

TECHNICAL MEMORANDUM

Date: 12/9/2019

To: Richard Deal, Transportation Agency for Monterey County

From: Margot Yapp, Shahram Misaghi, and Sharlan Montgomery Dunn, NCE

Subject: **DRAFT** Summary of Pavement Management Program Implementation for Monterey County and the Cities of Carmel-by-the-Sea, Del Rey Oaks, Greenfield, King City, Marina, Pacific Grove, and Sand City

Job #: 967.01.55

Background

Remarkable changes in the local and state transportation funding picture have been observed with the passage of Measure X in 2016 and the Road Maintenance and Rehabilitation Act (RMRA) in 2017. Combined, these two funding sources will inject more than \$12 million per year into Monterey County (County). To take advantage of these opportunities, Measure X requires local agencies to develop pavement management programs (PMPs) and to submit reports on road conditions. Similarly, access to RMRA funds requires agencies to submit project lists and expenditure reports for approval by the California Transportation Commission. Robust PMPs not only aid in funding receipt, but also provide accountability and transparency to residents. To access these and other benefits, the Transportation Agency for Monterey County (TAMC) selected Nichols Consulting Engineers, Chtd. (NCE) in 2018 to assist the County and seven local cities in developing their own PMPs.

This memorandum summarizes the countywide network and presents the aggregated results of the budget needs and funding analyses performed by NCE in 2018/19 for the County and the cities of Carmel-by-the-Sea, Del Rey Oaks, Greenfield, King City, Marina, Pacific Grove, and Sand City under the PMP implementation scope with TAMC. Note that the following analyses do not include the cities of Gonzales, Monterey, Salinas, Seaside, and Soledad.

Countywide Street/Road Inventory and Pavement Condition

Together, the County and the seven cities included in the 2018/19 implementation scope maintain approximately 1,345 centerline miles of paved streets and roads, the bulk of which are maintained by the County. Table 1 summarizes each jurisdiction's network including the network replacement cost, the pavement condition index (PCI), and the remaining service life (RSL). The aggregated network (hereafter denoted in this report as the "countywide" network), is also summarized in Table 1.

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Table 1. Countywide Summary Statistics

Jurisdiction	No. of Management Sections	Centerline Miles	Network Replacement Cost (\$M)	2018 Pavement Condition Index	2018 Remaining Service Life
Carmel-by-the-Sea	233	27.0	21.6	78	22
Del Rey Oaks	66	9.6	13.2	74	18
Greenfield	229	35.7	23.7	66	13
King City	166	30.7	49.8	61	14
Marina	450	75.3	98.3	64	17
Monterey County	2,281	1,094.9	1,100	48	8
Pacific Grove	360	66.7	65.9	55	11
Sand City	40	5.1	4.7	59	13
Countywide	3,825	1,345	1,377	52	10

The countywide local street/road network replacement cost is estimated to be \$1.4 billion. This can be viewed as the value of the pavement network and is the amount needed to fund reconstruction of the entire pavement network. This value does not include related infrastructure assets such as sidewalks, signals, markings, or signs.

The PCI is a measure of the pavement condition and ranges from zero to 100. A newly constructed road has a PCI of 100, while a failed road has a PCI of 25 or less. PCI ratings from 50-69 are considered to be in “Fair” condition. A pavement’s condition is affected by the environment, traffic loads and volumes, construction materials, and age. **The average PCI for the countywide network is 52.** This value is an area-weighted calculation. The 2018 PCIs for each jurisdiction are shown in Figure 1, along with the countywide and 2018 statewide average PCIs¹.

The RSL indicates the time it takes for a pavement section to deteriorate from its current condition to a failed condition (PCI<25) if no maintenance occurs. **The average RSL for the countywide network is approximately 10 years.**

¹ NCE. 2018. *California Statewide Local Streets and Roads Needs Assessment 2018 Update*. October.

