Pavement Management System Implementation

Final Report

June 2019

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Submitted to:

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Executive Summary

NCE was selected by the Fresno Council of Governments (Fresno COG) to implement a pavement management system for the City of San Joaquin (City). This project included eight other cities (Coalinga, Fowler, Firebaugh, Huron, Kingsburg, Mendota, Orange Cove, and Selma) as well. The purpose of this project is to help inform and educate policy makers on the conditions of the street network.

The City is responsible for the maintenance and repair of approximately 14.1 centerline miles of streets. The network's Pavement Condition Index (PCI) is 26. The City utilizes the StreetSaver® pavement management software and collects pavement distresses in compliance with ASTM D6433-16[1].

The following budget scenarios were performed as part of this implementation. The scenarios study the impact of funding on pavement condition over a period of ten years.

Scenario 1: $165,000 per year – The City's anticipated funding for paving projects is approximately $165,000 per year which consists of $100,000 from Measure C and $65,000 from Senate Bill-1 (SB 1 - Road Maintenance and Rehabilitation Account). At this funding level, the network PCI is expected to decrease from 26 to 19 over the next ten years.

Scenario 2: $320,000 per year – The City will need to spend approximately $320,000 per year in order to maintain the current network PCI at 26 over the next ten years.

Scenario 3: $1.06 million per year – At approximately $1.06 million per year, the network PCI will increase to 65 which is the same level with the current statewide average PCI.

Scenario 4: $1.43 million per year – In order to improve the network PCI to 85 over the next ten years, the City will need to spend approximately $1.43 million per year.

NCE recommends that the City increase the budget to at least $1.06 million per year in order to improve the pavement network to the same level as the current statewide average PCI of 65.

[1] ASTM. "ASTM D6433-16." Standard Practice for Roads and Parking Lots Pavement Condition Index Inspections.

Background

With the passing of SB 1, Fresno COG has allocated funds to develop the Multi-jurisdictional PMS for nine local cities within the Region that currently do not have such a program in place. By assisting these cities with the creation of a PMS, the Region will have the resource available to them to prioritize roadway improvements and better manage their roadway repair and maintenance more efficiently.

To achieve this goal, Fresno COG selected NCE to implement a pavement management system for nine cities, including the City of San Joaquin. The other eight cities are Coalinga, Fowler, Firebaugh, Huron, Kingsburg, Mendota, Orange Cove, and Selma.

Broadly, a "… *pavement management system (PMS) is designed to provide objective information and useful data for analysis so that … managers can make more consistent, cost-effective, and defensible decisions related to the preservation of a pavement network*."[2] In other words, a PMS is designed to assist cities with answering questions such as:

- What comprises the City's street network and what are the conditions of the streets?
- How will the condition of the City-maintained streets respond over time to maintenance and rehabilitation (M&R) treatments proposed under the existing funding levels?
- What M&R strategies exist to improve the current street conditions?
- What is the backlog of M&R work that should be done in order to achieve the City's pavement condition goal?
- What are the future M&R needs?
- What are the street repair priorities?
- How much funding is needed in order to improve current pavement conditions?

In order to answer the questions above, Fresno COG selected a PMS software program called StreetSaver®, which was developed by the Metropolitan Transportation Commission (MTC) and is widely used by Californian cities and counties.

[2] AASHTO "Guidelines for Pavement Management Systems". American Association of State Highway and Transportation Officials, Washington DC, July 1990.

Study Objectives

The goal of this project is to implement the StreetSaver PMS and populate it with current pavement conditions and to perform funding analyses with respect to the City's M&R program.

The objectives of this study were to:

- Establish an inventory of the street network
- Perform pavement condition inspections of the entire street network and determine the PCI of each street section as well as the average network PCI.
- Develop appropriate M&R strategies.
- Perform budgetary analyses and determine the M&R funding needs.
- Present a strategy for the most cost-effective program.

Finally, this report links the recommended repair program costs to the City's current and projected budget alternatives to improve the overall network condition. It also assesses the adequacy of existing revenues to meet the recommended maintenance needs.

Scope of Work

First, NCE performed pavement condition inspections of the City-maintained streets and alleys in January 2019 using the walking inspection method. Pavement distress data were collected and entered into StreetSaver to calculate the section's PCI. The condition inspections did not address non-pavement issues such as traffic, safety, street hazards, geometric issues, drainage issues, or immediate maintenance needs. As part of this task, a Quality Control Plan was developed and implemented and a copy is included in Appendix A.

Upon completion of the data collection activities, NCE reviewed and discussed M&R strategies with the City staff. This included selecting appropriate and effective treatments such as surface seals, overlays or reconstructions, as well as determining unit costs. The unit costs represent the overall project cost which incorporated material costs along with any related construction, engineering and design costs and were based on recent bid abstracts from the City as well as surrounding agencies. Once appropriate M&R alternatives were defined, they were entered into the StreetSaver® database for budgetary analyses.

NCE next performed a budget needs analysis using a period of ten years with an annual inflation rate of 3 percent. This identified M&R recommendations for each street section and determined the total M&R requirements over the analysis period under various funding levels.

Pavement Network and Current Condition

The City is responsible for the repair and maintenance of approximately 14.1 centerline miles of streets, of which 3.1 miles are arterials, 2.3 miles are collectors, and 8.7 miles are residentials. Streets, or pavements, are one of the City's most valuable assets with an estimated replacement value of $14.1 million. This does not include the value of other non-pavement street components, such as curb and gutters, sidewalks, or drainage. Additionally, there are approximately 0.4 centerline miles of gravel roads within the City limit but they are not included in the analysis.

The PCI is a measurement of pavement grade or condition and ranges from 0 to 100. A newly constructed street will have a PCI of 100, while a failed street will have a PCI of 25 or less. The pavement condition is primarily affected by climate, traffic loads and volumes, subgrade failure, construction materials and age. Some of the distresses manifested by pavement as it ages or fails are:

Asphalt Concrete (AC) Pavements:

- Alligator (Fatigue) Cracking*
- Bleeding
- Block Cracking
- Bumps and Sags
- Corrugation
- Depression
- Edge Cracking
- Longitudinal/Transverse Cracking
- Joint reflection cracking
- Patching and Utility Cut Patching
- Potholes
- Rutting*
- Shoving*
- Slippage Cracking*
- Raveling
- Weathering

Table 1 and Figure 1 on the next page illustrate the definitions of the pavement condition categories. Streets in "Fair" condition include streets with both non-load related (e.g., weathering or raveling) and load related (e.g., alligator cracking) distresses. Because the causes of these distresses are markedly different, the treatments used to address these conditions are also different, as are the costs of these treatments. Generally, streets with load-related distress are more expensive to repair. The two categories of distress are identified by II (non-load related) and III (load related). StreetSaver® assigns the appropriate treatments and costs to streets identified within each category.

Table 1: Pavement Condition Categories

Condition Category		PCI	Pavement Description
(I)	Good	70-100	Pavements which have minimal surface distress which may include some hairline longitudinal/transverse cracks and/or weathering. The pavement structure is sound and minor oxidation may occur.
(II)	Fair, Non-Loaded	50-69	Pavements which have a significant level of distress that are predominantly non-load related such as longitudinal/transverse cracks, bleeding, block cracking, weathering and raveling, etc. The pavement structure is sound and some oxidation has occured.
(III)	Fair, Load-Related	50-69	Pavements which have a significant level of distress that are predominantly load related such as alligator cracking and minor rutting, etc. The pavement structure is becoming deficient (minimal base failure).
(IV)	Poor	25-49	The pavement has moderate to severe surface distresses. Extensive weathering or raveling, block cracking, and load-related distresses such as alligator cracking, rutting, and potholes may occur.
(V)	Very Poor	0-24	The pavement has severe weather-related distress as well as large quantities of load-related distresses. The pavement is nearing the end of its service life.

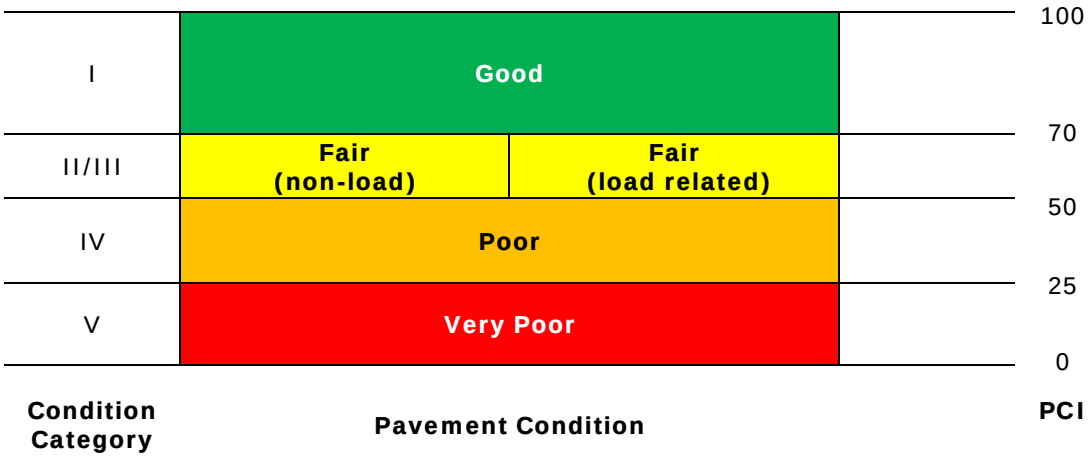


Figure 1: Pavement Condition Categories

The photos in Figure 2 below illustrate streets with a range of PCIs.

The photo on the left is from a portion of Idaho Street between Pine Avenue and 9th Avenue. Pavement surface displayed minimal distresses; in fact, only minor weather-related distresses were recorded during the inspection. PCI = 89 (Good)

The photo on the left is from 8th Street just north of California Avenue. At this point, substantial load-related distresses such as alligator cracking can be found along with block cracking and longitudinal cracking. The pavement had also oxidized considerably. PCI = 49 (Poor)

The photo on the left is from 7th Street between Nevada Avenue and Colorado Avenue it shows a street that is near the end of its service life. Extensive load-related distresses such as alligator cracking and potholes can be found throughout the entire section. Severe block cracking and raveling are also prominent due to age of pavement. PCI = 1 (Very Poor)

Figure 2: Examples of Streets with Different PCIs

Based on our January 2019 inspection, the City's average weighted (by area) PCI[3] is 26 which is considered a "Poor" condition. However, the average PCI does not completely describe the street network. Table 2 summarizes the City's street network and the PCI by functional classification.

[3] The weighted average PCI is a result of multiplying the area of each street section by the PCI of that section, totaling all sections together and then dividing by the total of the network area or functional classification.

Table 2. Pavement Network and Condition Summary

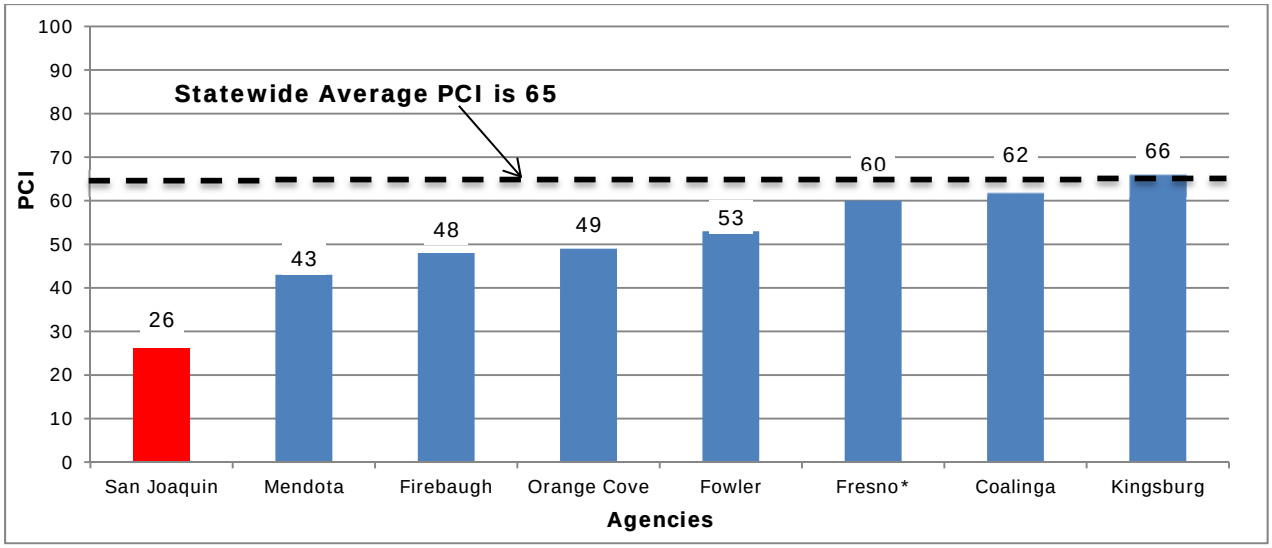
Functional Class	Centerline Miles	Lane Miles	Pavement Area (sq ft)	% Pavement Area	Average Weighted PCI
Arterial	3.1	10.1	761,460	26.3%	28
Collector	2.3	5.9	631,692	21.8%	28
Residential	8.7	17.4	1,499,787	51.8%	24
Total	**14.1**	**33.4**	**2,892,939**	**100.0%**	**26**
Gravel Streets	0.4	0.8	44,636	N/A	N/A

Table 3 summarizes the network condition by condition category. Approximately 8.5 percent of the City's streets are in "Good" condition, 28.9 percent are in either "Fair" or "Poor" condition, while almost two thirds are in the "Very Poor" category.

Table 3. Pavement Condition Breakdown by Functional Class and Condition Category

Condition Category	PCI Range	Arterial	Collector	Residential	Network
Good (I)	70-100	0.0%	3.8%	4.7%	8.5%
Fair (II/III)	50-69	5.4%	1.6%	4.2%	11.2%
Poor (IV)	25-49	5.8%	1.8%	10.1%	17.7%
Very Poor (V)	0-24	15.1%	14.6%	32.9%	62.6%
Total (%)		**26.3%**	**21.8%**	**51.8%**	**100.0%**

The City's average network PCI of 26 is significantly lower than the 2018 statewide average of 65 and those of neighboring agencies (see Figure 3).



