network.

As shown in the Table 1 below, the County's overall network Pavement Condition Index (PCI) currently stands at 33 for the 531.7 miles of paved roads on a scale of 0-100. The County's maintained system includes 16.7 miles of arterials, 196.4 miles of collectors, and 318.6 miles that are residential/local roads. The remaining mileage includes gravel roads which are not included in this report.

Table 1: Pavement Network and Condition Summary

Functional Class	Average PCI	Condition	Centerline Miles	2016 BOS Goal
Arterial	77	Very Good	16.72	70
Rural Major Collector	53	Good	83.49	50
Rural Minor Collector	31	Poor	112.93	50
Local Collectors	33	Poor	12.39	TBD
Residential or Local	22	Very Poor	306.17	TBD
Total	**33 (network average)**			

With the **network PCI average of 33**, in order to maintain a roadway network in a good state of repair, the County needs **$217.5 million over the next twenty years ($10.9 million per year)**. This amount is only for pavement and not the 54 bridges, culverts, traffic signals, street signs etc. that is a part of the County's assets which is maintained.

Currently the County operates with an allocation of $3.5 million for Road Maintenance, of which approximately $1.1 million is spent on pavement maintenance.

Introduction

The purpose of this report is to assist decision makers in utilizing the results of Tuolumne County's StreetSaver PMP. Having a well maintained road system enhances mobility throughout the County supporting the needs of the community and abets emergency response, tourism, commerce, agriculture and recreation.

Defining the Deterioration Curve of Pavement
The deterioration of the pavement (how long it lasts) is defined within StreetSaver in order to analyze the life of the pavement and where to best invest funds to extend that life. Inspections are important to better refine the deterioration curve of how that specific segment of pavement is performing over its life span.

Staff annually inspects the condition of the County maintained roads. Pavement inspection is conducted via inspection units. Staff conducts 600 plus inspections units per year. An inspection unit is a small segment of pavement section selected of convenient size which is then inspected in detail. The distress found in the inspection unit is used to calculate the PCI for the unit inspected. The PCI of the inspection units in the selection are then extrapolated to represent the condition of the entire section.

Routine Maintenance vs. Preventative Maintenance
Routine Maintenance consists of day-today activities that are scheduled by maintenance staff to maintain and preserve the condition of the roadway system.

Preventative Maintenance on the other hand consists of minor and major rehabilitation projects. Minor projects are non-structural enhancements made to the existing pavement sections to eliminate age-related surface cracking to extend the life of the existing pavement. Major rehabilitation consists of structural enhancements that both extend the service life of an existing pavement and improve its load-carrying capability.

Routine Maintenance	**Preventative Maintenance**	
	Minor Rehabilitation	*Major Rehabilitation/Reconstruction*
Pothole patching	Chip seal	Cold in place recycling (CIR)
Dig-outs	Microsurfacing	Thick overlays
Culvert cleaning	Slurry seal	Full depth reclamation (FDR)
Crack sealing	Overlays	Rebuild structural section
Shoulder backing		
Striping / signing		

StreetSaver utilizes the deterioration curve, selects the type of treatment based on the segment's PCI and selects specific roads and their treatments, maximizing the funds to extend the life of the pavement. It doesn't take into consideration routine maintenance. However, it is necessary to have routine maintenance as part of a County road maintenance budget. As stated in a later section, "Current Budget and Maintenance Practices" the County spends $3.5 annually on routine maintenance.

Pavement Network and Current Condition

Tuolumne County is responsible for the repair and maintenance of approximately 610 centerline miles of roads, of which 531.7 miles are paved. The majority of the road network is comprised of residential/local roads. **Roads are one of the County's most valuable assets** which are comprised of many components. The replacement value is **estimated to be $154 million just in pavement**, $130.6 million for 53 bridges and other assets, such as curbs and gutters, sidewalks, road side ditches, road drainage culverts, ADA curb ramps, cattle guards, street signs, and 13 signalized intersections have values as well.

The pavement condition index, or PCI, is a numerical classification of pavement grade or condition, ranging from 0 to 100. A newly constructed road will have a PCI of 100 (Very Good), while a heavily alligator road will have a PCI rating of 25 or less (Very Poor). Figure 1 illustrates and defines the range of the pavement condition categories.

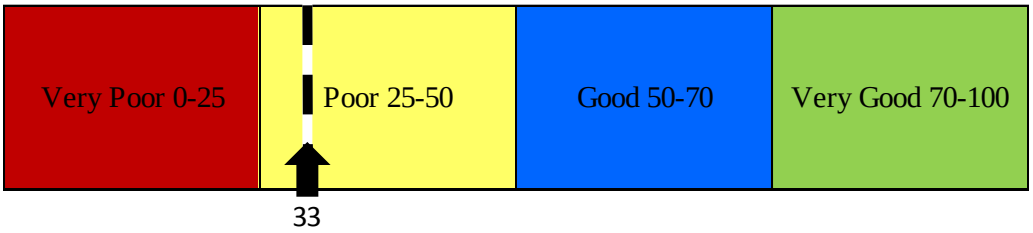

Figure 1. Pavement Condition Categories

The current **network average PCI of roads in the County maintained system is 33**. It has dropped from 46 (2012) to 41 (2014) to 36 (2016). In previous years, the County used four functional classifications: Arterial, Rural Major Collector, Rural Minor Collector and Residential Local Roads. In 2015, staff segregated certain local roads within the Street Saver Software creating a category with a functional class of "Local Collectors." The Local Collectors serve as the main entrances to major subdivisions, such Willow Springs Drive, Paseo De Los Portales, Arbolada Drive, Ponderosa Way and more. The breakdown of centerline miles and percentage of pavement within the network is listed below in Table 2.

Table 2: Pavement Network and Condition Summary for 2017

Functional Class	Centerline Miles	Lane Miles	No. of Management Sections	% of the Network (by area)	Average PCI
Arterial	16.72	41.07	45	5%	77
Rural Major Collector	83.49	169.59	232	19%	53
Rural Minor Collector	112.93	213.6	308	20%	31
Local Collectors	12.39	24.8	35	2%	33
Residential or Local	306.17	613.27	1213	54%	22
Total	**531.7**	**1062.33**	**1833**	**100%**	**33** (network average)

The County's Arterials are in very good condition with an average PCI of 77. The County's Major Collectors are in good condition with an average PCI of 53 and the Minor Collectors are in poor condition with an average PCI of 31. The Local Collectors are in poor condition with an average of 33. Our Local Roads have an average PCI of 22 which is considered in very poor condition.