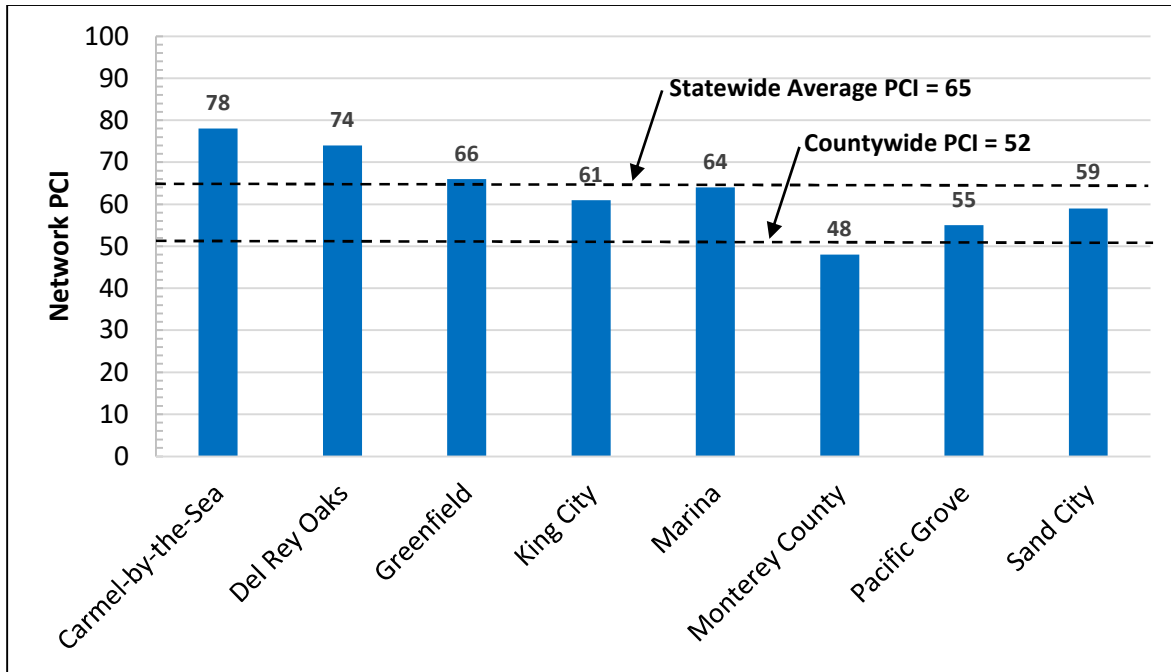


Figure 1. TAMC Jurisdiction PCIs and Countywide Network PCI

The PCI scale is divided into five condition categories as shown in Figure 2 using the PCI breakpoints shown on the right of the figure. Pavements in “Fair” condition are divided into two categories representing roads with primarily non-load-related distresses or roads with load-related distresses. Categories I and II have primarily non-load-related distresses (e.g., weathering), and Categories III, IV, and V have primarily load-related distresses (e.g., fatigue cracking). Since the failure mechanisms for load-related distresses are quite different from non-load-related distresses, the treatments used to address them are different, as are their associated costs. Generally, roads with load-related distresses are more expensive to repair.

Condition Category	Pavement Condition	PCI breakpoint
I	Good	100
II/III	Fair (non-load) / Fair (load-related)	70
IV	Poor	50
V	Failed	25
		0

Figure 2: Pavement Condition Categories by PCI

Figure 3 graphically breaks down the countywide network by condition category and also shows the breakdown for each jurisdiction. As shown, 20.9 percent, or about one-fifth, of the countywide network is in “Good” condition, 28.9 percent is in “Fair” condition, 42.5 percent is in Poor condition, and 7.7 percent is in “Failed” condition. By jurisdiction, Carmel-by-the-Sea and Del Rey Oaks have the largest percentages of roads in “Good” condition and Monterey County has smallest.