*PCI information from the 2018 Statewide Needs

Figure 3: San Joaquin PCI Comparison with Other Agencies

Maintenance and Rehabilitation Strategies

Preventive maintenance treatments such as crack seal and slurry seals are suitable for pavements in the “Good” condition and should be applied every seven years if the pavement condition is appropriate. As pavement condition deteriorates to lower levels, hot mix asphalt (HMA) overlays, Cold-in-Place recycling (CIR), and full-depth reclamation (FDR) should be performed. These are considered “rehabilitation or reconstruction”. Localized base repairs are commonly used as preparatory work prior to applying overlays. A detailed M&R decision tree for the City of San Joaquin can be found in Appendix C.

History has shown that it costs less to maintain streets in good condition than to repair ones that have failed. By letting pavements deteriorate, streets that once cost $3.75 per square yard (SY) to slurry seal may, in a few years, cost as much as $43.00/SY to reconstruct. With rising material costs, the timeliness of repairs becomes more critical.

After the acceptance of Senate Bill 1 in 2018, agencies within the Fresno County area experienced anywhere between 30 to 40 percent construction cost increase due to a shortage of construction materials and available contractors.

Figure 4 illustrates that pavement maintenance follows the old colloquial saying of "pay now or pay more later". The pavement deterioration curve shown by the blue line illustrates how pavement deteriorates over time.

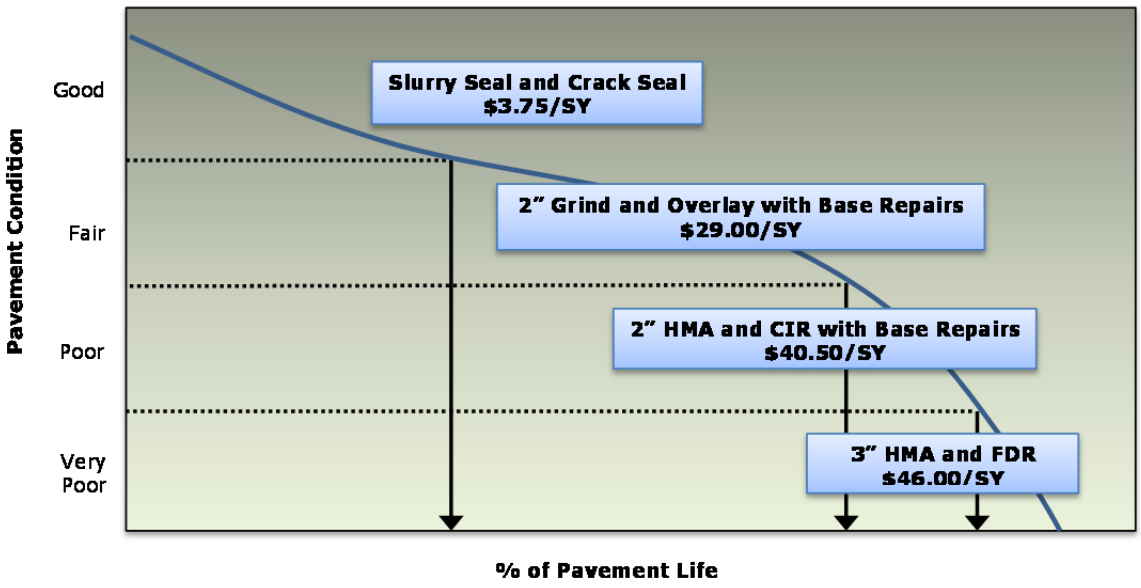


Figure 4: Costs of Maintaining Pavements over Time

Treatment Description

Slurry Seal and Crack Seal – Slurry seal is a very common preventative maintenance treatment used to extend the life of good condition pavements. It fills non-active cracks, seals raveled pavements, prevents against future moisture intrusion into the pavement base and subgrade, and provide a uniform surface texture with aesthetic appeal.

Grind and Overlay with Base Repairs – This process involves removing the top layer of pavement that has taken on distresses and overlay it back with new asphalt concrete. In conjunction with overlays treatments, it is recommended that areas with severe structural distresses receive base repairs before placement of the overlay. Base repairs allow the required overlay thickness to be reduced.

Cold in-Place Recycling and Full-Depth Reclamation – These methods allow the existing pavement materials to be reused in place. Therefore, the amount of virgin aggregate required are less than that of the traditional grind and overlay approach therefore the overall construction cost can be reduced. The reclaimed material is obtained by milling, planning, or crushing of the existing pavement.

It is important to carry out adequate testing and utilize engineering judgement on each specific pavement rehabilitation project in order to develop effective pavement design. The pavement thicknesses shown in Figure 4 are for planning purpose only and should not be apply to all projects.

Budget Needs

Once the pavement condition and the appropriate maintenance strategy has been determined, it is possible to determine the funding needed for maintenance of the City's streets. Simplistically, the StreetSaver® program seeks to answer the following questions:

If funding is not a constraint, how much money is needed to bring streets to a state of good repair? And maintain it at that level over the next ten years?

Therefore, based on the principle that it costs less to maintain streets in good condition, rather than focusing on fixing those in poor condition, StreetSaver® develops a funding strategy that will improve the overall condition of the streets and then maintain it at that level. The condition and functional classification of each street determines the appropriate treatment and cost from the decision tree.

For example, California Avenue has a PCI of 53, and the appropriate treatment is a 2-inch grind and overlay as well as localized base repairs. The area of the pavement section is then multiplied by the unit cost to determine the total treatment cost.

Additional surface seals over the next ten years may also be applied to preserve the pavement condition, if necessary.

Using this process, the entire street network for the City was evaluated and summed. The resulting maintenance needs is approximately $13.3 million over the next ten years using an annual inflation rate of three percent. If the City follows this funding strategy recommended, the average PCI will increase to 98 in fiscal year (FY) 2019/20 then fluctuate in the mid-80s until thereafter. If however, no funding is allocated to street pavement maintenance, the streets will deteriorate and the network PCI will drop to 10 by the end of FY 2028/29. The results of the budget needs analysis are summarized in Table 4.

Table 4. Results of Budget Needs 2019 – 2028

Fiscal Year (FY)	Current	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	Total
Budget Needs ($M)	N/A	11.7	0.0	0.0	0.1	0.0	0.0	0.0	1.4	0.0	0.0	13.3
Treated PCI	26	98	91	89	87	86	85	83	88	87	85	N/A
Untreated PCI	26	24	20	18	17	15	14	13	12	11	10	N/A

In this analysis, the total funding needed is “front-loaded;” i.e., it is less expensive to repair the streets in the first year than in subsequent years due to the effect of deferring maintenance and inflation. Although very few agencies can afford this “front-loaded” approach, it highlights the next treatments each street section needs and becomes a reference point for other funding scenarios.

The deferred maintenance in 2019 is $11.7 million. Deferred maintenance consists of pavement maintenance, preservation, and rehabilitation activities that are needed, but cannot be performed due to lack of funding. It is also referred to as the unfunded backlog. Shrinking budgets have forced many cities and counties to defer much-needed pavement maintenance activities. Deferring these activities results in an increased frequency of citizen complaints about the condition of the pavement network and a higher cost to repair these streets.

The prediction models in StreetSaver® may result in a more conservative performance due to the impacts of newer and more cost-effective technologies are not included at this time. For example, if improved materials are utilized, e.g., asphalt-binder with rubber or polymers, the actual performance of these treatments may be under-stated by the models. However, if the City assesses the pavement conditions regularly, the prediction of future conditions will continue to improve.

Budget Scenarios

Having determined the ten-year maintenance needs of the City's street network, the next step in developing a cost-effective M&R strategy is to conduct "what-if" analyses. Using the StreetSaver® budget scenario module, the impacts of the City's budget can be evaluated. This module seeks to answer the following questions:

If funding is constrained, what is the most cost-effective way to spend the funds? What are the consequences on the PCI and deferred maintenance? Which streets will be prioritized for repairs and when will they be repaired?

The program determines the effects of the different funding scenarios on PCI and deferred maintenance. By examining the effects on these performance measures, the advantages and disadvantages of different funding levels and maintenance strategies become clear.

The following scenarios were performed:

Scenario 1: $165,000 per year – The City's anticipated funding for paving is approximately $165,000 per year ($100,000 from Measure C and $65,000 from SB 1). At this funding level, the network PCI is expected to decrease from 26 to 19 in ten years.

Scenario 2: $320,000 per year – The City will need approximately $320,000 per year in order to maintain the current network PCI at 26.

Scenario 3: $1.06 million per year – At approximately $1.06 million per year, the network PCI will increase to 65; this is the same as the statewide average PCI.

Scenario 4: $1.43 million per year – In order to improve the network PCI to 85 over the next ten years, the City will need to spend approximately $1.43 million per year on street M&R projects.

Summaries of the results of each scenario are provided starting from the next page. Note that "Rehabilitation" includes overlays and reconstruction, while "Preventive Maintenance" includes all surface seals. Detailed results are presented in Appendices D and E.

Scenario 1: Existing Budget ($165,000 per year)

This scenario shows the impact of the City's anticipated paving budget of $165,000 per year over the next ten years. Measure C provides $100,000 and SB-1 provides $65,000. The overall pavement condition will decline to a "Very Poor" condition category with an average PCI of 19 and the deferred maintenance will increase to $14.7 million over the next ten years. At the end of the analysis period, only 19.7 percent of the network will be in the "Good" condition while an overwhelming 80.3 percent of the street network will be in the "Very Poor" condition category. Table 5 and Figure 5 summarize the results from Scenario 1.

Table 5. Summary of Results for Scenario 1

Fiscal Year	Current	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	Total
Budget ($M)	N/A	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	0.165	1.65
Rehabilitation ($M)	N/A	0.086	0.140	0.147	0.120	0.143	0.147	0.150	0.080	0.149	0.160	1.32
Preventive Maintenance ($M)	N/A	0.079	0.025	0.018	0.045	0.022	0.018	0.015	0.085	0.016	0.005	0.33
Deferred Maintenance ($M)	11.7	11.5	11.9	12.2	12.6	12.8	13.2	13.6	14.0	14.4	14.7	N/A
Treated PCI	26	24	22	21	20	20	20	19	19	19	19	N/A

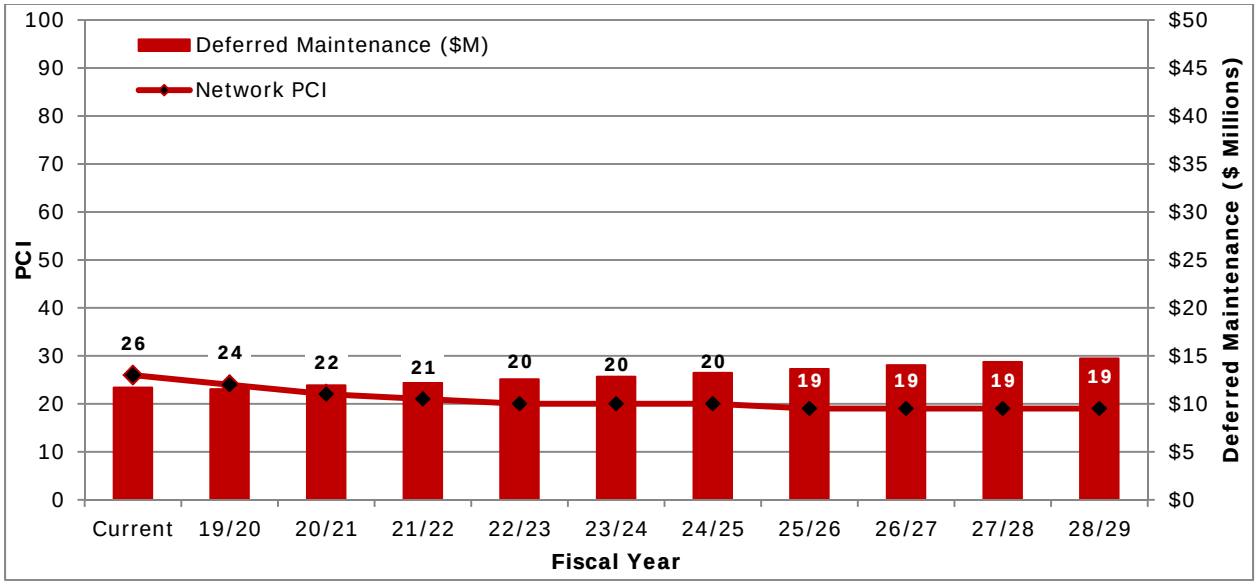


Figure 5: PCI vs. Deferred Maintenance for Scenario 1

Scenario 2: Maintain PCI at 26 ($320,000 per year)

In Scenario 2, an annual budget of approximately $320,000 will be needed to maintain the network PCI at 26 over the next ten years. The deferred maintenance will increase to $12.7 million in FY 2028/29. Approximately 30.7 percent of the streets will be in the "Good" condition, and the "Poor" and "Very Poor" condition streets will increase to 69.3 percent. Table 6 and Figure 6 summarize the results from Scenario 2.