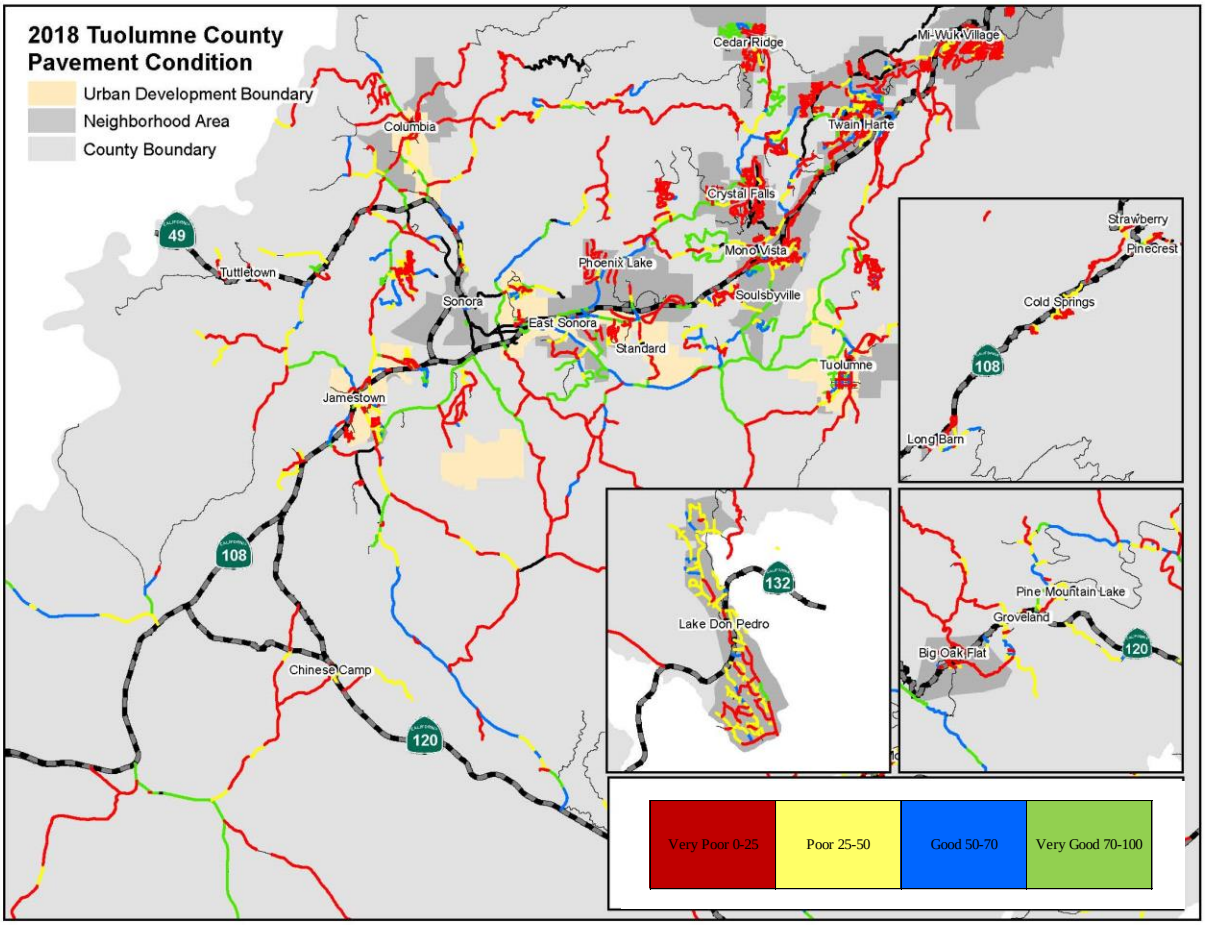

Figure 2. Pavement Condition Regional Map

In Figure 2 above, one can graphically see that the overall road network is in poor condition. However, roadways (major collectors) connecting each urban community, are in good condition.

In 2012, the Board of Supervisors approved the Pavement Management Preventative Maintenance Methodology Matrix, and in 2016 revised the matrix to be more realistic based on the monetary revenues. The Matrix establishes goals for the PCI for each tier. Tier 1 Arterials have a PCI goal greater than 70, Tier 2 Collectors have a PCI goal greater than 50, and Tier 3 Local Roads PCI's were to be determined based on the revenues that would be generated from the senate bill proposed by Senator Jim Beall. Table 3 below summarizes the changes made from 2012 to 2016.

Table 3: Pavement Condition Breakdown by Functional Class and Board's Goals

Functional Class	Average PCI	2012 BOS Goal	2016 BOS Goal
Arterial	77	70	70
Rural Major Collector	53	60	50
Rural Minor Collector	31	60	50
Local Collectors	33	50	TBD
Residential or Local	22	50	TBD
Total	**33 (network average)**		

Below in Figure 3, presents the comparison of the network average PCI from 2012 through 2017. There has been a significant decrease in the overall PCI for each classification of roads in the past two (2) years.

Functional Class	2012 Average PCI	2014 Average PCI	2016 Average PCI	2017 Average PCI	BOS Goal
Arterial	87	79	81	77	70
Rural Major Collector	66	60	57	53	50
Rural Minor Collector	43	41	35	31	50
Local Collectors	-	-	36	33	TBD
Residential or Local	36	30	25	22	TBD
Total (network averge)	**46**	**41**	**36**	**33**	

Figure 3: Comparison of PCI Breakdown by Functional Class for 2012 through 2017

This decrease is the result of limited revenue resources to fund preventative maintenance.

Current Legislation

On April 28, 2017, the Governor signed Senate Bill (SB) 1 (Beall, Chapter 5, Statutes of 2017). The focus of the bill was to address basic road maintenance, rehabilitation and critical safety needs on both the state highway and local streets and road system. SB 1 increases per gallon fuel excise taxes; increases diesel fuel sales taxes and vehicle registration fees; and provides for inflationary adjustments to tax rates in future years.

The tax increases approved by the Legislature is anticipated to raise more than $5.2 billion annually to repair California's crumbling roads and bridges, improve mass transit, expand bike lanes and reduce traffic congestion. The state has a backlog of $130 billion in repair and replacement projects for its transportation system.

The County is anticipated to receive approximately $4 million annually for the next ten years. Even though the revenue comes from gas taxes and registrations, this funding has been separated and is under the Road Maintenance and Rehabilitation Account (RMRA) rather than Highway User Tax Account (HUTA).

Current Budget and Maintenance Practices

In general, the County Road Maintenance budget is broken down into various categories which expenditures and revenues are reported to the State Controller's Office each year by means of *Annual Road Report*. Each activity is separated into a category in order to account for the appropriate use of funds as governed by *California Constitution* Article XIX and *Street and Highways Code* Section 2101.

Figure 4 below shows various areas where road maintenance was expended in year 2017. Only a portion of the budget is provided for preventative maintenance which includes routine maintenance activities such as patching, dig-outs, crack sealing and surface patching. The figure does not show the break-out of preventative maintenance for rehabilitation or reconstruction; the costs are typically captured within the Capital Projects budget or Capital Fund.