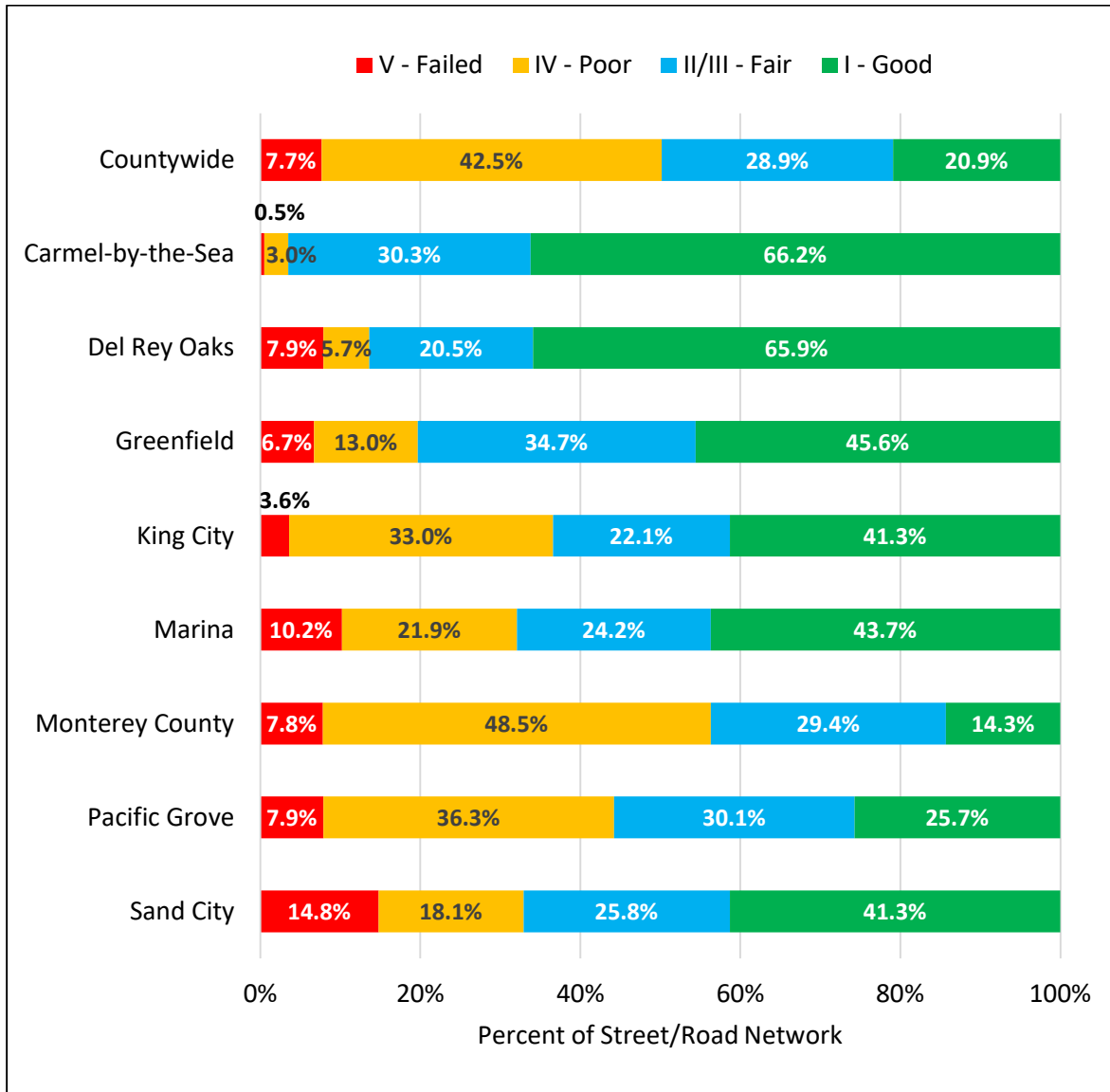


Figure 3: Breakdown of Street/Road Network by Pavement Condition Category

Budget Needs Analysis

A budget needs analysis was performed to identify the funding required to perform all maintenance and rehabilitation treatments at the optimal time. As shown in Table 2, **the countywide 10-year maintenance budget needs is estimated at \$762 million.**

Table 2. Summary Results for Needs Analysis

Jurisdiction	10-Year Budget Needs (\$M)
Carmel-by-the-Sea	6.0
Del Rey Oaks	3.2
Greenfield	15.2
King City	22.3
Marina	33.4
Monterey County	644.2
Pacific Grove	34.8
Sand City	2.7
Countywide	761.8

Table 3 lists the 10-year existing funding levels for each jurisdiction, including Measure X and RMRA funds.

Table 3. Existing Funding by Jurisdiction

Jurisdiction	10-Year Existing Funding (\$M)
Carmel-by-the-Sea	3.45
Del Rey Oaks	1.39
Greenfield	11.0
King City	9.0
Marina	15.0
Monterey County	240.0
Pacific Grove	11.4
Sand City	0.4
Countywide	291.7

Figure 4 compares the existing funding to the funding needs by showing the percent of funding needs met by the existing funding countywide and for each jurisdiction. The existing funding will only meet approximately 38.3 percent of the countywide needs over the next 10 years.