Table 6. Summary of Results for Scenario 2

Fiscal Year	Current	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	Total
Budget ($M)	N/A	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	3.20
Rehabilitation ($M)	N/A	0.22	0.31	0.32	0.28	0.32	0.30	0.30	0.24	0.32	0.32	2.93
Preventive Maintenance ($M)	N/A	0.10	0.01	0.00	0.04	0.00	0.02	0.02	0.08	0.00	0.00	0.27
Deferred Maintenance ($M)	11.7	11.4	11.6	11.7	11.9	12.0	12.1	12.3	12.5	12.6	12.7	N/A
Treated PCI	26	25	23	23	23	23	24	24	25	26	26	N/A

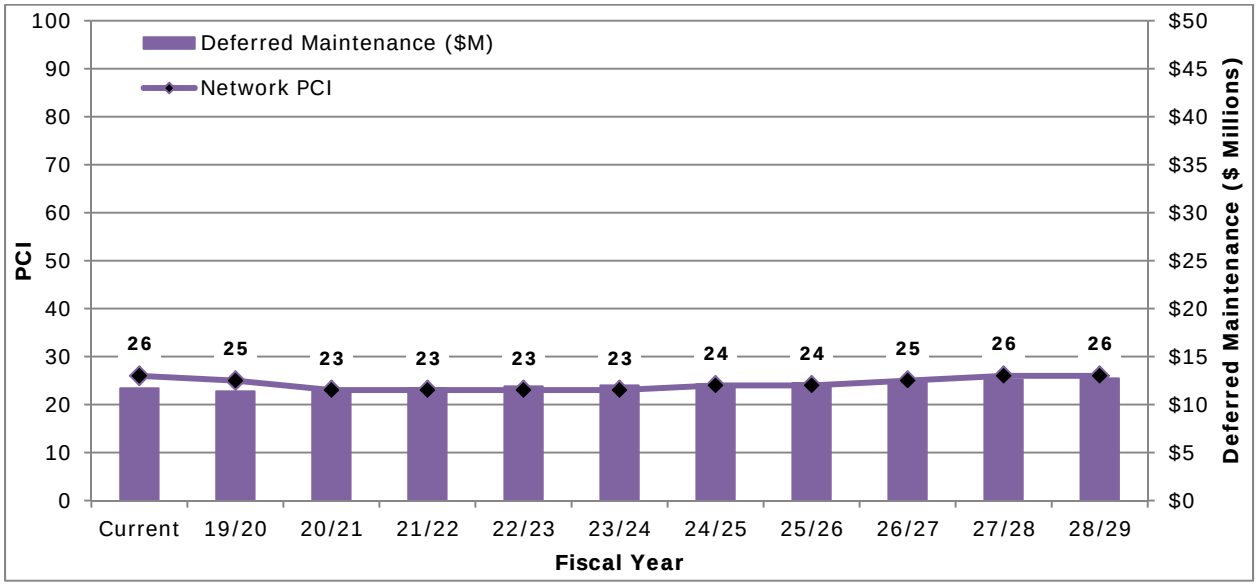


Figure 6: PCI vs. Deferred Maintenance for Scenario 2

Scenario 3: Improve PCI to 65 ($1.06 million per year)

If the City increases the annual budget to $1.06 million per year, the network PCI will improve to 65 over the next ten years. The deferred maintenance will decrease to $5.2 million in FY 2028/29. More than three-quarters (76.7 percent) of the network will be in the "Good" condition and the remainder (23.3 percent) will be in the "Very Poor" category. Table 7 and Figure 7 summarize the results from Scenario 3.

Table 7. Summary of Results for Scenario 3

Fiscal Year	Current	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	Total
Budget ($M)	N/A	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	10.6
Rehabilitation ($M)	N/A	1.03	1.03	1.02	1.02	1.06	1.01	1.03	1.01	1.03	1.04	10.3
Preventive Maintenance ($M)	N/A	0.03	0.03	0.04	0.04	0.00	0.05	0.03	0.05	0.03	0.02	0.3
Deferred Maintenance ($M)	11.7	10.7	10.2	9.6	9.1	8.4	7.8	7.7	6.5	5.9	5.2	N/A
Treated PCI	26	28	31	35	39	44	49	53	57	61	65	N/A

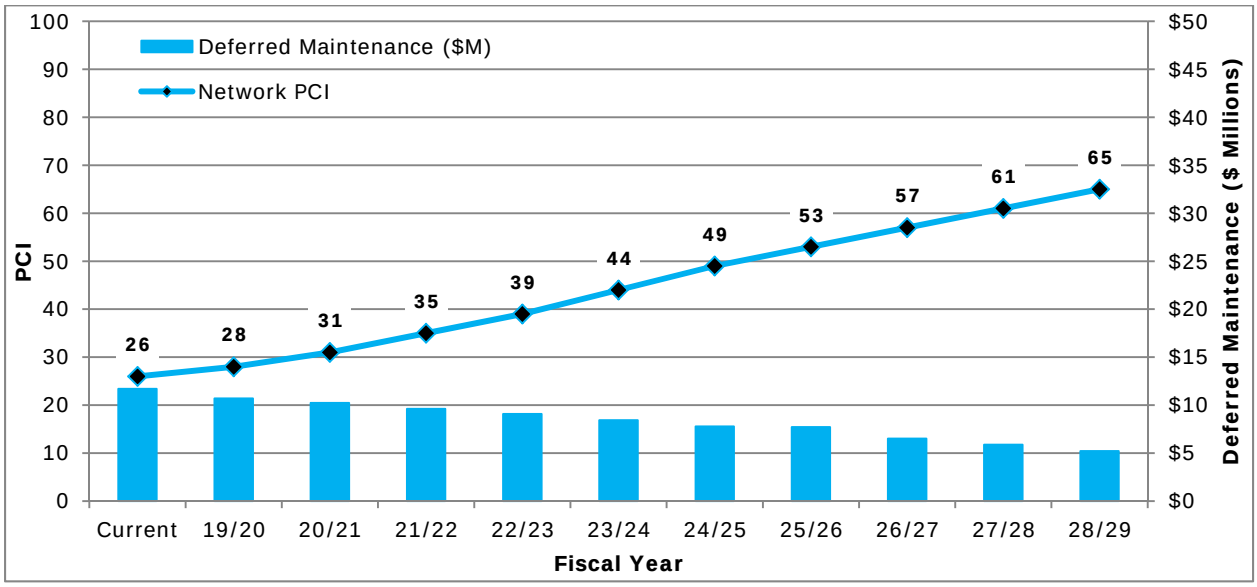


Figure 7: PCI vs. Deferred Maintenance for Scenario 3

Scenario 4: Improve PCI to 85 ($1.43 million per year)

An annual budget of $1.43 million is required r to improve the network PCI to 85 over the next ten years. At this funding level, the deferred maintenance will decrease to only $400,000 by FY 2028/29. At the end of the analysis period, every street section will be in the "Good" condition category. Table 8 and Figure 8 summarize the results from Scenario 4.

Table 8. Summary of Results for Scenario 4

Fiscal Year	Current	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	Total
Budget ($M)	N/A	1.43	1.43	1.43	1.43	1.43	1.43	1.43	1.43	1.43	1.43	14.3
Rehabilitation ($M)	N/A	1.38	1.40	1.43	1.34	1.43	1.41	1.38	1.35	1.38	1.41	13.9
Preventive Maintenance ($M)	N/A	0.05	0.03	0.00	0.09	0.00	0.02	0.05	0.08	0.05	0.02	0.4
Deferred Maintenance ($M)	11.7	10.3	9.4	8.3	7.3	6.1	5.0	3.9	2.7	1.6	0.4	N/A
Treated PCI	26	30	36	41	48	55	62	68	74	80	85	N/A

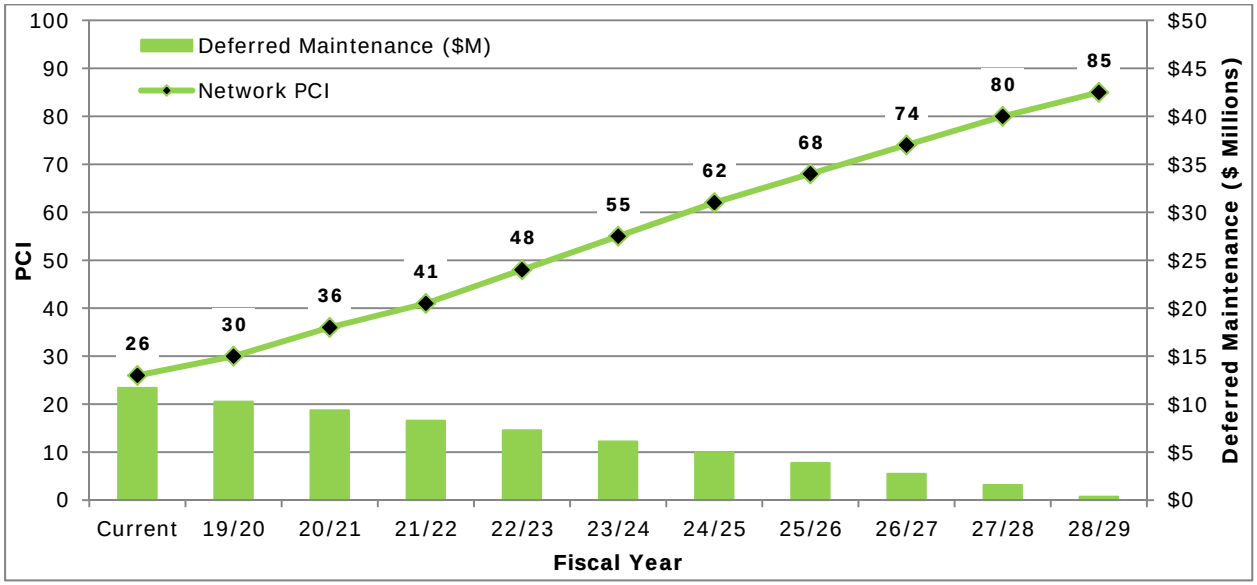


Figure 8: PCI vs. Deferred Maintenance for Scenario 4

Summary

Figures 9 and 10 compare the resulting PCIs and deferred maintenance for all budget scenarios.

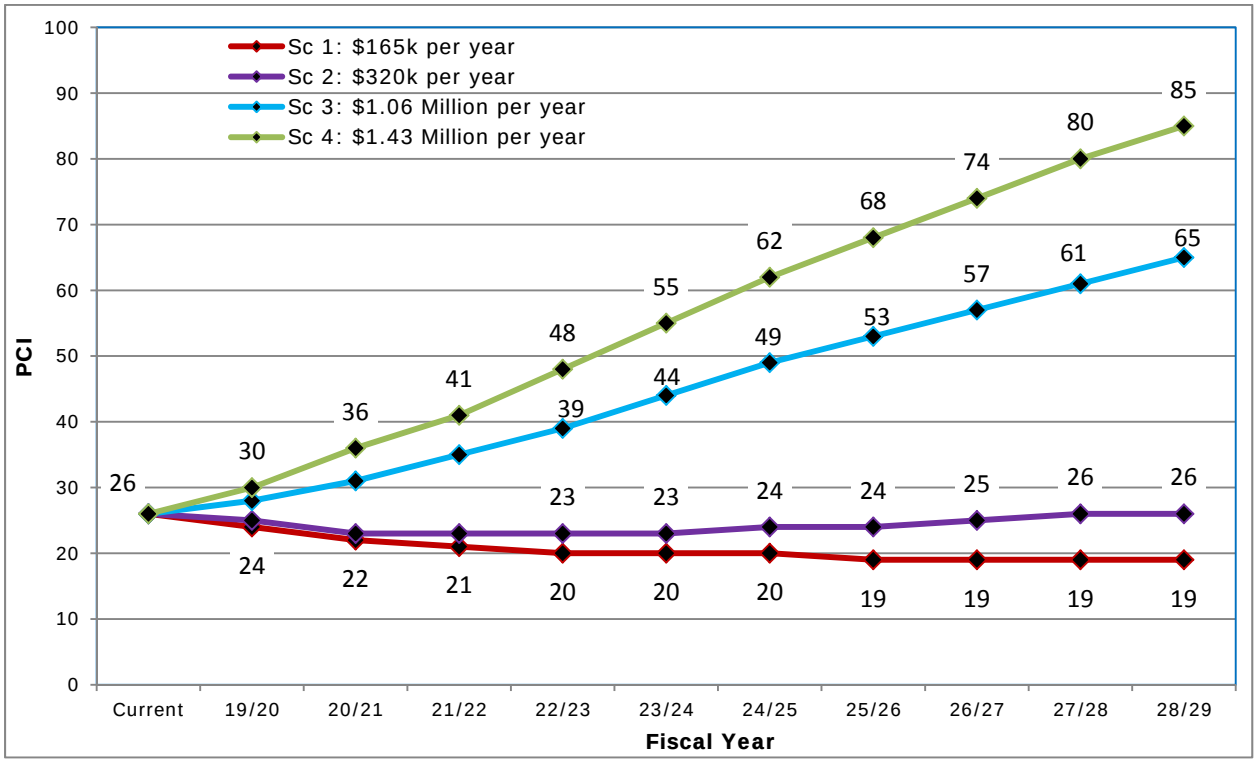


Figure 9: PCI Comparisons between Scenarios

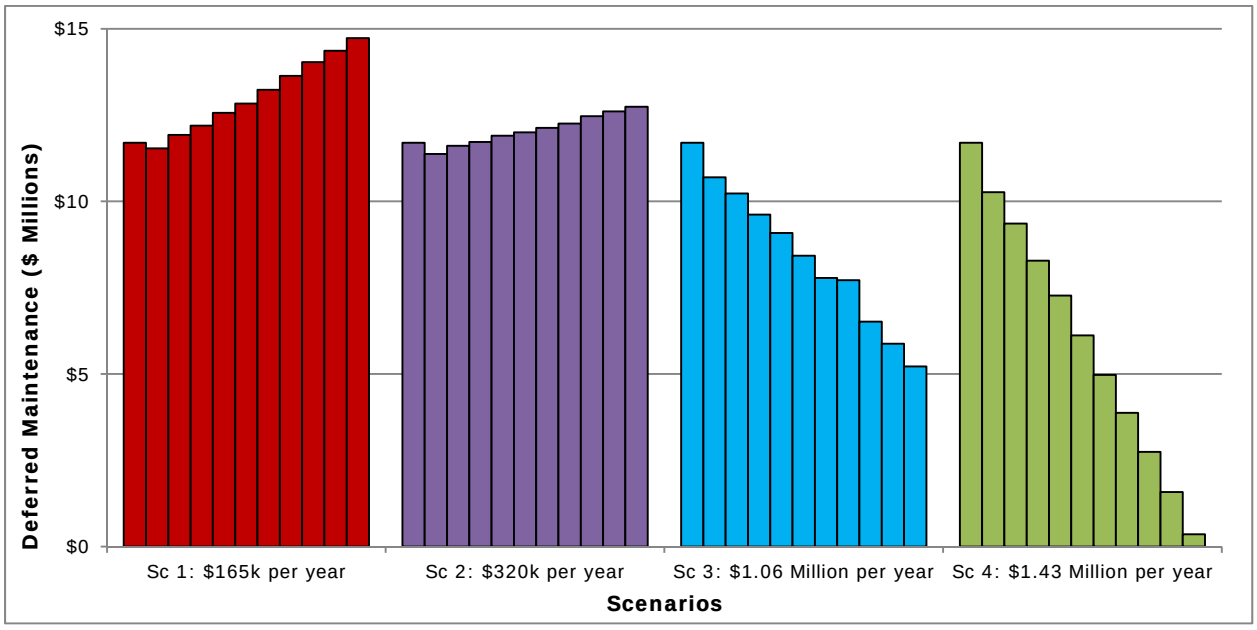


Figure 10: Deferred Maintenance Comparisons between Scenarios

Figure 11 compares the changes in the pavement condition distribution for the five budget scenarios with the current condition.