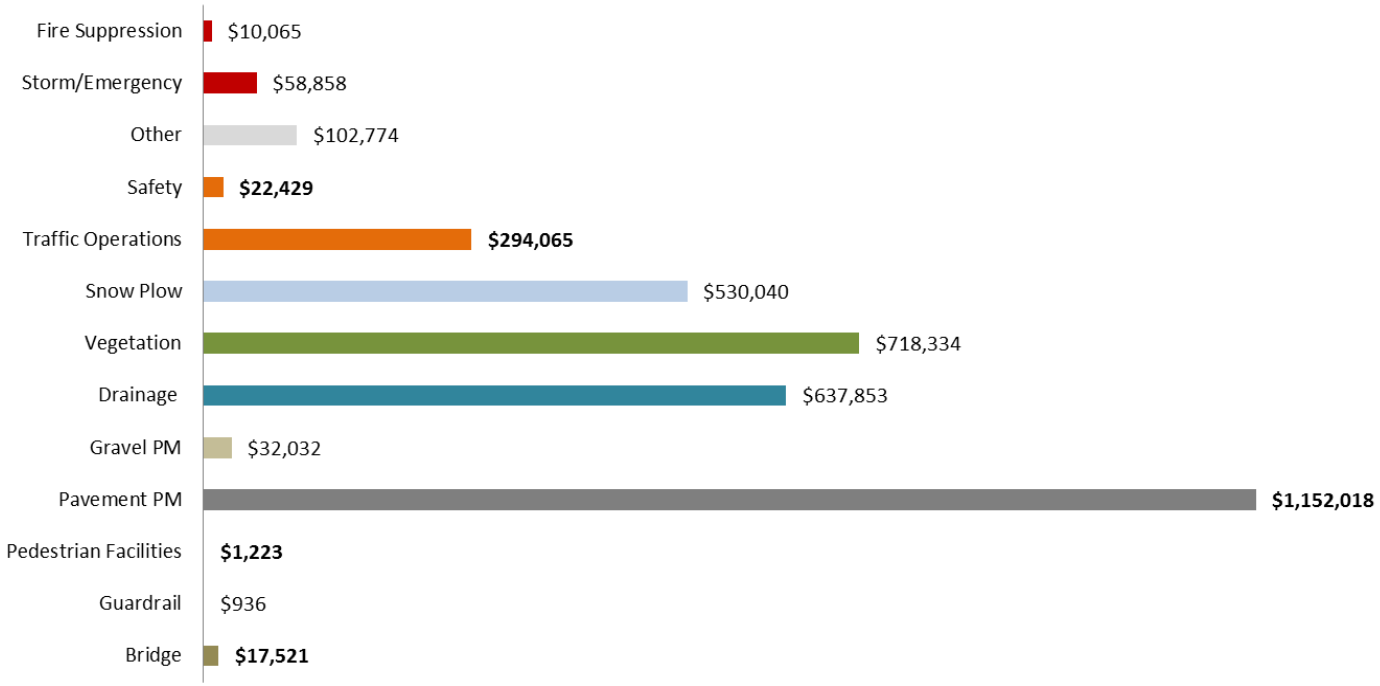

Figure 4: Road Maintenance Expenditures for 2017 ($3.5 million)

A review of the County's expenditures for roads in 2017 indicates that competing demands have resulted in only a small percentage of funds actually going to pavement repairs. For instance, as reported in the 2017 *Annual Road Report* the total expenditure for the Road Fund (all services, engineering and administration, and preventative maintenance) was approximately $5.3 million. Road maintenance allocated $3.5 million, of which approximately $1.1 million was spent on pavement maintenance.

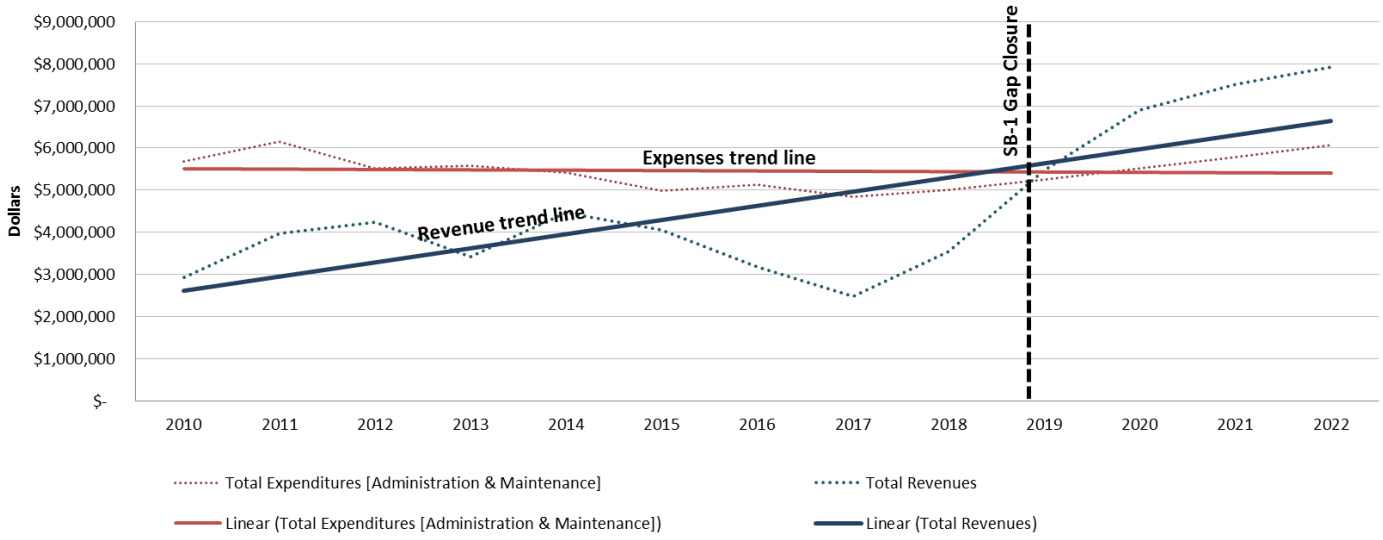

Figure 5: Road Fund Revenues versus Expenses

The County itself has been operating below operating costs based on the significant reduction in revenue for the Road Fund due to decreases in the allocation from the State's Highway User Tax Account (HUTA), commonly referred to as Gas Tax Revenue. Although with the passing of SB-1, also known as the Road Maintenance and Rehabilitation Account (RMRA), it is anticipate that the County will not see an increase in the road network pavement condition index. Operating costs to provide basic road services and routine maintenance is greater than the revenues received. The projections of RMRA funds will close the gap of revenues needed in order to operate the Road Fund.