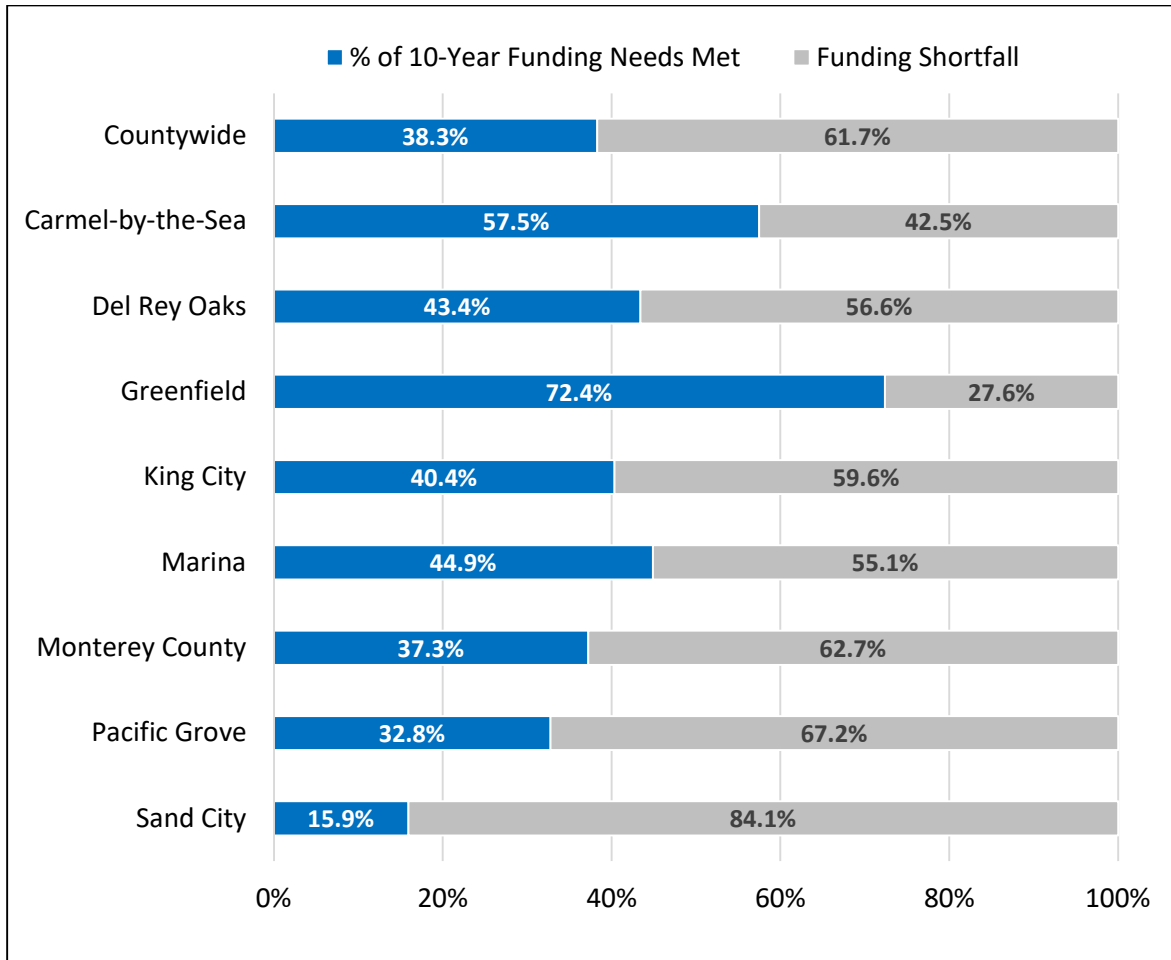


Figure 4. Percent of 10-Year Funding Needs Met by Existing Funding

Funding Scenarios

In general, three main funding scenarios were performed for each jurisdiction:

Scenario 1: Existing Funding – This scenario determines the effect of the existing annual funding on network condition and deferred maintenance.