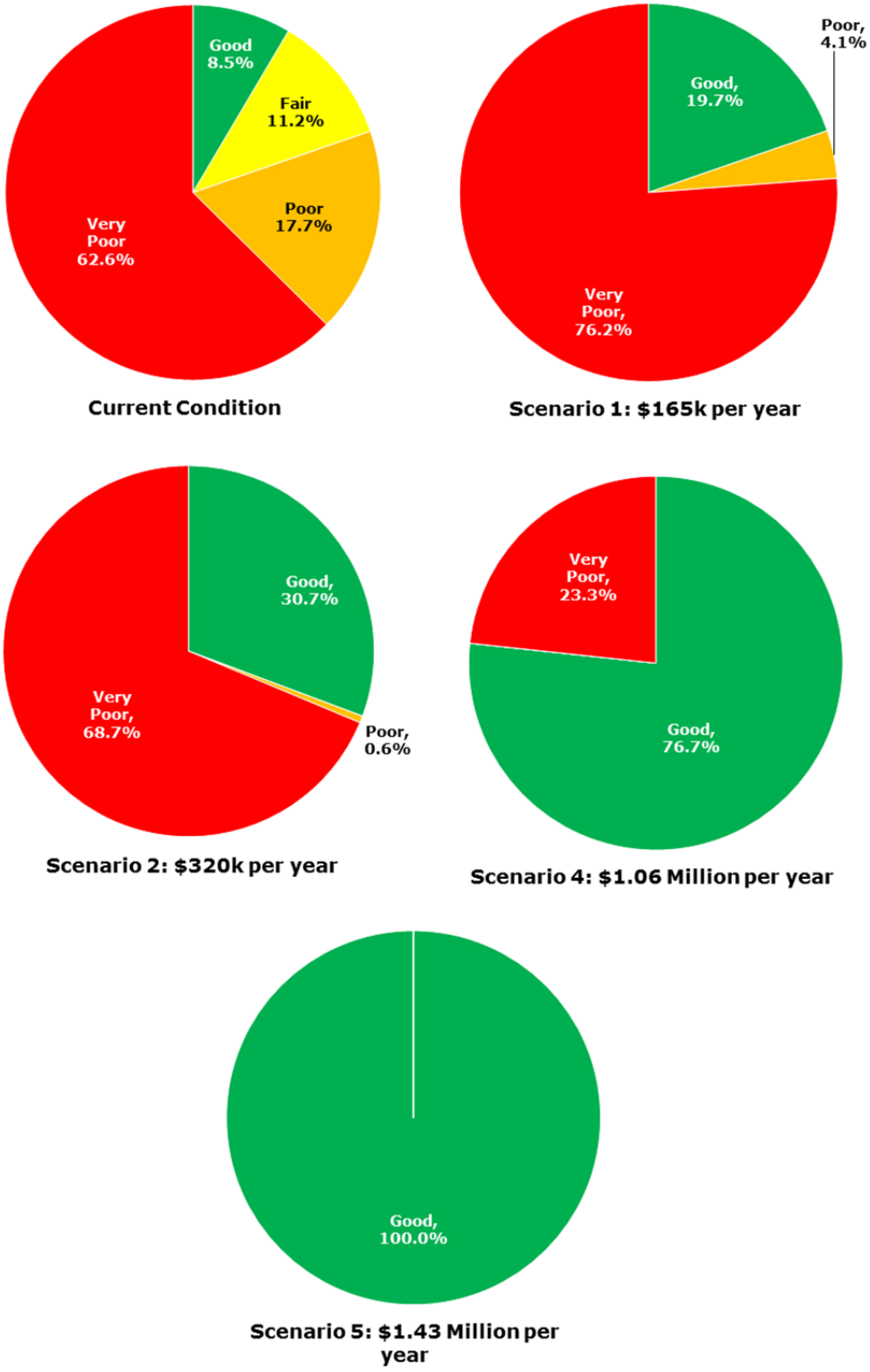


Figure 11: Pavement Condition Breakdown for All Scenarios

Recommendations

The City of San Joaquin has a substantial investment in its street network with an estimated total replacement cost of $14.1 million. Overall, the street network is in the "Poor" condition with a citywide average PCI of 26. Based on the data collected and the scenario analyses, NCE recommends that the City implement the items listed below.

1. **Pavement Funding**
   The City's overall pavement network is in critical condition. The network PCI will decrease to 19 if left untreated within the next ten years, which means that nearly every street will need to be reconstructed. NCE recommends that the City should implement a paving program of approximately $1.06 million per year (Scenario 3) as it will improve the City's network condition to the same level as the statewide average. At this funding level, the street network will be mostly in the "Good" condition category with 23.3 percent in the "Very Poor" category. Improving the pavement condition to the "Good" category will allow the City to preserve the streets through preventive maintenance methods such as slurry seals which are significantly cheaper than overlays.

2. **Pavement Maintenance Strategies**
   NCE recommends that the City consider alternative treatments such as Full-depth reclamation (FDR) and cold-in-place recycling (CIR)s which are alternatives to reconstruction and conventional overlays. These treatments could potentially offer cost savings of approximately 20 to 30 percent compared to traditional treatments.

   Due to the relatively small size of each pavement project, NCE recommends that the City investigate the option of combining paving projects with neighboring agencies in order to take advantage of economies of scale.

3. **Re-inspection Strategies**
   In order to monitor future pavement performance and on-going maintenance needs, NCE recommends that the City inspects the arterial and collector network every two years and the residential network and alleys every five to six years.

4. **M&R Decision Tree**
   NCE recommends that the City review and update the M&R decision tree and the associated unit costs annually to reflect new construction techniques and changing costs so the funding analysis will continue to be reliable and accurate.

5. **Additional Funding**

NCE recommends that the City take full advantage of SB-1 and actively pursue additional pavement funding sources if feasible. Some examples of funding sources are listed:

Federal

- Community Development Block Grants (CDBG)
- Congestion Mitigation & Air Quality Improvement (CMAQ)
- Surface Transportation Block Grant Program (STBG)
- Highway Safety Improvement Program (HSIP)

State

- State Transportation Improvement Program (STIP)
- Active Transportation Program (ATP)
- Vehicle License Fee (VLF)
- CalRecycle grants
- Transportation Development Act (TDA)

Local

- Local sales taxes
- Development impact fees
- Traffic impact and transportation mitigation fees
- Utility tax
- Parking and various permit fees
- Parcel taxes

Appendix A

Quality Control Plan

QC Plan

Pavement Management Program
2018

NCE
Point Richmond, CA
501 Canal Blvd. Suite I
Pt. Richmond, CA 94804

Fresno COG

Table of Contents

Appendix

1.0 INTRODUCTION

When performing data collection in any field, the need for quality control is paramount. This need for quality data is essential for accurate planning, analysis and design. NCE's "Quality Assurance Management Plan" (QAMP), which was last revised in March 2009, affirms that:

> *"NCE is dedicated to achieving technical and management excellence and to delivering professional engineering and environmental services that meet or exceed our clients' needs. NCE's Quality Assurance (QA) Program is designed to achieve these goals. This QA Management Plan (QAMP) describes NCE's QA Program, which is based on four principles: client satisfaction, employee participation, problem prevention, and continuous quality improvements."*

NCE's QAMP establishes minimum quality standards for performance and procedures for assuring that our clients receive quality service. It requires the participation of employees at every level. It encourages Project Managers and technical staff to take pride in their work and responsibility for ensuring that the work is done correctly the first time. The program is designed to reduce the incidence of problems related to quality and results in implementation, where necessary, of corrective actions and modification of work procedures to minimize the incidence of future problems.

NCE has also prepared detailed and specific Quality Control Plans for projects, and the most notable example is for the **Long Term Pavement Performance (LTPP) – Western Regional Support Contract** for the Federal Highway Administration. This is a 150 page document that covers data collection on highways, including deflection, profile, pavement distresses, traffic, maintenance and rehabilitation history, materials testing and sampling as well as a document control.

1.1 Objectives

This document constitutes a formal Quality Control Plan (QCP) for the Fresno Council of Governments to include The Cities of Colinga, Firebaugh, Fowler, Huron, Kingsburg, Mendota, Orange Grove, San Joaquin and Selma (OCG). Specifically, it is intended for the 2018 Pavement Management Program Update project. The focus is on data collection issues.

1.2 Structure

The following components are addressed in this QC Plan:

- Condition survey procedures used
- Accuracy required for data collection
- Inspector qualifications and experience
- Safety

2.0 QUALITY CONTROL PLAN

2.1 Condition Survey Procedure

The governing documents in performing condition surveys are:

- "PAVER™ Pavement Distress Identification Manual for Asphalt Surfaced Roads and Parking Lots", US Army Corps of Engineers ERDC-CERL June 2009.
- "PAVER™ Pavement Distress Identification Manual for Concrete Surfaced Roads and Parking Lots", US Army Corps of Engineers ERDC-CERL June 2009.

Any exceptions to the above procedures are discussed with the agency before any surveys are performed. These are usually related to distresses or situations that are not covered in the manuals. Examples include slippage cracks, roller check marks or edge cracking on streets with no curbs and gutters. Others include the use of seals or open-graded asphalt concrete mixes. Any modifications must be documented and submitted to the City for approval.

All surveys are performed as ***walking*** surveys, and a minimum 10% sampling rate is utilized. Field crews are typically composed of a one-person crew on residential streets and some collectors, and up to two-person crews for major arterials, depending on traffic volumes and speeds. The safety of field personnel is paramount in all instances.

The sample unit selected must be representative of the entire pavement section. This assumes that the section is homogeneous; if it is not homogeneous, then the section must be split according to the criteria agreed upon by the agency. Typically, the criteria used are:

- Pavement condition
- Construction age, if known
- Maintenance history, if known
- Traffic volumes (or functional classification as a surrogate)
- Surface types e.g. asphalt concrete or Portland cement concrete
- Geometric elements e.g. widths

Any modifications to the section inventory data will be documented and provided to the City.

Typical sample unit dimensions are 100 ft long by the width of the street. Since the maximum size of a sample unit allowed under StreetSaver is 4000 sf, streets that are wider than 40 feet wide will have shorter lengths (generally 50 feet) or if they are divided by a raised median, separate sample units taken in each direction.

Any pavement areas that are not representative of the section will be noted and surveyed as a special sample unit.

2.2 Accuracy Required For Data Collection

The accuracy required for data collection has two components, both of which are further described in the following paragraphs.

- Re-inspections
- PCI comparisons with past surveys

2.2.1 Random and Systematic Re-inspection

A minimum of 5% of the total sample units will be re-inspected and this 5% will be selected based on both a random and a systematic basis. All re-inspections are made by an engineer or inspector other than the original inspector.

Random Re-inspections

Random re-inspections will include a representative selection across the following categories:

- Functional classes i.e. arterials, collectors, locals;
- Surface types e.g. asphalt concrete or Portland cement concrete;
- Pavement conditions e.g. good, fair, poor;
- Inspectors;
- Geographical areas, if applicable.

Systematic Re-inspections

For systematic re-inspections, this could be due to noticed trends such as specific treatment types (e.g. open-graded mixes), a specific inspector or geographical area. In such cases, more than 5% will be re-inspected.

Acceptability Criteria

At the time of re-inspection, the actual distresses will be re-inspected and verified, and any corrections made, if necessary. The following acceptance criteria shall be applied to the re-inspection as required by the Metropolitan Transportation Commission (MTC):

1) At least 50 percent of the PCI values for the re-inspected sections must be within +/- 5 PCI points of the original inspection PCI values.
2) No more than 12 percent of the PCI values for the re-inspected sections can be greater than +/- 15 PCI points of the original inspection PCI values

If the above acceptance criteria are not met then an additional 5% will be re-inspected. This will continue until the re-inspected sections meet the acceptability criteria.

2.2.2 PCI Comparison with Past Surveys

As another level of quality control, the new PCIs are compared with the previous PCI. If they differ by more than ±15 PCI points, these sections are automatically flagged for further investigation.

If PCI is +15 points:

The section is investigated to see if a maintenance and rehabilitation event has occurred since the last survey, but which has not been recorded. This can only be resolved with feedback from the agency. Typically, it may include activities such as:

- Crack sealing activities – changes medium or high severity cracking to low severity
- Patching activities - alligator cracking that has been removed and patched, so that the resultant PCI is increased.
- Surface seals
- Overlays

If PCI is -15points

The section is checked to see if the average deterioration rate (usually 3 to 4 points per year) is exceeded. If the drop in PCI is within the range of what is acceptable, no further action is required. If the drop is more than the acceptable range, a re-inspection will be performed. The default performance curves in the StreetSaver program are the basis for what is acceptable.

2.3 Inspectors Qualification and Experience

All NCE's inspectors are required to attend formal training on condition distress surveys. For example, any of NCE's inspectors working on the LTPP project are required to attend a week-long training workshop every year to maintain their certifications. The Regional Transportation Commission (RTC) of Washoe County requires inspectors to be calibrated prior to performing any work using the ASTM D6433 protocols (also known as the MicroPAVER surveys).

Similarly, in agencies that use the MTC StreetSaver system, NCE's inspectors attend the distress training conducted by MTC. After the formal training, they work with an experienced inspector before they are allowed to work on their own. Within the first month of working on their own, up to 20% of their work is checked weekly. Any necessary corrections are made immediately.