The trend lines above in Figure 5 show closing funding disparities in fiscal year 2019. Not until then, can the County use the remaining allocations of RMRA funds to work on Capital Projects for rehabilitation or reconstruction in order to increase the County's overall PCI.

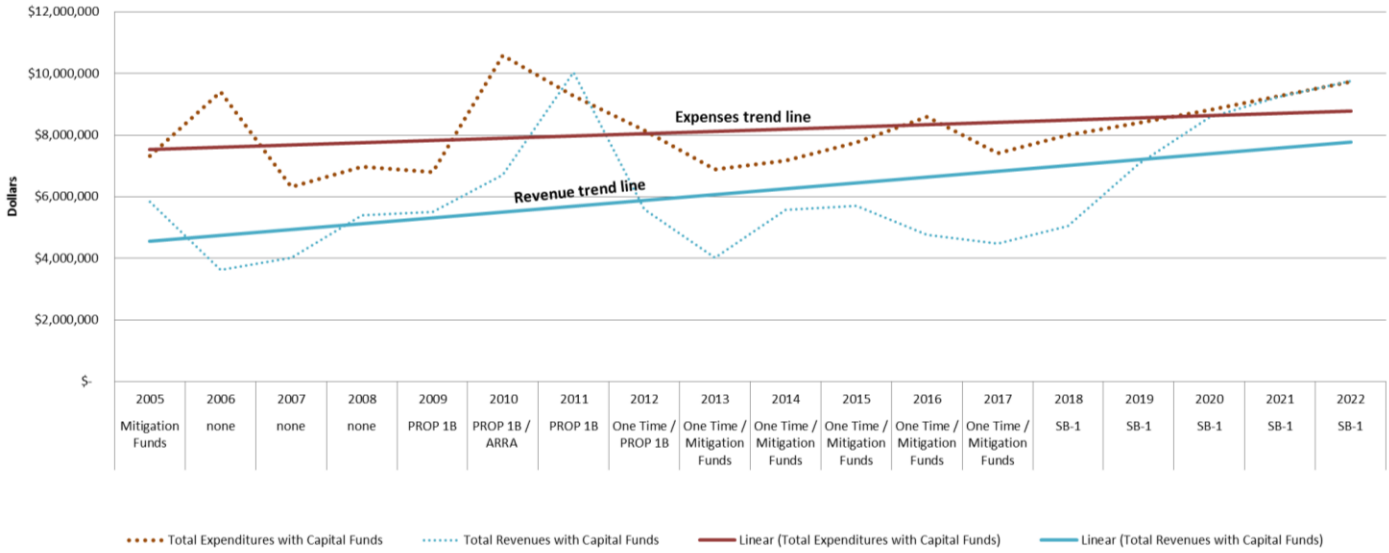

Figure 6: Capital Fund and Road Fund Revenues versus Expenses

Most often the Road Fund is supplemented by the Capital Fund (transportation projects). Engineering staff's extraordinary efforts in writing grants, generating revenue, help fund our Capital Fund. Throughout the years, the County has received additional State and Federal funds including some general one-time funds in conjunction with mitigation funds. The trend lines above in Figure 6 demonstrate, even with the influx of SB-1 revenues, the County will still need to supplement with various State and Federal Funding Programs in order to accomplish the ultimate goal for SB-1.

> *The County will still need to supplement with various State and Federal Funding Programs in order to accomplish the ultimate goal for SB-1.*

Budget Needs

To keep a roadway in a good state of repair, it must be reconstructed if necessary and then given routine maintenance including preventative maintenance. The cycle of preventative maintenance is the key for the most cost efficient long term preservation of that asset.

As shown below in Figure 7 on the following page, the red line represents the County's current PCI position of 33. At this level, it would be required that the roads be reconstructed, prior to being put on the preventative maintenance cycle (shown by the green line) to maintain the intended good state of repair.

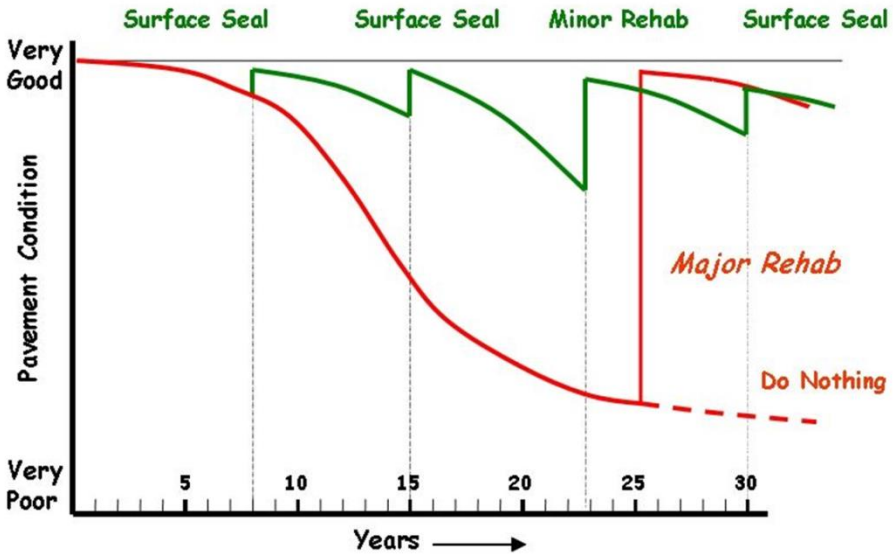

Figure 7: Pavement Cycle for Preventative Maintenance

Using this cycle as shown above, StreetSaver develops a maintenance strategy that can improve the overall condition of the roads, and then maintain it at that level. Using this process, the entire road network for the County was evaluated. This exercise, using an annual 5% inflation factor, identified pavement maintenance needs of approximately **$217.5 million over the next twenty years ($10.9 million per year)**. .

Budget Scenarios

Having determined the 20 year maintenance needs of the County maintained roads, the next step in developing a cost-effective maintenance and rehabilitation strategy is to model several "what if" analyses. Using the StreetSaver budget scenario module, the impacts of various budget scenarios were evaluated.

The program determines the effects of various funding scenarios on system-wide pavement condition index (PCI) and deferred maintenance (unfunded backlog). By examining the effects and outcomes of the various funding scenario models, the advantages and disadvantages of different funding levels and maintenance strategies become clear. The following scenarios were analyzed for this report:

Scenario 1: Perfect World - Eliminate Unfunded Backlog **–** Under this scenario, an estimated **$198.7 million would be required over the next 20 years** to eliminate the unfunded maintenance backlog in the first year. It will also increase the current network PCI of 33 to 70 over the next twenty years. By 2037, 90% of the network will be in the "Very Good" and "Good" condition categories.

In many respects, this scenario represents the "perfect world" scenario, since it assumes that all required repairs are funded. However, this is not achievable and requires the County expend to **$85 million in the first three years (2018-2020)** to bring the roads to a good repair prior to spending an average of **$6.7 annually for the remain seventeen years** to maintain a PCI above 70.