Scenario 2: Maintain Current PCI – This scenario aims to maintain the network PCI at the current level.

Scenario 3: Best Management Practices – This scenario aims to achieve a maintainable network by minimizing the deferred maintenance by the end of the analysis period.

Two jurisdictions opted to modify these scenarios:

- King City – Replaced the best management practice scenario (Scenario 3) with one that increased the network PCI to 70 during the first 5 years and then maintained it for the following 5 years.
- Marina – Replaced the maintain current PCI scenario (Scenario 2) with one showing the effect of a \$2.5M per year budget and replaced the best management practice scenario (Scenario 3) with one that improved the PCI to 70 by the end of the analysis period.

Results of Funding Scenarios

The results of the scenarios for each jurisdiction were aggregated to estimate the countywide budget, PCI, and deferred maintenance. The results of the modified scenarios for King City and Marina were similar to the desired countywide scenarios and were therefore considered an acceptable substitution and were incorporated directly into the aggregated Scenario 2 and Scenario 3.

The funding scenarios indicate that the countywide 10-year budget were \$291.7 million for Scenario 1, \$388.1 million for Scenario 2, and \$837.2 million for Scenario 3. Figure 5 graphically shows the change in PCI over time for each scenario. Under the existing funding (Scenario 1), the countywide PCI will fall to 46 by 2028. For Scenario 2, the countywide PCI will be maintained at 52 throughout the analysis period, and for Scenario 3, the countywide PCI will increase to 78 by 2028.