Finally, NCE conducts a one-day training and calibration workshop for all NCE staff involved with data collection. This is conducted once a year.

Resumes of NCE's technicians utilized on this project are included in Appendix A.

3.0 SAFETY PROCEDURE

NCE administers a health and safety program in compliance with the Nevada Occupational Safety and Health act (Section 618.383) and Cal OSHA Title VIII, Section 3203. The program is documented in NCE's *Workplace Safety Program Manual.*

Generally, the safety procedures include:

- Inspectors to wear a safety vest at all times;
- Flashing beacon on all vehicles utilized for surveys; and
- Stopped vehicles to be parked at locations away from moving traffic e.g. nearby parking, shoulders etc.

On streets where there is a high volume of traffic or high speeds, additional measures may be necessary, such as:

- Surveys to occur during off-peak periods or on weekends;
- Additional inspector to watch out for traffic; and
- Traffic flaggers in extreme cases.

In extreme cases where it is not possible to walk on the pavement surface, surveys will be performed from sidewalks or raised medians. However, this is extremely rare for city or county roads/streets; this is most often encountered on state highways, and lane closures are the most likely option at this point.

APPENDIX A

RESUMES OF FIELD INSPECTORS

Franc Escobedo
Engineering Field Technician

Mr. Franc Escobedo has over 15 years of experience as a pavement management technician for NCE. He has performed numerous pavement condition inspections throughout California, Idaho, and Washington. His experience includes distress collection across various Pavement Management Systems including the Metropolitan Transportation Commission StreetSaver, PAVER, Cartegraph, and Hansen systems.

Additionally, Mr. Escobedo has completed both the OCTA PAVER and MTC "Distress Identification" courses for both Asphalt Concrete and Portland Cement Pavements and now assists with the training of agency staff on both courses.

Mr. Escobedo performs all activities relating to pavement data collection using hardcopy forms or tablets. As part of the quality control process, he performs cross-checks of data in the PMS database. He also regularly performs quality control checks of field collected data and pavement maintenance history to ensure that PMS databases are accurate and up-to-date. During this process, he also generates detailed reports, which are necessary to perform his cross-checks of the collected data.

His field experience and expertise are added benefits to agencies during field training. Listed below are a collection of agencies for which Mr. Escobedo has performed condition inspections – they total over 6,000 centerline miles of roads and streets.

Representative Projects

Pavement Management

Pavement Management Inspections | ***Engineering Field Technician***

- Ada County, Idaho
- Agoura Hills
- Anaheim
- Antioch
- Bakersfield
- Bell
- Buena Park
- Camarillo
- Chula Vista
- Commerce
- Corona
- Cudahy
- Dana Point
- Davis
- El Centro
- El Cerrito
- Elk Grove
- Encinitas
- Fairfield
- Fremont
- Fullerton
- Hayward
- Hillsborough
- Humboldt County
- Inyo County
- La Habra
- Lake County
- Lake Forest
- Lemon Grove
- Marin County
- Martinez
- Mendocino County
- Milpitas
- Mission Viejo
- Mono County
- Mountain View
- Newark
- Orange County
- Palm Springs
- Redwood City
- San Clemente
- San Diego County
- San Dimas
- San Ramon
- Santa Cruz County
- Santa Maria
- Seal Beach
- Siskiyou County
- South Lake Tahoe
- Stanislaus County
- Stanton
- Thousand Oaks
- Torrance
- Tulare
- Tuolumne County
- Tustin
- Vallejo
- Vernon
- Vista
- Walnut Creek
- West Covina
- West Sacramento

Projects included various forms of inspections for pavement distress data collection, such as walking, windshield, and/or semi-automated.

Education
Computer Operations Program
Computer Learning Center, Los Angeles, CA, 1983-84
Network Engineering & Administrative Program
Computer Learning Center, Anaheim, CA, 1997
Certified Network Administration
Computer Learning Center, Anaheim, CA 1997

Registrations and Certifications
OCTA PAVER Certification 2016

MTC StreetSaver Rater Certification Program (expires September 2019)

Joined NCE
2004

Total Years of Experience
15

Collaboration. Commitment. Confidence.℠

David Bivins
Senior Engineering Technician

Mr. Bivins has over 17 years of experience as a pavement management technician. As a senior technician, his experience extends beyond data collection for pavement distresses. Mr. Bivins is one of NCE's most experienced distress collectors and a primary choice for working with and training of our clients in field data collection activities.

Mr. Bivins performs all functions relating to data collection using paper forms or a tablet. As part of the quality control process, he performs cross-checks of data in the PMS database. He has performed quality control checks of field collected data and pavement maintenance history to ensure that PMS databases are accurate and up-to-date. During this process, Mr. Bivins also generates detailed reports, which are needed to help perform his cross-checks of the collected data.

His field experience and expertise is an added benefit to agencies during field training. Having performed data collection for agencies all over the State of California, Mr. Bivins has a depth of experience related to pavement types and conditions from performing condition surveys on more than 15,000 centerline miles of roads and streets. In addition, Mr. Bivins is proficient and certified in the two most popular distress identification procedures – PAVER and StreetSaver. He attends annual in-house training and assists in training local agencies on distress identification and collection procedures.

Education
Civil Engineering Courses
San Francisco State University, 1994
AutoCAD Advanced Course
CAD Masters, Walnut Creek, CA, 1997

Registrations and Certifications
MTC StreetSaver Rater Certification Program (expires September 2019)

Joined NCE
2011

Total Years of Experience
17 years

Representative Projects

Pavement Management

Pavement Management System Updates | *Senior Field Technician*
Various Cities and Counties, CA

Projects included various forms of surveys for pavement distress data collection, this may have included walking, windshield, and/or semi-automated.

- Ada County, ID
- Alameda County
- Albany
- Buena Park
- Campbell
- Chula Vista
- Citrus Heights
- Danville
- Davis
- East Bay Regional Park District
- Elk Grove
- Fairfield
- Folsom
- Fremont
- Fullerton
- Hayward
- Humboldt County
- Inyo County
- Lafayette
- Lake County
- Los Gatos
- Mammoth Lakes
- Marin County
- Mendocino County
- Mission Viejo
- Modesto
- Newark
- Orinda
- Pebble Beach
- Placer County
- San Bruno
- San Mateo County
- Santa Barbara County
- Santa Cruz
- Santa Cruz County
- Santa Rosa
- Stanislaus County
- Stanton
- Torrance
- West Sacramento

Jacob Rajnowski

Field Technician

Mr. Rajnowski joined NCE in 2016 as a as a pavement management technician and is experienced in collecting distress data and coring samples for pavement management systems. He is currently collecting pavement distress data for the Counties of Sonoma and Lake.

He is certified by the Metropolitan Transportation Commission's (MTC) to perform pavement distress inspections; the certification testing involves passing a rigorous field test.

Apart from conducting field inspections, Mr. Rajnowski performs all functions related to data collection and is an active participant in the QC process, including crosschecks of data in the PMS database, quality control checks of field collected data and pavement maintenance history to ensure that PMS databases are accurate and up to date. During this process, detailed reports are generated to perform crosschecks of the data collected. Additionally, Mr. Rajnowski has completed the OCTA PAVER™ 'Distress Identification' course for Asphalt Concrete and Portland Cement Pavements. He has performed condition surveys at San Francisco since 2016.

Education
Sterling High School, Sterling, IL, 2003

Joined NCE
2016

Registrations and Certifications
OCTA PAVER Certification 2017
MTC Certification 2016

Total Years of Experience
2 years

Representative Projects

Pavement Management

Pavement Management System Updates | ***Field Technician***
Various Cities and Counties, CA
Projects included various forms of surveys for pavement distress data collection, this may have included walking, windshield, and/or semi-automated.

- Ada County, ID
- Buena Park
- Half Moon Bay
- Humboldt County
- Lake County
- Lincoln
- Martinez
- Mission Viejo
- Moreno Valley
- Placer County
- Pleasant Hill
- San Francisco
- Sonoma County
- Stockton
- Trinity County
- Ventura County
- Walnut Creek
- Yolo County

Appendix B

Section Description Inventory
Section PCI Listing - Street Network

I. Sorted by Street Name
II. Sorted by Descending PCI
III. Gravel Streets

Section Description Inventory Report

This report lists a variety of section description information for each of the City's street pavement sections. It lists the street and section identifiers, limits, functional class, surface type, number of lanes, lengths, widths, and inspected PCI.

All of the City's vehicular street sections are included in the report. The report is sorted alphabetically by Street Name and Section ID and by descending PCIs. The field descriptions in this report are listed.

A list of gravel streets are also included.

Header	Description
STREET ID	Street identification in StreetSaver® unique for each street
STREET NAME	The name of the street as indicated by street signs in the field
SECTION ID	Section identification number in StreetSaver® unique for each section of one street
BEG LOCATION	Beginning limit of the section
END LOCATION	Ending limit of the section
LENGTH (FT)	Length of the section in feet
WIDTH (FT)	Average width of the section in feet
AREA (SF)	Area of the section in square feet
FC	Functional Classification (A – Arterial, C – Collector, R – Residential/Local, O – Other/Alley)
# OF LANES	Number of travel lanes of the section
SURFACE TYPE	Surface Type (AC = Asphalt Concrete Pavement, AC/AC = AC Overlay of AC Pavement, Gravel =)
PCI DATE	Last pavement inspection date
PCI	Average inspected PCI for the section.

City of San Joaquin
Pavement Management System Implementation
Section PCI Listing

Sorted by Street Name

Street ID	Street Name	Section ID	Beg Location	End Location	Length (ft)	Width (ft)	Area (sf)	FC	# of Lanes	Surface Type	PCI Date	PCI
AMAN	AMAN	0100	PUNJAB	ARIZONA AVE	390	33	12,870	R	2	AC	1/24/2019	29
ANNAB	ANNABELLA	0100	ELM AVE	PAVEMENT CHANGE	1,029	37	38,073	R	2	AC	1/28/2019	78
ANNAB	ANNABELLA	0200	PAVEMENT CHANGE	FOURTH ST	102	32	3,264	R	2	AC	1/28/2019	7
ARIZONA	ARIZONA	0100	EIGHTH ST	MAIN ST	761	37	28,157	R	2	AC	1/28/2019	24
ARIZONA	ARIZONA	0200	MAIN ST	EAST END	897	30	26,910	R	2	AC	1/28/2019	33
CALIFORNIA	CALIFORNIA	0100	THRID ST	FIFTH ST	656	48	31,488	C	4	AC	1/28/2019	53
CALIFORNIA	CALIFORNIA	0200	FIFTH ST	EIGHTH ST	1,160	46	53,360	C	4	AC	1/28/2019	8
CALIFORNIA	CALIFORNIA	0300	EIGHTH ST	MAIN ST	780	46	35,880	C	4	AC	1/28/2019	9
CALIFORNIA	CALIFORNIA	0400	MAIN ST	ELEVENTH ST	373	46	17,158	C	4	AC	1/28/2019	11
CALIFORNIA	CALIFORNIA	0500	ELEVENTH ST	END	536	46	24,656	C	4	AC	1/28/2019	33
COLORADO	COLORADO	0100	SUTTER AVE	WIDTH CHANGE	1,108	53	58,724	A	4	AC	1/26/2019	63
COLORADO	COLORADO	0200	WIDTH CHANGE	FIFTH ST	886	46	40,756	A	4	AC	1/26/2019	46
COLORADO	COLORADO	0300	FIFTH ST	SIXTH ST	886	46	40,756	A	4	AC	1/26/2019	25
COLORADO	COLORADO	0400	SIXTH ST	NINTH ST	1,173	52	60,996	A	4	AC	1/26/2019	67
COLORADO	COLORADO	0500	NINTH ST	TWELFTH ST	1,223	52	63,596	A	4	AC	1/26/2019	19
COLORADO	COLORADO	0600	TWELFTH TH	MANNING AVE	928	52	48,256	A	4	AC	1/26/2019	26
COLORADO	COLORADO	0700	MANNING AVE	PLACER AVE	1,653	42	69,426	A	4	AC	1/26/2019	18
COLORADO	COLORADO	0800	PLACER AVE	SPRINGFIELD AVE	2,247	42	94,374	A	4	AC	1/26/2019	13
COLO CT	COLORADO CT	0100	COLORADO AVE	NORHT END	176	32	5,632	R	2	AC	1/26/2019	57
COLUSA	COLUSA	0100	SOUTH CITY LIMIT	WIDTH CHANGE	743	30	22,290	R	2	AC	1/24/2019	76
COLUSA	COLUSA	0200	WIDTH CHANGE	MANNING AVE WEST	652	40	26,080	R	2	AC	1/24/2019	66
DEEP	DEEP	0100	PUNJAB	ARIZONA AVE	372	33	12,276	R	2	AC	1/24/2019	23
DONNA	DONNA	0100	SOUTH END	MANNING AVE WEST	659	37	24,383	R	2	AC	1/24/2019	17
8TH	EIGHTH	0100	COLORADO AVE	NEVADA AVE	637	37	23,569	R	2	AC	1/28/2019	40
8TH	EIGHTH	0200	CALIFORNIA AVE	333' N/O CALIFORNIA AVE	333	37	12,321	R	2	AC	1/28/2019	49
8TH	EIGHTH	0300	333' N/O CALIFORNIA AVE	NORTH END	487	37	18,019	R	2	AC	1/28/2019	56
11TH	ELEVENTH	0100	COLORADO AVE	NEVADA AVE	641	37	23,717	R	2	AC	1/28/2019	5
11TH	ELEVENTH	0200	NEVADA AVE	CALIFORNIA AVE	660	37	24,420	R	2	AC	1/28/2019	6
ELM	ELM	0100	COLORADO AVE	PAVEMENT CHANGE	775	48	37,200	R	2	AC	1/28/2019	29
ELM	ELM	0200	PAVEMENT CHANGE	THIRD ST	1,101	30	33,030	R	2	AC	1/28/2019	72
5TH	FIFTH	0100	COLORADO AVE	928' N/O COLORADO AVE	928	35	32,480	R	2	AC	1/28/2019	11
5TH	FIFTH	0200	928' N/O COLORADO AVE	CALIFORNIA AVE	406	37	15,022	R	2	AC	1/28/2019	65
1ST	FIRST	0100	COLORADO AVE	550' N/O COLORADO AVE	550	37	20,350	R	2	AC	1/28/2019	14
1ST	FIRST	0200	550' N/O COLORADO AVE	ANNABELLA AVE	180	37	6,660	R	2	AC	1/28/2019	67
1ST CT	FIRST CT	0100	FIRST ST	CDS WEST	240	36	8,640	R	2	AC	1/28/2019	39
4TH	FOURTH	0100	ANNABELLA AVE	NEVADA AVE	255	32	8,160	R	2	AC	1/28/2019	13
IDAHO	IDAHO	0100	PINE AVE	NINTH AVE	886	36	31,896	R	2	AC	1/24/2019	89
IDAHO	IDAHO	0200	NINTH ST	MAIN ST	850	36	30,600	R	2	AC	1/24/2019	5
IDAHO	IDAHO	0300	MAIN ST	MANNING AVE WEST	310	36	11,160	R	2	AC	1/24/2019	2
KARIN	KARIN	0100	DONNA	COLUSA ST	519	37	19,203	R	2	AC	1/24/2019	12
MAIN	MAIN ST	0100	MANNING AVE	RR TRACKS	1,130	60	67,800	C	2	AC	1/28/2019	16
MAIN	MAIN ST	0200	RR TRACKS	CALIFORNIA AVE	1,534	66	101,244	C	2	AC	1/28/2019	16
MAIN	MAIN ST	0300	CALIFORNIAAVE	164' N/O ARIZONA AVE	848	64	54,272	C	2	AC	1/28/2019	83
MAIN	MAIN ST	0400	164' N/O ARIZONA AVE	NORTH CITY LIMIT	1,544	37	57,128	C	2	AC	1/28/2019	83
MANNING	MANNING	0100	CITY LIMIT SOUTH	SUTTER AVE	710	53	37,630	A	2	AC	1/26/2019	56
MANNING	MANNING	0200	SUTTEN AVE	PINE AVE	1,401	30	42,030	A	2	AC	1/26/2019	9