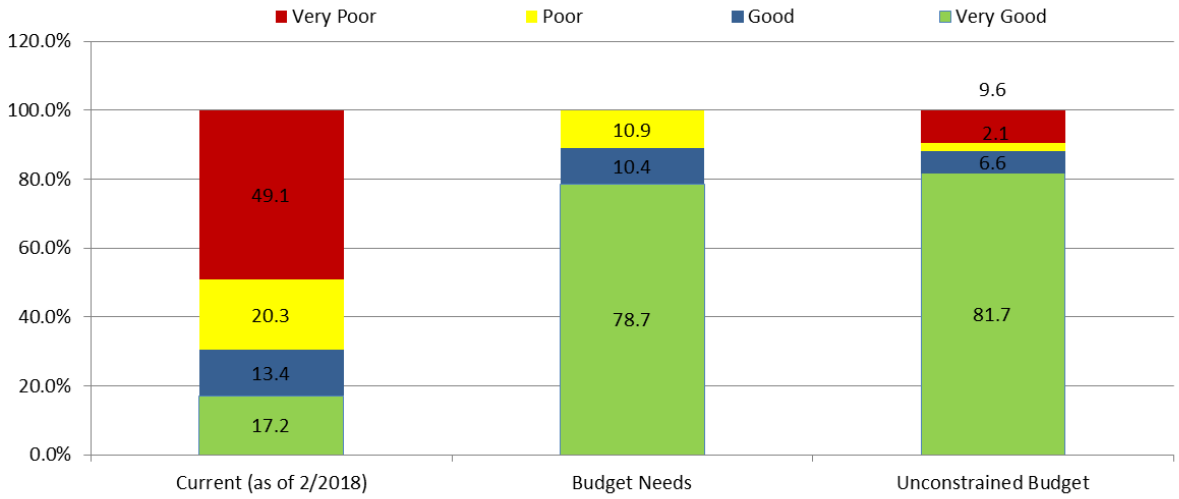

Figure 8 Pavement Condition Eliminating the Unfunded Backlog

Figure 8 above demonstrates the "perfect world" scenario by having an unconstrained budget. It is consistent with the needs for the County.

Note: Deferred maintenance consists of pavement maintenance that is needed, but cannot be performed due to lack of funding. It is also referred to as the unfunded backlog.

Scenario 2: Meet goals of County presented in 2016 (70-50-0)– The Board adopted PCI goals in 2012 and modified these goals in 2016. The goals identified Arterials to maintain a PCI of 70 and above, the Collectors to maintain a PCI of 50 and above. It was not determined a goal for local roads due to the proposed legislation (Senate Bill 1).

Using StreetSaver's ability for target driven scenarios, Scenario 2 defines Arterials to be above a PCI of 70, Collectors to be above a PCI of 50, and Local Roads to be above a PCI of 0. Meaning, that the County would no longer provide preventative maintenance on the local roads and only fund improvements on the Arterial and Collector Roads.

This scenario would require approximately **$81.4 million over the next 20 years ($4.1 annually)**, of which $56.8 million would go to rehabilitation and $24.6 million to preventative maintenance. It would increase the Minor Collectors' PCI of 31 to PCI of 50+, and the Residential/Local Roads from a PCI of 30 to a PCI of 0+ over the next twenty years. This scenario would decrease the overall network to a PCI of 24. Thus, because majority of the overall network is local roads.

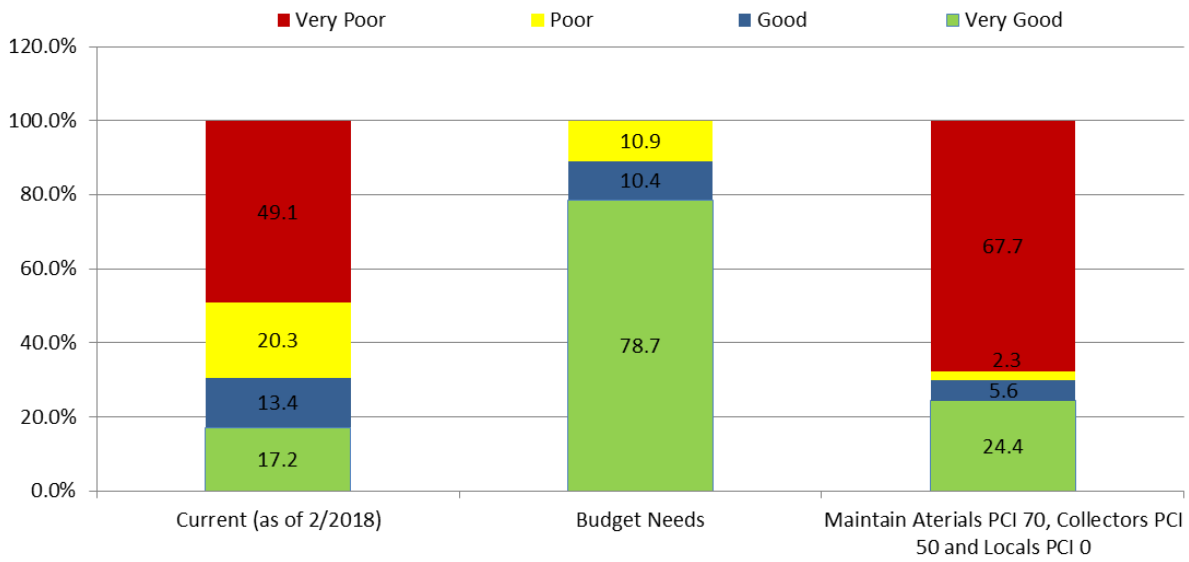

Figure 9 Pavement Condition Eliminating the Preventative Maintenance on Local Roads

It is projected by California State Association of Counties (CSAC) that the County should receive approximately $4 million to $5 million annually from the revenues received by SB-1 (RMRA Fund). Under this scenario, all revenues received from the RMRA funds could fund preventative maintenance needs on the County's Arterials and Collectors Roads. The Local Roads would require some other measures in order to fund pavement maintenance needs.

The additional revenues from SB-1, if all received funds were allocated, can fund preventative maintenance only on the County's Arterials and Collector Roads.

Scenario 3: Minimum Percent of Road Network in Very Good Condition – This target driven scenario evaluates the proposed option for the County to focus a minimum percent of each classification in good condition. The analysis targeted one hundred percent of the Arterials in very good condition, seventy percent of the Collectors in very good condition and ten percent of the Locals in very good condition. The County will require approximately **$124 million over the next 20 years ($6.2 million annually),** of which $84.8 million would go to rehabilitation and $39.5 to preventive maintenance. It would increase the overall network to a PCI of 41.