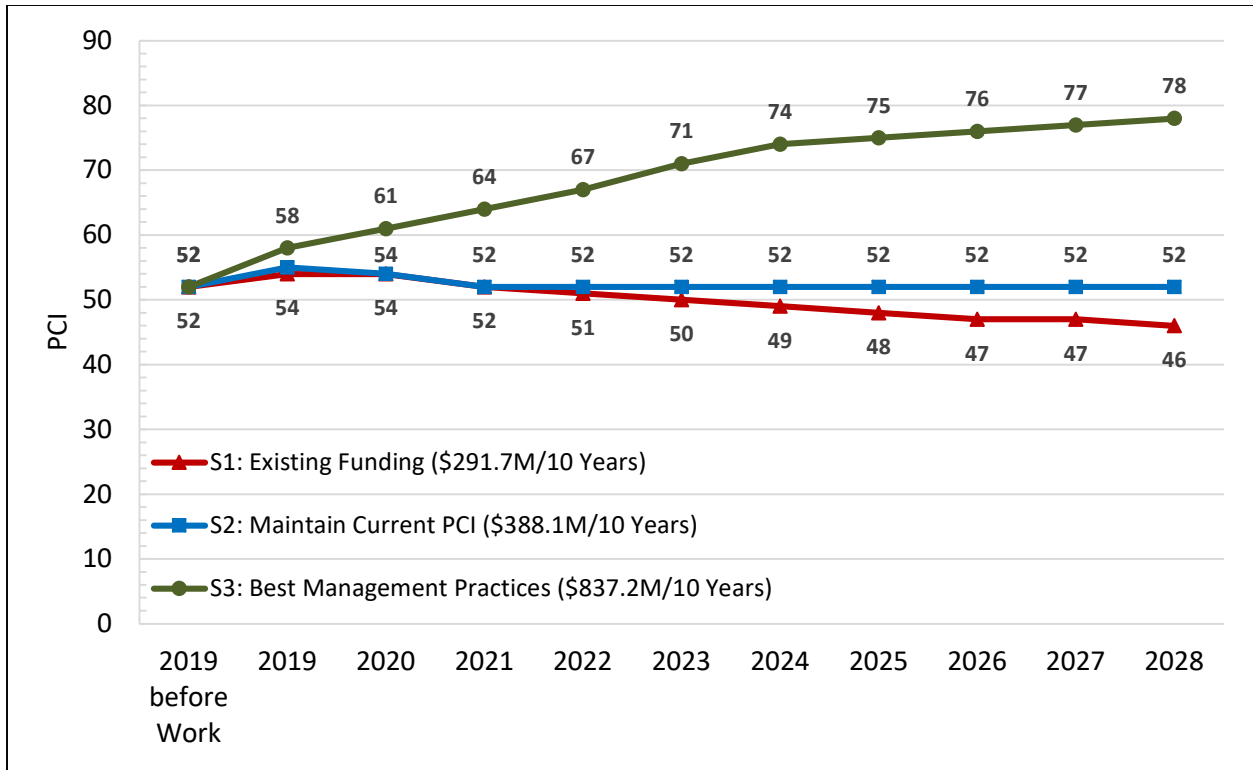


Figure 5. Countywide PCI Over Time for Each Scenario

Figure 6 shows the current condition of the countywide network compared to the projected condition for each of the three scenarios. All three scenarios will increase the portion of the network in “Good” condition; however, Scenarios 1 and 2 will also significantly increase the portion of the network in “Failed” condition. Only Scenario 3 will see a reduction in the portion of the network in “Poor” and “Failed” condition.

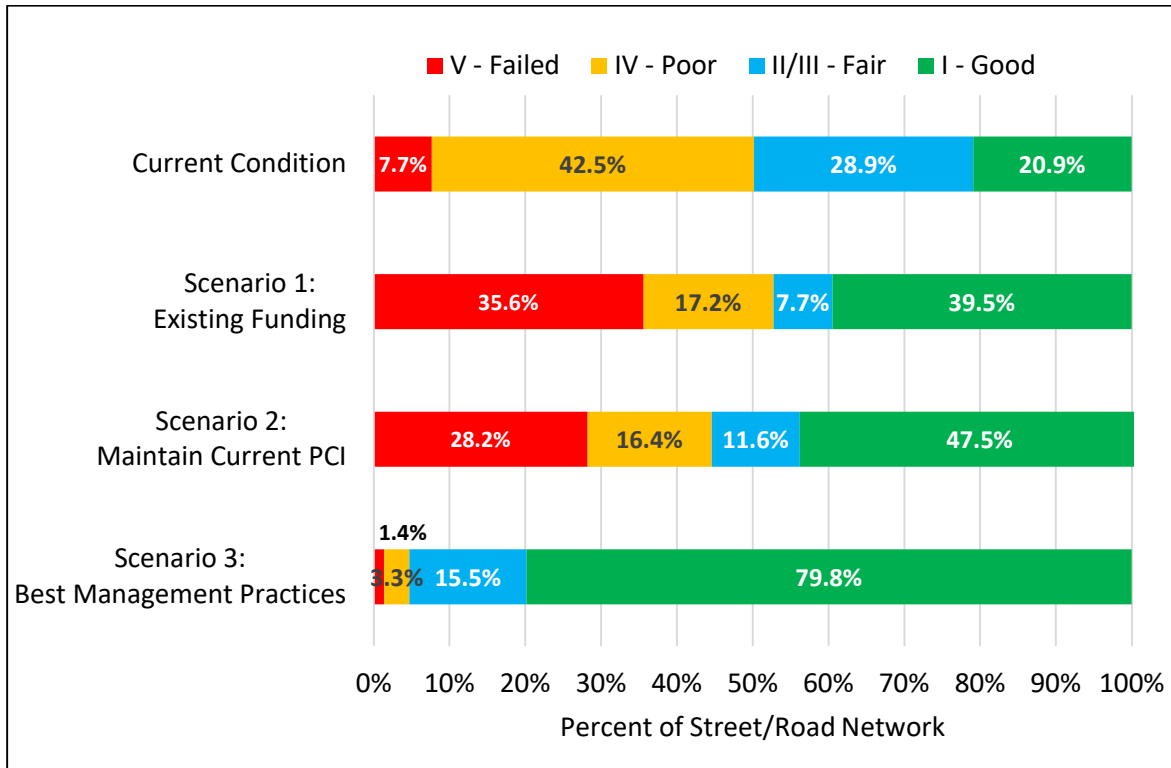


Figure 6. Current and Projected (2028) Pavement Network Condition for Each Scenario

Figure 7 illustrates the changes in deferred maintenance over time for each scenario. For Scenario 1, the deferred maintenance will increase by almost two-thirds over the next 10 years. For Scenario 2, the deferred maintenance will still increase, by about one-third. Scenario 3 will nearly eliminate the deferred maintenance by 2028.