Street ID	Street Name	Section ID	Beg Location	End Location	Length (ft)	Width (ft)	Area (sf)	FC	# of Lanes	Surface Type	PCI Date	PCI
MANNING	MANNING	0300	PINE AVE	WIDTH CHANGE	702	38	26,676	A	2	AC	1/26/2019	14
MANNING	MANNING	0400	WIDTH CHANGE	RAILROAD AVE	1,550	62	96,100	A	2	AC	1/26/2019	9
MANNING	MANNING	0500	RAILROAD AVE	COLORADO AVE	648	37	23,976	A	2	AC	1/26/2019	4
MANNING	MANNING	0600	COLORADO AVE	WIDTH CHANGE	718	54	38,772	A	2	AC	1/26/2019	36
MANNING	MANNING	0700	WIDTH CHANGE	PLACER AVE	606	32	19,392	A	2	AC	1/26/2019	9
NEVADA	NEVADA AVE	0100	THIRD ST	260' E/O THIRD ST	260	37	9,620	R	2	AC	1/30/2019	77
NEVADA	NEVADA AVE	0200	260' E/O THIRD ST	FIFTH ST	341	32	10,912	R	2	AC	1/30/2019	13
NEVADA	NEVADA AVE	0300	FIFTH ST	591' S/O FIFTH ST	291	50	14,550	R	2	AC	1/30/2019	5
NEVADA	NEVADA AVE	0400	591' S/O FIFTH ST	NINTH ST	933	46	42,918	R	2	AC	1/30/2019	4
NEVADA	NEVADA AVE	0500	NINTH ST	MAIN ST	371	50	18,550	R	2	AC	1/30/2019	6
NEVADA	NEVADA AVE	0600	MAIN ST	TWELFTH ST	752	53	39,856	R	2	AC	1/30/2019	38
9TH	NINTH	0100	PINE AVE	RAILROAD AVE	1,441	60	86,460	C	2	AC	1/26/2019	6
9TH	NINTH	0200	RAILROAD AVE	COLORADO AVE	429	62	26,598	C	2	AC	1/26/2019	32
9TH	NINTH	0300	COLORADO AVE	CALIFORNIA AVE	1,326	46	60,996	C	2	AC	1/26/2019	8
9TH	NINTH	0400	CALIFORNIA AVE	PUNJAB	396	37	14,652	C	2	AC	1/26/2019	52
OREGON	OREGON	0100	PINE ST	NINTH ST	556	37	20,572	R	2	AC	1/26/2019	5
OREGON	OREGON	0200	NINTH ST	MANNING AVE WEST	826	37	30,562	R	2	AC	1/26/2019	13
ORLANDO	ORLANDO	0100	CALIFORNIA AVE	CDS NORTH	202	37	7,474	R	2	AC	1/24/2019	43
PINE	PINE	0100	MANNING AVE WEST	OREGON AVE	934	30	28,020	R	2	AC	1/26/2019	4
PINE	PINE	0200	OREGON AVE	RAILROAD AVE	1,035	30	31,050	R	2	AC	1/26/2019	5
PLACER	PLACER AVE	0100	MANNING AVE WEST	PARLIER AVE	2,652	25	66,300	R	2	AC	1/24/2019	1
PLACER	PLACER AVE	0200	PARLIER AVE	MAIN ST	1,410	25	35,250	R	2	AC	1/24/2019	0
PUNJAB	PUNJAB	0100	NINTH ST	MAIN ST	513	37	18,981	R	2	AC	1/24/2019	45
PUNJAB	PUNJAB	0200	MAIN ST	AMAN ST	520	33	17,160	R	2	AC	1/24/2019	27
RAILROAD	RAILROAD	0100	MANNING AVE	MAIN ST	1,101	40	44,040	R	2	AC	1/30/2019	2
RAILROAD	RAILROAD	0200	MAIN ST	NINTH ST	512	40	20,480	R	2	AC	1/30/2019	6
RAILROAD	RAILROAD	0300	NINTH ST	PINE AVE	1,246	40	49,840	R	2	AC	1/30/2019	11
RAILROAD	RAILROAD	0400	PINE AVE	710' N/O PINE	710	26	18,460	R	2	AC	1/30/2019	5
2ND	SECOND	0100	ANNABELLA AVE	ELM AVE	509	36	18,324	R	2	AC	1/28/2019	66
2ND CT	SECOND CT	0100	CDS WEST	SECOND ST	114	40	4,560	R	2	AC	1/28/2019	67
7TH	SEVENTH	0100	COLORADO AVE	NEVADA AVE	640	37	23,680	R	2	AC	1/26/2019	1
6TH	SIXTH	0100	COLORADO AVE	NEVADA AVE	656	35	22,960	R	2	AC	1/28/2019	5
6TH	SIXTH	0200	NEVADA AVE	CALIFORNIA AVE	684	37	25,308	R	2	AC	1/28/2019	0
6TH	SIXTH	0300	CALIFORNIA AVE	NORTH END	336	37	12,432	R	3	AC	1/28/2019	66
SPRINGF	SPRINGFIELD	0100	CITY LIMIT WEST	PLACER AVE	1,385	18	24,930	R	2	AC	1/30/2019	14
SPRINGF	SPRINGFIELD	0200	PLACER AVE	COLORADO AVE	1,628	18	29,304	R	2	AC	1/30/2019	36
SUTTER	SUTTER	0100	CITY LIMIT SOUTH	MANNING AVE	1,335	36	48,060	R	2	AC	1/30/2019	13
SUTTER	SUTTER	0200	MANNING AVE	PARLIER AVE	2,659	16	42,544	R	2	AC	1/30/2019	0
SUTTER	SUTTER	0300	PARLIER AVE	COLORADO AVE	1,101	18	19,818	R	2	AC	1/30/2019	0
3RD	THIRD	0100	ANNABELLA AVE	382' N/O ANNABELLA AVE	382	37	14,134	R	2	AC	1/28/2019	63
3RD	THIRD	0200	382' N/O ANNABELLA AVE	CALIFORNIA AVE	376	37	13,912	R	2	AC	1/28/2019	27
12TH	TWELFTH	0100	COLORADO AVE	CALIFORNIA AVE	1,349	37	49,913	R	2	AC	1/28/2019	7
12TH	TWELFTH	0200	CALIFORNIA AVE	ARIZONA AVE	637	37	23,569	R	2	AC	1/28/2019	49
UTAH	UTAH	0100	PINE AVE	NINETH ST	228	37	8,436	R	2	AC	1/24/2019	7
UTAH	UTAH	0200	NINTH ST	MANNING AVE WEST	406	37	15,022	R	2	AC	1/24/2019	4
WHITE	WHITE	0100	THIRD ST	FIFTH ST	592	37	21,904	R	2	AC	1/28/2019	42

Street ID	Street Name	Section ID	Beg Location	End Location	Length (ft)	Width (ft)	Area (sf)	FC	# of Lanes	Surface Type	PCI Date	PCI
IDAHO	IDAHO	0100	PINE AVE	NINTH AVE	886	36	31,896	R	2	AC	1/24/2019	89
MAIN	MAIN ST	0300	CALIFORNIAAVE	164' N/O ARIZONA AVE	848	64	54,272	C	2	AC	1/28/2019	83
MAIN	MAIN ST	0400	164' N/O ARIZONA AVE	NORTH CITY LIMIT	1,544	37	57,128	C	2	AC	1/28/2019	83
ANNAB	ANNABELLA	0100	ELM AVE	PAVEMENT CHANGE	1,029	37	38,073	R	2	AC	1/28/2019	78
NEVADA	NEVADA AVE	0100	THIRD ST	260' E/O THIRD ST	260	37	9,620	R	2	AC	1/30/2019	77
COLUSA	COLUSA	0100	SOUTH CITY LIMIT	WIDTH CHANGE	743	30	22,290	R	2	AC	1/24/2019	76
ELM	ELM	0200	PAVEMENT CHANGE	THIRD ST	1,101	30	33,030	R	2	AC	1/28/2019	72
COLORADO	COLORADO	0400	SIXTH ST	NINTH ST	1,173	52	60,996	A	4	AC	1/26/2019	67
1ST	FIRST	0200	550' N/O COLORADO AVE	ANNABELLA AVE	180	37	6,660	R	2	AC	1/28/2019	67
2ND CT	SECOND CT	0100	CDS WEST	SECOND ST	114	40	4,560	R	2	AC	1/28/2019	67
COLUSA	COLUSA	0200	WIDTH CHANGE	MANNING AVE WEST	652	40	26,080	R	2	AC	1/24/2019	66
2ND	SECOND	0100	ANNABELLA AVE	ELM AVE	509	36	18,324	R	2	AC	1/28/2019	66
6TH	SIXTH	0300	CALIFORNIA AVE	NORTH END	336	37	12,432	R	3	AC	1/28/2019	66
5TH	FIFTH	0200	928' N/O COLORADO AVE	CALIFORNIA AVE	406	37	15,022	R	2	AC	1/28/2019	65
COLORADO	COLORADO	0100	SUTTER AVE	WIDTH CHANGE	1,108	53	58,724	A	4	AC	1/26/2019	63
3RD	THIRD	0100	ANNABELLA AVE	382' N/O ANNABELLA AVE	382	37	14,134	R	2	AC	1/28/2019	63
COLO CT	COLORADO CT	0100	COLORADO AVE	NORHT END	176	32	5,632	R	2	AC	1/26/2019	57
8TH	EIGHTH	0300	333' N/O CALIFORNIA AVE	NORTH END	487	37	18,019	R	2	AC	1/28/2019	56
MANNING	MANNING	0100	CITY LIMIT SOUTH	SUTTER AVE	710	53	37,630	A	2	AC	1/26/2019	56
CALIFORNIA	CALIFORNIA	0100	THRID ST	FIFTH ST	656	48	31,488	C	4	AC	1/28/2019	53
9TH	NINTH	0400	CALIFORNIA AVE	PUNJAB	396	37	14,652	C	2	AC	1/26/2019	52
8TH	EIGHTH	0200	CALIFORNIA AVE	333' N/O CALIFORNIA AVE	333	37	12,321	R	2	AC	1/28/2019	49
12TH	TWELFTH	0200	CALIFORNIA AVE	ARIZONA AVE	637	37	23,569	R	2	AC	1/28/2019	49
COLORADO	COLORADO	0200	WIDTH CHANGE	FIFTH ST	886	46	40,756	A	4	AC	1/26/2019	46
PUNJAB	PUNJAB	0100	NINTH ST	MAIN ST	513	37	18,981	R	2	AC	1/24/2019	45
ORLANDO	ORLANDO	0100	CALIFORNIA AVE	CDS NORTH	202	37	7,474	R	2	AC	1/24/2019	43
WHITE	WHITE	0100	THIRD ST	FIFTH ST	592	37	21,904	R	2	AC	1/28/2019	42
8TH	EIGHTH	0100	COLORADO AVE	NEVADA AVE	637	37	23,569	R	2	AC	1/28/2019	40
1ST CT	FIRST CT	0100	FIRST ST	CDS WEST	240	36	8,640	R	2	AC	1/28/2019	39
NEVADA	NEVADA AVE	0600	MAIN ST	TWELFTH ST	752	53	39,856	R	2	AC	1/30/2019	38
MANNING	MANNING	0600	COLORADO AVE	WIDTH CHANGE	718	54	38,772	A	2	AC	1/26/2019	36
SPRINGF	SPRINGFIELD	0200	PLACER AVE	COLORADO AVE	1,628	18	29,304	R	2	AC	1/30/2019	36
ARIZONA	ARIZONA	0200	MAIN ST	EAST END	897	30	26,910	R	2	AC	1/28/2019	33
CALIFORNIA	CALIFORNIA	0500	ELEVENTH ST	END	536	46	24,656	C	4	AC	1/28/2019	33
9TH	NINTH	0200	RAILROAD AVE	COLORADO AVE	429	62	26,598	C	2	AC	1/26/2019	32
AMAN	AMAN	0100	PUNJAB	ARIZONA AVE	390	33	12,870	R	2	AC	1/24/2019	29
ELM	ELM	0100	COLORADO AVE	PAVEMENT CHANGE	775	48	37,200	R	2	AC	1/28/2019	29
PUNJAB	PUNJAB	0200	MAIN ST	AMAN ST	520	33	17,160	R	2	AC	1/24/2019	27
3RD	THIRD	0200	382' N/O ANNABELLA AVE	CALIFORNIA AVE	376	37	13,912	R	2	AC	1/28/2019	27
COLORADO	COLORADO	0600	TWELFTH TH	MANNING AVE	928	52	48,256	A	4	AC	1/26/2019	26
COLORADO	COLORADO	0300	FIFTH ST	SIXTH ST	886	46	40,756	A	4	AC	1/26/2019	25
ARIZONA	ARIZONA	0100	EIGHTH ST	MAIN ST	761	37	28,157	R	2	AC	1/28/2019	24
DEEP	DEEP	0100	PUNJAB	ARIZONA AVE	372	33	12,276	R	2	AC	1/24/2019	23
COLORADO	COLORADO	0500	NINTH ST	TWELFTH ST	1,223	52	63,596	A	4	AC	1/26/2019	19
COLORADO	COLORADO	0700	MANNING AVE	PLACER AVE	1,653	42	69,426	A	4	AC	1/26/2019	18
DONNA	DONNA	0100	SOUTH END	MANNING AVE WEST	659	37	24,383	R	2	AC	1/24/2019	17