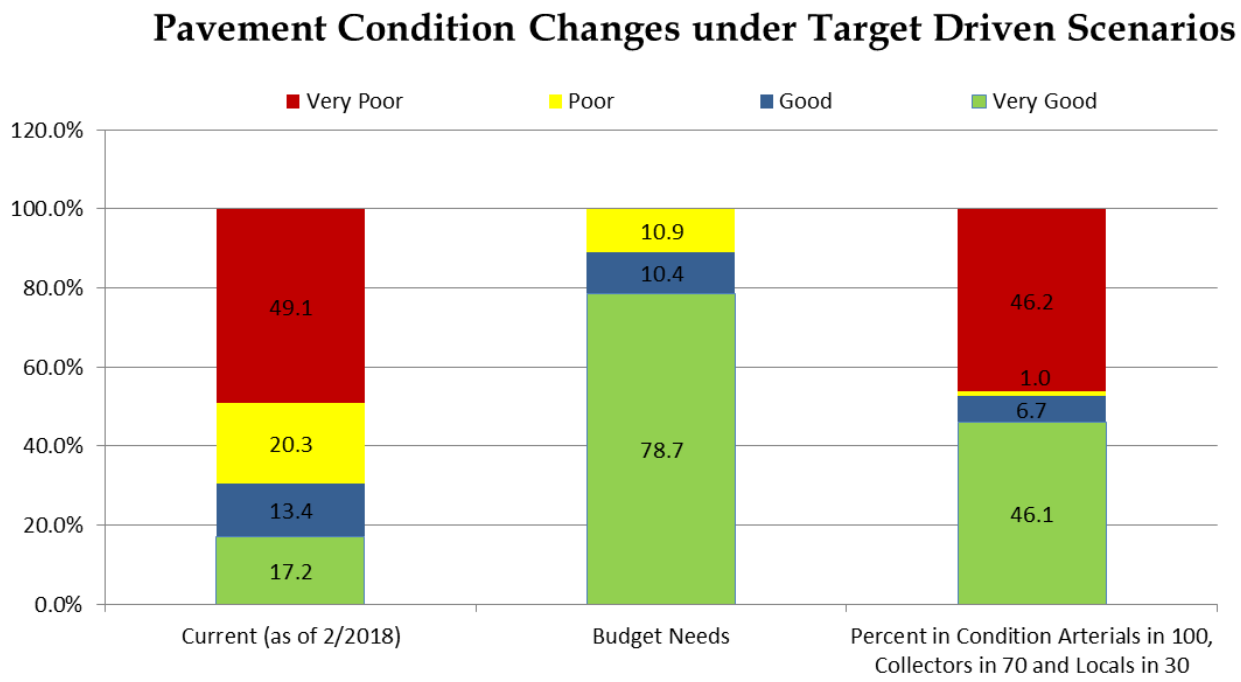

Figure 10 Pavement Condition Minimum Percent in Very Good Condition

Based on the projections as stated above, revenues received from SB-1 (RMRA Fund) would not be enough to maintain this scenario. However, if the County became a self-help County and could generate the additional $1.2 million annually, then almost half the entire network could be brought in a very good condition.

The Need for Additional Funding (Reserve Funding)

The County's current funding level for pavement is estimated to be approximately $1.1 million annually for routine maintenance towards preventative maintenance. At this budget level, the network PCI will decrease dramatically to a PCI of 15 by 2037. Our County's 610 miles of network is in the last spiral to failure. Within the next thirty years our road system will literally fall apart.

With the passing of SB-1, the RMRA will only close the gap in the Road Fund for routine road maintenance activities. This alone will not generate enough revenue to bring the County roads in a good state of repair.

Since 57% of the network is composed of residential/local roads, the County could look at funding those roads with special funding mechanisms. The following alternatives are some of the possibilities the County should consider to generate additional revenue:

- **Regional Sales Tax (County Wide) Transportation Authority**
  The Self-Help Counties Coalition (SHCC) is an organization of 20 local county transportation agencies delivering super majority voter-approved transportation sales tax measures throughout California.

- **Develop Permanent Road Divisions (PRD) Zones**
  PRDs provide a mechanism for funding road maintenance and associated services for neighborhood roads that are dedicated to the public but are not part of the County maintained system. The County's active CSAs and PRDs have a network average greater than a PCI of 68 for their maintained roads.

- **Allocate Local Transportation Funds (LTF) annually**
  LTF funds are administered by TCTC and are annually allocated to the County and the City for road maintenance using a population based formula. For Fiscal Year 2016-2017, $185,661 of LTF funds was included in the County's Road Maintenance Budget.

All of the possible solutions require public involvement. Public meetings could be held to educate the general public about what might be economical solutions for their areas. Having such funds in place would provide an opportunity for the Board to develop a reasonable goal of a PCI greater than 0.

39% of the network is composed of Collector Roads. The County could look into funding those roads via means which target more users, since they are likely traveled by services in the County as well as economic resources to our recreational and commercial centers throughout the County. Some possible fund sources are:

- **Truck Route Permit Fee**
  Currently the County doesn't have a Fee. Leverages a surcharge fee on trucks for use of County roads to help recoup the costs of heavy wheel loads from truck traffic.

- **Devote More Local Sales Tax/General Fund revenues to Road Maintenance**.
  The County currently under its Maintenance of Effort (MOE) contributes $775,000 towards road maintenance. This is one percent of General Fund that is invested on transportation.

Summary

The County's needs are **$217.5 million over the next twenty years ($10.9 million per year)** just for pavement. This value doesn't include routine maintenance and other financial needs for other transportation infrastructure.

The County is in no position to bring the roadway network into a good state of repair. The County would be required to invest **$85 million in the first three years (2018-2020)** to bring the roads to a good repair prior to spending an average of **$6.7 annually for the remain seventeen years** to maintain a PCI above 70.

The Board of Supervisors should re-evaluate the County's PCI goals for each road classification. Even if the County invested all the revenues anticipated from SB-1 just to pavement preservation, requiring approximately **$81.4 million over the next 20 years ($4.1 annually)**, it would neglect the local roads (dropping a PCI down to 0) and require supplementing additional revenues for the fiscal deficiencies in the Road Fund for routine maintenance and services. The overall network would remain in poor condition with a PCI of 24 due to the lack of preventative maintenance on the local roads.

A solution for the County would be to pursue a Regional Sales Tax to provide supplemental revenues to expend on the needed preventative maintenance for the County maintained roadway network. An additional percent could general enough revenues, including SB-1 revenues, to keep one hundred percent of the County's Arterials in very good condition, seventy percent of the Collectors in very good condition and ten percent of the Locals in very good condition. The County will require approximately **$124 million over the next 20 years ($6.2 million annually)** to keep the pavement in good condition and an overall network to a PCI of 41.