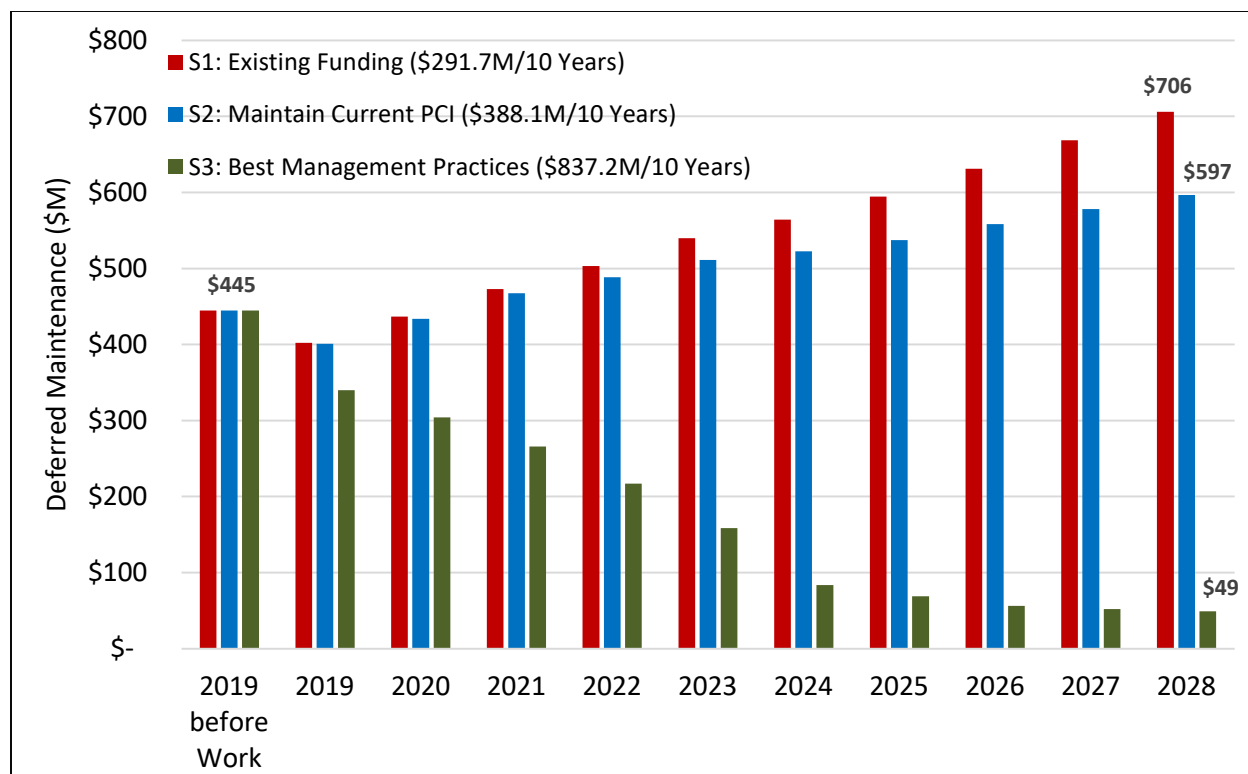


Figure 7. Deferred Maintenance Over Time for Each Scenario

Summary

In summary, Monterey County and the seven cities included in the 2018/19 pavement management implementation scope have a substantial investment of \$1.4 billion in the pavement network. Overall, the countywide street and road network is in “Fair” condition, with a 2018 network PCI of 52. Of the 1,345 centerline miles throughout the county, about one-fifth are in “Good” condition while about half are in “Poor” or “Failed” condition.

The analyses indicate that approximately \$762 million needs to be spent on pavement maintenance and rehabilitation over the next 10 years to essentially repair all streets and roads and bring the network to a condition level where it can be maintained with on-going preventive maintenance. In the long run, this strategy will save money by preventing future pavement deterioration to levels requiring more costly rehabilitation or reconstruction.

With the existing funding level (\$291.7 million over 10 years), the countywide network will decrease to a PCI of 46 by 2028 and the deferred maintenance will increase to \$706 million. If approximately \$388.1 million is spent on pavement maintenance and rehabilitation countywide over the next 10 years, then the countywide PCI will be maintained at 52 and the deferred maintenance will increase to \$597 million. Additional funding will begin to see the countywide network PCI increase and the deferred maintenance decrease.