Street ID	Street Name	Section ID	Beg Location	End Location	Length (ft)	Width (ft)	Area (sf)	FC	# of Lanes	Surface Type	PCI Date	PCI
MAIN	MAIN ST	0100	MANNING AVE	RR TRACKS	1,130	60	67,800	C	2	AC	1/28/2019	16
MAIN	MAIN ST	0200	RR TRACKS	CALIFORNIA AVE	1,534	66	101,244	C	2	AC	1/28/2019	16
1ST	FIRST	0100	COLORADO AVE	550' N/O COLORADO AVE	550	37	20,350	R	2	AC	1/28/2019	14
MANNING	MANNING	0300	PINE AVE	WIDTH CHANGE	702	38	26,676	A	2	AC	1/26/2019	14
SPRINGF	SPRINGFIELD	0100	CITY LIMIT WEST	PLACER AVE	1,385	18	24,930	R	2	AC	1/30/2019	14
COLORADO	COLORADO	0800	PLACER AVE	SPRINGFIELD AVE	2,247	42	94,374	A	4	AC	1/26/2019	13
4TH	FOURTH	0100	ANNABELLA AVE	NEVADA AVE	255	32	8,160	R	2	AC	1/28/2019	13
NEVADA	NEVADA AVE	0200	260' E/O THIRD ST	FIFTH ST	341	32	10,912	R	2	AC	1/30/2019	13
OREGON	OREGON	0200	NINTH ST	MANNING AVE WEST	826	37	30,562	R	2	AC	1/26/2019	13
SUTTER	SUTTER	0100	CITY LIMIT SOUTH	MANNING AVE	1,335	36	48,060	R	2	AC	1/30/2019	13
KARIN	KARIN	0100	DONNA	COLUSA ST	519	37	19,203	R	2	AC	1/24/2019	12
CALIFORNIA	CALIFORNIA	0400	MAIN ST	ELEVENTH ST	373	46	17,158	C	4	AC	1/28/2019	11
5TH	FIFTH	0100	COLORADO AVE	928' N/O COLORADO AVE	928	35	32,480	R	2	AC	1/28/2019	11
RAILROAD	RAILROAD	0300	NINTH ST	PINE AVE	1,246	40	49,840	R	2	AC	1/30/2019	11
CALIFORNIA	CALIFORNIA	0300	EIGHTH ST	MAIN ST	780	46	35,880	C	4	AC	1/28/2019	9
MANNING	MANNING	0200	SUTTEN AVE	PINE AVE	1,401	30	42,030	A	2	AC	1/26/2019	9
MANNING	MANNING	0400	WIDTH CHANGE	RAILROAD AVE	1,550	62	96,100	A	2	AC	1/26/2019	9
MANNING	MANNING	0700	WIDTH CHANGE	PLACER AVE	606	32	19,392	A	2	AC	1/26/2019	9
CALIFORNIA	CALIFORNIA	0200	FIFTH ST	EIGHTH ST	1,160	46	53,360	C	4	AC	1/28/2019	8
9TH	NINTH	0300	COLORADO AVE	CALIFORNIA AVE	1,326	46	60,996	C	2	AC	1/26/2019	8
ANNAB	ANNABELLA	0200	PAVEMENT CHANGE	FOURTH ST	102	32	3,264	R	2	AC	1/28/2019	7
12TH	TWELFTH	0100	COLORADO AVE	CALIFORNIA AVE	1,349	37	49,913	R	2	AC	1/28/2019	7
UTAH	UTAH	0100	PINE AVE	NINETH ST	228	37	8,436	R	2	AC	1/24/2019	7
11TH	ELEVENTH	0200	NEVADA AVE	CALIFORNIA AVE	660	37	24,420	R	2	AC	1/28/2019	6
NEVADA	NEVADA AVE	0500	NINTH ST	MAIN ST	371	50	18,550	R	2	AC	1/30/2019	6
9TH	NINTH	0100	PINE AVE	RAILROAD AVE	1,441	60	86,460	C	2	AC	1/26/2019	6
RAILROAD	RAILROAD	0200	MAIN ST	NINTH ST	512	40	20,480	R	2	AC	1/30/2019	6
11TH	ELEVENTH	0100	COLORADO AVE	NEVADA AVE	641	37	23,717	R	2	AC	1/28/2019	5
IDAHO	IDAHO	0200	NINTH ST	MAIN ST	850	36	30,600	R	2	AC	1/24/2019	5
NEVADA	NEVADA AVE	0300	FIFTH ST	591' S/O FIFTH ST	291	50	14,550	R	2	AC	1/30/2019	5
OREGON	OREGON	0100	PINE ST	NINTH ST	556	37	20,572	R	2	AC	1/26/2019	5
PINE	PINE	0200	OREGON AVE	RAILROAD AVE	1,035	30	31,050	R	2	AC	1/26/2019	5
RAILROAD	RAILROAD	0400	PINE AVE	710' N/O PINE	710	26	18,460	R	2	AC	1/30/2019	5
6TH	SIXTH	0100	COLORADO AVE	NEVADA AVE	656	35	22,960	R	2	AC	1/28/2019	5
MANNING	MANNING	0500	RAILROAD AVE	COLORADO AVE	648	37	23,976	A	2	AC	1/26/2019	4
NEVADA	NEVADA AVE	0400	591' S/O FIFTH ST	NINTH ST	933	46	42,918	R	2	AC	1/30/2019	4
PINE	PINE	0100	MANNING AVE WEST	OREGON AVE	934	30	28,020	R	2	AC	1/26/2019	4
UTAH	UTAH	0200	NINTH ST	MANNING AVE WEST	406	37	15,022	R	2	AC	1/24/2019	4
IDAHO	IDAHO	0300	MAIN ST	MANNING AVE WEST	310	36	11,160	R	2	AC	1/24/2019	2
RAILROAD	RAILROAD	0100	MANNING AVE	MAIN ST	1,101	40	44,040	R	2	AC	1/30/2019	2
PLACER	PLACER AVE	0100	MANNING AVE WEST	PARLIER AVE	2,652	25	66,300	R	2	AC	1/24/2019	1
7TH	SEVENTH	0100	COLORADO AVE	NEVADA AVE	640	37	23,680	R	2	AC	1/26/2019	1
PLACER	PLACER AVE	0200	PARLIER AVE	MAIN ST	1,410	25	35,250	R	2	AC	1/24/2019	0
6TH	SIXTH	0200	NEVADA AVE	CALIFORNIA AVE	684	37	25,308	R	2	AC	1/28/2019	0
SUTTER	SUTTER	0200	MANNING AVE	PARLIER AVE	2,659	16	42,544	R	2	AC	1/30/2019	0
SUTTER	SUTTER	0300	PARLIER AVE	COLORADO AVE	1,101	18	19,818	R	2	AC	1/30/2019	0

Street ID	Street Name	Section ID	Beg Location	End Location	Length (ft)	Width (ft)	Area (sf)	FC	# of Lanes	Surface Type	PCI Date	PCI
CHERRY	CHERRY	0100	WEST CITY LIMIT	SUTTER AVE	703	16	11,248	O	2	GRAVEL		0
RAILROAD	RAILROAD	0500	710' N/O PINE	SUTTER AVE	1,138	26	29,588	R	2	GRAVEL		0
SUTTER	SUTTER	0400	COLORADO AVE	CITY LIMIT NORTH	190	20	3,800	R	2	GRAVEL		0

Appendix C

Maintenance and Rehabilitation (M&R) Decision Tree

Maintenance and Rehabilitation Decision Tree

This report presents the current maintenance and rehabilitation (M&R) decision tree that exists in the database. The decision tree forms the basis for all of the budgetary computations that are included in this volume. ***Changes to the decision tree will make the results in the budget reports invalid.*** All pavement treatment unit costs relevant to the street types in the database were updated.

The decision tree lists the treatments and costs selected for preventive maintenance and rehabilitation activities. Each line represents a specific combination of functional classification and surface type.

The preventive maintenance portion of the report is identified as Condition Category I – Good. All preventive maintenance treatment listings are assigned only to sections in Condition Category I. Street sections with PCI values under this range are assigned to treatments listed in Categories II through V.

In the preventive maintenance category, a time sequence is used to identify the appropriate treatment and cost. Each preventive maintenance treatment description consists of three parts: 1) a CRACK treatment, 2) a SURFACE treatment, and 3) a RESTORATION treatment. These three parts allow the user to specify one of three different preventive maintenance treatments depending on the prior maintenance history of the section.

1. The CRACK treatment part can be used to specify the most frequent type of preventive maintenance activity planned (typically crack seals).
2. The SURFACE treatment part can be used to specify more extensive and less frequent preventive maintenance activities, such as chip seals or slurry seals. For example, a crack seal can be specified on a 3-year cycle with a slurry seal specified after seven years.
3. The RESTORATION part can be used to specify a surface restoration treatment (such as an overlay) to be performed after a specified number of surface treatments. For example, after three successive slurry seals, an overlay can be specified instead of another slurry seal.

Rehabilitation treatments are assigned to sections in Condition Categories II through V. Each line is defined by a specific combination of functional classification, surface type, and condition category.

The City adjusted the PCI thresholds for budget analysis in StreeSaver® for different functional classifications to meet the goal of improving the PCI.

- Arterial/Collector functional class
  - Good 70-100
  - Fair 50-69
  - Poor 25-49
  - Very Poor 0-24

- Residential/Local/Alley functional class
    - Good 70-100
    - Fair 50-69
    - Poor 25-49
    - Very Poor 0-24

COLUMN	DESCRIPTION
Functional Class	Functional Classification identifying the branch number.
Surface	Surface Type identifying the branch number. Surface Type (AC Pavement, AC/AC = AC Overlay of AC Pavement, AC/PCC = AC Overlay of PCC Pavement, PCC = PCC Pavement, ST = Surface treatment over gravel base/subgrade).
Condition Category	Condition Category (I through V).
Treatment Type	First Row (Crack Treatment) indicates localized treatment (e.g. crack sealing). Second Row (Surface Treatment) indicates surface treatment (e.g. microsurfacing). Third Row (Restoration Treatment) indicates surface restoration (e.g. overlay).
Treatment	Name of treatments from the "Treatment Descriptions" report.
Cost/SqYd, except Seal Cracks in LF	Average unit cost per square yard for each treatment except for “SEAL CRACKS” which is cost per linear feet.
Yrs. Between Crack Seals	First Row - number of years between successive treatment applications specified in the first row (i.e. CRACK treatment).
Yrs. Between Surface Seals	Second Row - number of years between successive treatment applications specified in the second row (i.e. SURFACE treatment).
# of Surface Seals before Overlay	Number of times that the treatment application in the second row (i.e. SURFACE treatment) will be performed prior to performing the treatment application in the third row.

Treatments highlighted in yellow indicated that a specific functional class and surface combination does not exist within the City (i.e. an AC overlay of PCC pavement arterial street, a surface treatment over gravel base/subgrade pavement residential street, etc.). Therefore, treatments for these functional class and surface combination will be “Do Nothing”.

Note that the treatments assigned to each section should not be blindly followed in preparing a street maintenance program. Engineering judgment and project level analysis should be applied to ensure that the treatment is appropriate and cost effective for the section.