There are approximately 24 self-help counties that have been successful at improving overall transportation network by implementing a transportation sales tax. San Joaquin County, with the half-cent sales text in Measure K has generated $735 million in transportation improvements within the County. Yolo County is also looking at the same challenges as Tuolumne County as to not having enough revenue from SB-1 to meet their 10 year needs, as reported in the *Davis Enterprise.* Yolo County is looking to generate $8.5 million with a countywide quarter-cent sales tax to provide repairs in the unincorporated county roads and city streets of Davis, Winters, Woodland and West Sacramento[1].

[1] https://www.davisenterprise.com/local-news/county-looking-at-sales-tax-increase-to-fund-road-repairs/

Conclusions

Tuolumne County already has a substantial investment in its County-maintained road system, which is estimated to have a replacement cost of $154 million. Overall, the roads are in poor condition, with an average PCI of 33. Less than a quarter of the County's maintained roads are in the good condition category, while almost two-thirds are in poor or very poor condition categories. The latter category will require significant amounts of funding to repair.

The analyses indicate that the County needs to spend $217.5 million in pavement maintenance and rehabilitation over the next twenty years, in order to reduce the unfunded backlog. By doing so, roads can be maintained in good condition with on-going preventive maintenance.

As the Board's legislative platform has identified the need to conduct a study of options for the eventual replacement of the gas tax as the primary means of funding local road construction and maintenance, it is also identified in this report that even with the passing of SB-1, still will not be enough to fiscally restore our roadway network into a good state of repair. If the County pursues becoming a self- help county the opportunity for the County to capitalize on much needed repair will be optimal with the help of the many fiscal revenue sources in order to maintain and improve the road network.

Appendix A

Network Summary Statistics
Budget Needs - Projected PCI/Cost Summary Report
Budget Needs - Preventive Maintenance Treatment/Cost Summary Report
Budget Needs - Rehabilitation Treatment/Cost Summary Report

Tuolumne County
2 S. Green Street
Sonora, CA 95370
(209) 533-3633

Network Summary Statistics

Printed: 03/21/2018

	Total Sections	Total Center Miles	Total Lane Miles	PCI
Arterial	45	16.72	41.07	79
Other	35	12.39	24.80	34
Rural Minor Collector (6)	308	112.93	214.38	30
Rural Major Collector (5)	232	83.49	169.59	51
Residential/Local	1,213	306.17	605.96	21
Total	**1,833**	**531.69**	**1,055.80**	
			Overall Network PCI as of 3/21/2018:	**32**
****Combined**	**9**	**4.20**	**8.39**	**N/A**
Residential/Local	1	0.23	0.46	N/A
Gravel	8	3.97	7.93	N/A

**** Combined Sections are excluded from totals. These Sections do not have a PCI Date - they have not been inspected or had a Treatment applied.**

Tuolumne County
2 S. Green Street
Sonora, CA 95370
(209) 533-3633

Needs - Projected PCI/Cost Summary

Inflation Rate = **5.00 %** Printed: 02/20/2018

Year	PCI Treated	PCI Untreated	PM Cost	Rehab Cost	Cost
2018	91	30	$849,678	$104,378,231	$105,227,909
2019	85	27	$457,840	$3,077,178	$3,535,018
2020	84	25	$237,142	$3,151,876	$3,389,018
2021	82	23	$988,018	$267,243	$1,255,261
2022	83	21	$1,213,812	$2,861,614	$4,075,426
2023	80	20	$335,613	$1,853,385	$2,188,998
2024	79	18	$384,710	$2,923,801	$3,308,511
2025	80	17	$11,581,771	$3,007,415	$14,589,186
2026	81	15	$1,290,744	$3,524,199	$4,814,943
2027	80	14	$9,510,782	$750,310	$10,261,092
2028	79	13	$1,772,221	$196,787	$1,969,008
2029	77	12	$774,557	$117,791	$892,348
2030	78	11	$1,025,599	$5,541,571	$6,567,170
2031	75	10	$765,263	$2,782,231	$3,547,494
2032	76	9	$16,237,164	$3,357,880	$19,595,044
2033	74	8	$725,760	$1,543,455	$2,269,215
2034	76	8	$1,442,177	$9,375,941	$10,818,118
2035	75	7	$13,368,521	$2,751,198	$16,119,719
2036	74	6	$479,982	$750,056	$1,230,038
2037	72	6	$1,286,426	$568,224	$1,854,650

% PM	PM Total Cost	Rehab Total Cost	Total Cost
29.76%	**$64,727,780**	**$152,780,386**	**$217,508,166**

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Sonora, CA 95370
(209) 533-3633

Needs - Preventive Maintenance Treatment/Cost Summary

Inflation Rate = **5.00 %** Printed: 01/20/2018

Treatment	Year	Area Treated		Cost
CRACK SEAL AND CAPE SEAL	2018	51,676.67	sq.yd.	$258,386
	2019	7,833.33	sq.yd.	$41,125
	2021	80,984.89	sq.yd.	$468,755
	2022	111,166.22	sq.yd.	$675,625
	2024	58,920	sq.yd.	$394,796
	2025	7,833.33	sq.yd.	$55,112
	2026	68,469.11	sq.yd.	$505,805
	2027	87,189.56	sq.yd.	$676,304
	Total	474,073.11		$3,075,908
CRACK SEAL AND CHIP SEAL	2018	108,407	sq.yd.	$509,521
	2019	108,050.33	sq.yd.	$533,236
	2020	42,374.22	sq.yd.	$219,577
	2021	92,765.11	sq.yd.	$504,731
	2022	89,708.56	sq.yd.	$512,505
	2023	55,592.44	sq.yd.	$333,480
	2024	27,206.56	sq.yd.	$171,363
	2025	1,671,723.56	sq.yd.	$11,055,900
	2026	114,436.44	sq.yd.	$794,658
	2027	62,813.11	sq.yd.	$457,992
	Total	2,373,077.33		$15,092,963
CRACK SEAL AND REJUVENATOR	2018	32,882.56	sq.yd.	$82,213
	2019	5,378.22	sq.yd.	$14,118
	2020	6,372.22	sq.yd.	$17,565
	2021	5,004.44	sq.yd.	$14,485
	2023	557.33	sq.yd.	$1,779
	2025	29,283	sq.yd.	$103,013
	2026	26,793.67	sq.yd.	$98,974
	2027	2,172,136.33	sq.yd.	$8,424,614
	Total	2,278,407.78		$8,756,761
SEAL CRACKS	2021	25.15	ft.	$47
	2022	1,576.75	ft.	$3,081
	2023	172.94	ft.	$354
	Total	1,774.84		$3,482
SINGLE CHIP SEAL	2025	4,111.11	sq.yd.	$10,066
	2026	141,080.78	sq.yd.	$362,699
	Total	145,191.89		$372,765
	Total Quantity	5,272,524.95		$27,301,879

Tuolumne County
2 S. Green Street
Sonora, CA 95370
(209) 533-3633

Needs - Rehabilitation
Treatment/Cost Summary

Inflation Rate = **5.00 %** Printed: 01/20/2018

Treatment	Year		Area Treated		Cost
CAPE SEAL	2018		122,190.33	sq.yd.	$574,302
	2022		137,981.44	sq.yd.	$788,285
	2023		5,420	sq.yd.	$32,512
	2026		137,981.44	sq.yd.	$958,164
	2027		5,420	sq.yd.	$39,519
		Total	408,993.22	sq.yd.	$2,392,782
CAPE SEAL WITH LOCALIZED REPAIR	2018		698,786.67	sq.yd.	$7,896,384
	2019		34,578.44	sq.yd.	$410,277
		Total	733,365.11	sq.yd.	$8,306,661
CHIP SEAL	2018		452,175.67	sq.yd.	$1,537,437
	2022		452,175.67	sq.yd.	$1,868,768
	2026		452,175.67	sq.yd.	$2,271,498
		Total	1,356,527	sq.yd.	$5,677,703
CIR (3") + AC (1.5")	2018		1,088,818.22	sq.yd.	$29,180,429
		Total	1,088,818.22	sq.yd.	$29,180,429
CIR (4") + AC (2")	2018		21,441.33	sq.yd.	$804,050
		Total	21,441.33	sq.yd.	$804,050
CRACK SEAL AND CHIP SEAL	2018		344,534.33	sq.yd.	$1,614,605
	2019		22,004.78	sq.yd.	$106,890
	2020		56,868.11	sq.yd.	$294,680
	2021		6,111.11	sq.yd.	$33,250
	2025		211,138.78	sq.yd.	$1,396,363
	2026		22,540.33	sq.yd.	$153,884
	2027		56,868.11	sq.yd.	$414,643
		Total	720,065.56	sq.yd.	$4,014,315
MICROSURFACING	2018		137,767	sq.yd.	$344,440
	2019		405,850.67	sq.yd.	$1,065,404
	2020		360,326.11	sq.yd.	$993,194
	2021		33,141.67	sq.yd.	$95,918
	2022		35,898.56	sq.yd.	$109,094
	2023		17,899.33	sq.yd.	$57,116
	2024		31,980.22	sq.yd.	$107,146
	2025		11,348.89	sq.yd.	$39,925
	2026		23,793.33	sq.yd.	$87,890
	2027		21,443.89	sq.yd.	$83,169
		Total	1,079,449.67	sq.yd.	$2,983,296
MILL AND THIN AC OVERLAY (2")	2018		183,322.67	sq.yd.	$4,245,132
	2019		6,204.67	sq.yd.	$155,707
	2020		30,282.22	sq.yd.	$775,396
	2024		2,913	sq.yd.	$89,395
		Total	222,722.56	sq.yd.	$5,265,630
PULVERIZED-STABLIZED BASE (5")/ CAPE SEAL	2018		2,166,758.11	sq.yd.	$46,585,593
		Total	2,166,758.11	sq.yd.	$46,585,593
SLAB REPLACEMENT	2019		2,133.33	sq.yd.	$12,992

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Needs - Rehabilitation
Treatment/Cost Summary

Inflation Rate = **5.00 %** Printed: 01/20/2018

Treatment	Year		Area Treated		Cost
	2023		4,055.56	sq.yd.	$30,021
		Total	6,188.89	sq.yd.	$43,013
SLURRY SEAL WITH LOCALIZED REPAIR	2018		107,367.78	sq.yd.	$311,381
	2019		418,462.56	sq.yd.	$1,274,280
	2020		353,521.11	sq.yd.	$1,130,354
	2021		41,127.44	sq.yd.	$138,075
	2022		24,836.22	sq.yd.	$87,551
	2023		31,271.11	sq.yd.	$115,744
	2024		12,553.89	sq.yd.	$48,790
	2025		1,706.67	sq.yd.	$6,965
	2026		4,726	sq.yd.	$20,250
	2027		5,099.44	sq.yd.	$22,943
		Total	1,000,672.22	sq.yd.	$3,156,333
THICK AC OVERLAY (2.5")	2018		367,977.22	sq.yd.	$10,708,168
	2019		6,386.11	sq.yd.	$195,128
	2023		51,795.11	sq.yd.	$1,923,664
	2024		53,884.67	sq.yd.	$2,101,334
	2025		38,785.44	sq.yd.	$1,588,137
	2027		6,111.11	sq.yd.	$275,878
		Total	524,939.67	sq.yd.	$16,792,309
SINGLE CHIP SEAL	2018		10,472.22	sq.yd.	$11,625
	2019		10,472.22	sq.yd.	$12,207
	2022		5,866.67	sq.yd.	$7,916
	2023		516.67	sq.yd.	$732
	2027		4,088.89	sq.yd.	$7,041
		Total	31,416.67	sq.yd.	$39,521
RECONSTRUCT STRUCTURE (AC)	2018		60,959.11	sq.yd.	$533,399
		Total	60,959.11	sq.yd.	$533,399
THICK AC OVERLAY(2.5 INCHES)	2018		80,121.67	sq.yd.	$478,329
		Total	80,121.67	sq.yd.	$478,329
				Total Cost	$126,253,363

Appendix B

Pavement Management Preventative Maintenance Methodology Matrix

2016 Adopted Pavement Management Preventative Maintenance Methodology

	PCI Existing	PCI Goal	Road class	Primary factor:	Secondary Factor:	Tertiary Factor:
				ADT	Truck Traffic	Service
Tier 1	77	70+	Arterials	Arterial Roads with higher ADT's will have a higher priority for funding and project selection.	Roads with similar ADT's that carry higher truck traffic volumes will have a higher priority in receiving preventative maintenance treatment.	Services entire county Multi-modes of transportation
Tier 2	53 31 33	50+	Major Collectors Minor Collectors Local Collector*	Collector Roads with higher ADT's will have a higher priority in funding and scheduling.	Roads with similar ADT's that carry higher truck traffic volumes will have a higher priority in receiving preventative maintenance treatment.	Access recreational and commercial centers. Multi-modes of transportation
Tier 3	22	TBD	Local Roads	Local Roads with higher ADT's will have a higher priority in funding and scheduling.		Roads that meet CVC 627** definition for residential density will have a higher priority for funding and project selection.
Tier 4	N/A	N/A	Local Roads - Gravel	Local Roads (Gravel) will receive limited preventative maintenance treatments.		Roads with similar ADT's that carry higher truck traffic volumes will have a higher priority in receiving preventative maintenance treatment.

*Designated as a Local Road that has an ADT comparable to a Collector

**California Vehicle Code 627 Engineering and Traffic Survey