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San Joaquin, CA 93660

Decision Tree

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Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Arterial	AC	I - Very Good	Crack Treatment	SEAL CRACKS	$1.00	3		
			Surface Treatment	CRACK SEAL+SLURRY SEAL	$3.75		7	
			Restoration Treatment	1.5" MILL W/ 1.5" HMA OVERLAY	$18.00			3
		II - Good, Non-Load Related		1.5" MILL W/ 1.5" HMA OVERLAY	$18.00			
		III - Good, Load Related		2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	$29.00			
		IV - Poor		2" HMA W/ CIR+BASE REPAIR	$40.50			
		V - Very Poor		FDR W/ 3" HMA OVERLAY	$46.00			
	AC/AC	I - Very Good	Crack Treatment	SEAL CRACKS	$1.00	3		
			Surface Treatment	CRACK SEAL+SLURRY SEAL	$3.75		7	
			Restoration Treatment	1.5" MILL W/ 1.5" HMA OVERLAY	$18.00			3
		II - Good, Non-Load Related		1.5" MILL W/ 1.5" HMA OVERLAY	$18.00			
		III - Good, Load Related		2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	$29.00			
		IV - Poor		2" HMA W/ CIR+BASE REPAIR	$40.50			
		V - Very Poor		FDR W/ 3" HMA OVERLAY	$46.00			
	AC/PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		DO NOTHING	$0.00			
		V - Very Poor		DO NOTHING	$0.00			

Functional Class and Surface combination not used

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Decision Tree

Printed: 03/12/2019

Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Arterial	PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		DO NOTHING	$0.00			
		V - Very Poor		DO NOTHING	$0.00			
	ST	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		DO NOTHING	$0.00			
		V - Very Poor		DO NOTHING	$0.00			

Functional Class and Surface combination not used

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Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Collector	AC	I - Very Good	Crack Treatment	SEAL CRACKS	$1.00	3		
			Surface Treatment	CRACK SEAL+SLURRY SEAL	$3.75		7	
			Restoration Treatment	1.5" MILL W/ 1.5" HMA OVERLAY	$18.00			3
		II - Good, Non-Load Related		1.5" MILL W/ 1.5" HMA OVERLAY	$18.00			
		III - Good, Load Related		2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	$29.00			
		IV - Poor		2" HMA W/ CIR+BASE REPAIR	$40.50			
		V - Very Poor		FDR W/ 3" HMA OVERLAY	$43.00			
	AC/AC	I - Very Good	Crack Treatment	SEAL CRACKS	$1.00	3		
			Surface Treatment	CRACK SEAL+SLURRY SEAL	$3.75		7	
			Restoration Treatment	1.5" MILL W/ 1.5" HMA OVERLAY	$18.00			3
		II - Good, Non-Load Related		1.5" MILL W/ 1.5" HMA OVERLAY	$18.00			
		III - Good, Load Related		2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	$29.00			
		IV - Poor		2" HMA W/ CIR+BASE REPAIR	$40.50			
		V - Very Poor		FDR W/ 3" HMA OVERLAY	$43.00			
	AC/PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		DO NOTHING	$0.00			
		V - Very Poor		DO NOTHING	$0.00			

Functional Class and Surface combination not used

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Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Collector	PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		DO NOTHING	$0.00			
		V - Very Poor		DO NOTHING	$0.00			
	ST	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		DO NOTHING	$0.00			
		V - Very Poor		DO NOTHING	$0.00			

Functional Class and Surface combination not used

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Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Residential/Local	AC	I - Very Good	Crack Treatment	SEAL CRACKS	$1.00	3		
			Surface Treatment	CRACK SEAL+SLURRY SEAL	$3.75		7	
			Restoration Treatment	2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	$33.50			3
		II - Good, Non-Load Related		CRACK SEAL+SLURRY SEAL	$3.75			
		III - Good, Load Related		CRACK SEAL+SLURRY SEAL+BASE REPAIR	$9.25			
		IV - Poor		2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	$33.50			
		V - Very Poor		FDR W/ 3" HMA OVERLAY	$43.00			
	AC/AC	I - Very Good	Crack Treatment	SEAL CRACKS	$1.00	3		
			Surface Treatment	CRACK SEAL+SLURRY SEAL	$3.75		7	
			Restoration Treatment	2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	$33.50			3
		II - Good, Non-Load Related		CRACK SEAL+SLURRY SEAL	$3.75			
		III - Good, Load Related		CRACK SEAL+SLURRY SEAL+BASE REPAIR	$9.25			
		IV - Poor		2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	$33.50			
		V - Very Poor		FDR W/ 3" HMA OVERLAY	$43.00			
	AC/PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		DO NOTHING	$0.00			
		V - Very Poor		DO NOTHING	$0.00			

Functional Class and Surface combination not used

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Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Residential/Local	PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		DO NOTHING	$0.00			
		V - Very Poor		DO NOTHING	$0.00			
	ST	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		DO NOTHING	$0.00			
		V - Very Poor		DO NOTHING	$0.00			

Functional Class and Surface combination not used

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Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Other	AC	I - Very Good	Crack Treatment	SEAL CRACKS	$1.00	3		
			Surface Treatment	CRACK SEAL+SLURRY SEAL	$3.75		7	
			Restoration Treatment	2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	$33.50			3
		II - Good, Non-Load Related		CRACK SEAL+SLURRY SEAL	$3.75			
		III - Good, Load Related		CRACK SEAL+SLURRY SEAL+BASE REPAIR	$9.25			
		IV - Poor		2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	$33.50			
		V - Very Poor		FDR W/ 3" HMA OVERLAY	$43.00			
	AC/AC	I - Very Good	Crack Treatment	SEAL CRACKS	$1.00	3		
			Surface Treatment	CRACK SEAL+SLURRY SEAL	$3.75		7	
			Restoration Treatment	2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	$33.50			3
		II - Good, Non-Load Related		CRACK SEAL+SLURRY SEAL	$3.75			
		III - Good, Load Related		CRACK SEAL+SLURRY SEAL+BASE REPAIR	$9.25			
		IV - Poor		2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	$33.50			
		V - Very Poor		FDR W/ 3" HMA OVERLAY	$43.00			
	AC/PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		DO NOTHING	$0.00			
		V - Very Poor		DO NOTHING	$0.00			

Functional Class and Surface combination not used

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Decision Tree

Printed: 03/12/2019

Functional Class	Surface	Condition Category	Treatment Type	Treatment	Cost/Sq Yd, except Seal Cracks in LF:	Yrs Between Crack Seals	Yrs Between Surface Seals	# of Surface Seals before Overlay
Other	PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		DO NOTHING	$0.00			
		V - Very Poor		DO NOTHING	$7.27			
	ST	I - Very Good	Crack Treatment	DO NOTHING	$0.00	3		
			Surface Treatment	DO NOTHING	$0.00		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		DO NOTHING	$0.00			
		V - Very Poor		DO NOTHING	$0.00			

Functional Class and Surface combination not used

Appendix D

Budget Needs

I. Projected PCI/Cost Summary

II. Rehabilitation Treatment/Cost Summary

III. Preventive Maintenance Treatment/Cost Summary

Budget Needs Reports

The purpose of this module is to answer the question: ***If the City had all the money in the world, what sections should be fixed and how much will it cost?*** Based on the Maintenance & Rehabilitation (M&R) decision tree and the PCIs of the sections, the program will then select a maintenance or rehabilitation action and compute the total costs over a period of ten years. The Budget Needs represents the "ideal world" funding levels, while the Budget Scenarios reports in the next section represent the most "cost effective" prioritization possible for the actual funding levels.

A budget needs analysis has been performed. The summary results from the analysis are shown below. An interest rate of 3% and an inflation factor of 3% were used to project the costs for the next ten years. This report shows the total ten-year budget that would be required to meet the City's standards as exemplified in the M&R decision tree.

As indicated in the report, with a budget of $8.16 million over the next ten years the PCI of the street network will improve from the current level of 67 to 84 by fiscal year (FY) 2028/29. If no treatments are programmed, the weighted average PCI is projected to deteriorate to 42 by FY 2028/29.

Budget Needs reports included in this volume are listed below:

- Projected PCI/Cost Summary
- Preventative Maintenance Treatment/Cost Summary
- Rehabilitation Treatment/Cost Summary

Needs - Projected PCI / Cost Summary

This report summarizes and projects the City's network PCI values over a ten-year period, both with and without treatments applied. These costs are based on those in the M&R decision tree. It also projects the costs over a ten-year period.

COLUMN	DESCRIPTION
Year	Year in the analysis period.
PCI Treated	Projected network average PCI with all needed treatments applied.
PCI Untreated	Projected network average PCI without any treatments applied.
PM Cost	Total preventive maintenance treatment cost.
Rehab Cost	Total rehabilitation treatment cost.
Cost	The budget required for each year in the analysis period to meet the City's standard as shown on the M&R decision tree.
Total Cost	Total budget required over a ten-year period.

City of San Joaquin
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Needs - Projected PCI/Cost Summary

Inflation Rate = 3.00 %

Printed: 04/11/2019

Year	PCI Treated	PCI Untreated	PM Cost	Rehab Cost	Cost
2019	98	24	$75,579	$11,620,291	$11,695,870
2020	91	20	$0	$35,670	$35,670
2021	89	18	$14,100	$0	$14,100
2022	87	17	$612	$58,624	$59,236
2023	86	15	$2,275	$0	$2,275
2024	85	14	$2,523	$0	$2,523
2025	83	13	$1,955	$5,583	$7,538
2026	88	12	$1,387,644	$0	$1,387,644
2027	87	11	$29,918	$0	$29,918
2028	85	10	$17,924	$0	$17,924

% PM	PM Total Cost	Rehab Total Cost	Total Cost
11.56%	$1,532,530	$11,720,168	$13,252,698

Needs - Rehabilitation Treatment/Cost Summary

This report summarizes each rehabilitation treatment type, quantity of pavement affected, and total costs over the ten-year period. It also summarizes the total quantities and costs over the next ten years.

COLUMN	DESCRIPTION
Treatment	Type of rehabilitation treatments needed.
Year	Year in the analysis period (i.e. 2019, 2021, 2022 etc).
Area Treated	Quantities in square yard.
Cost	Rehabilitation treatment cost.

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Needs - Rehabilitation Treatment/Cost Summary

Inflation Rate = 3.00 %

Printed: 04/11/2019

Treatment	Year		Area Treated		Cost
1.5" MILL W/ 1.5" HMA OVERLAY	2019		3,498.67	sq.yd.	$62,976
		Total	3,498.67	sq.yd.	$62,976
2" HMA W/ CIR+BASE REPAIR	2019		14,531.33	sq.yd.	$588,519
		Total	14,531.33	sq.yd.	$588,519
2" MILL W/ 2" HMA OVERLAY+BASE REPAIR	2019		51,741.33	sq.yd.	$1,647,340
		Total	51,741.33	sq.yd.	$1,647,340
CRACK SEAL+SLURRY SEAL	2019		8,187.56	sq.yd.	$30,704
	2020		4,295.78	sq.yd.	$16,594
	2022		6,315.11	sq.yd.	$25,879
	2025		1,246.67	sq.yd.	$5,583
		Total	20,045.11	sq.yd.	$78,760
CRACK SEAL+SLURRY SEAL+BASE REPAIR	2019		5,241.67	sq.yd.	$48,487
	2020		2,002.11	sq.yd.	$19,076
	2022		3,239.56	sq.yd.	$32,745
		Total	10,483.33	sq.yd.	$100,308
FDR W/ 3" HMA OVERLAY	2019		210,869.44	sq.yd.	$9,242,265
		Total	210,869.44	sq.yd.	$9,242,265

Total Cost $11,720,168

Needs - Preventive Maintenance Treatment/Cost Summary

This report summarizes each preventive maintenance treatment type, quantity of pavement affected, and total costs over the ten-year period. It also summarizes the total quantities and costs over the next ten years.

COLUMN	DESCRIPTION
Treatment	Type of preventive maintenance treatments needed.
Year	Year in the analysis period (i.e. 2019, 2021, 2022, etc).
Area Treated	Quantities in linear feet (Seal Cracks) or square yard (Slurry Seal).
Cost	Maintenance treatment cost.

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Needs - Preventive Maintenance Treatment/Cost Summary

Inflation Rate = 3.00 %

Printed: 04/11/2019

Treatment	Year	Area Treated		Cost
CRACK SEAL+SLURRY SEAL	2019	20,153.67	sq.yd.	$75,579
	2021	3,544	sq.yd.	$14,100
	2026	300,794.44	sq.yd.	$1,387,312
	2027	6,297.89	sq.yd.	$29,918
	2028	3,544	sq.yd.	$17,341
	Total	334,334		$1,524,250
SEAL CRACKS	2022	558.06	ft.	$612
	2023	2,013.05	ft.	$2,275
	2024	2,161.93	ft.	$2,523
	2025	1,627.58	ft.	$1,955
	2026	268.34	ft.	$332
	2028	444.13	ft.	$583
	Total	7,073.08		$8,280
	Total Quantity	341,407.08		$1,532,530

Appendix E

Scenario Summary Reports

I. Cost Summary

II. Network Condition Summary

City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

Scenarios - Cost Summary

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $165K per year

Year	PM	Budget	Rehabilitation			Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2019	$50,000	$165,000	II	$28,357	Non-Project	$50,427	$0	$11,535,527	Funded	$0
			III	$0					Unmet	$177,126
			IV	$81,532	Project	$0				
			V	$0						
			Total	$109,889						
			Project	$0						
2020	$0	$165,000	II	$14,176	Non-Project	$9,567	$0	$11,927,787	Funded	$0
			III	$0					Unmet	$0
			IV	$0	Project	$0				
			V	$140,435						
			Total	$154,611						
			Project	$0						
2021	$0	$165,000	II	$0	Non-Project	$0	$0	$12,195,066	Funded	$0
			III	$16,380					Unmet	$0
			IV	$0	Project	$0				
			V	$146,552						
			Total	$162,932						
			Project	$0						
2022	$0	$165,000	II	$25,879	Non-Project	$401	$0	$12,562,596	Funded	$0
			III	$16,871					Unmet	$0
			IV	$0	Project	$0				
			V	$108,306						
			Total	$151,056						
			Project	$0						
2023	$0	$165,000	II	$0	Non-Project	$18,107	$0	$12,834,424	Funded	$0
			III	$0					Unmet	$0
			IV	$99,084	Project	$0				
			V	$43,880						
			Total	$142,964						
			Project	$0						

Year	PM	Budget		Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2024	$0	$165,000	II	$0	Non-Project	$15,480	$0	$13,231,902	Funded	$0
			III	$0					Unmet	$217,488
			IV	$0	Project	$0				
			V	$147,320						
			Total	$147,320						
			Project	$0						
2025	$0	$165,000	II	$5,583	Non-Project	$988	$0	$13,634,087	Funded	$0
			III	$0					Unmet	$0
			IV	$0	Project	$0				
			V	$132,880						
			Total	$138,463						
			Project	$0						
2026	$74,000	$165,000	II	$0	Non-Project	$73,806	$194	$14,034,947	Funded	$0
			III	$0					Unmet	$0
			IV	$64,704	Project	$0				
			V	$0						
			Total	$64,704						
			Project	$0						
2027	$0	$165,000	II	$0	Non-Project	$14,189	$0	$14,361,493	Funded	$0
			III	$0					Unmet	$0
			IV	$0	Project	$0				
			V	$149,083						
			Total	$149,083						
			Project	$0						
2028	$0	$165,000	II	$0	Non-Project	$2,303	$0	$14,731,104	Funded	$0
			III	$0					Unmet	$0
			IV	$0	Project	$0				
			V	$153,704						
			Total	$153,704						
			Project	$0						

Summary

Functional Class	Rehabilitation	Prev. Maint.	Funded Stop Gap	Unmet Stop Gap
Arterial	$378,748	$14,277	$0	$103,621
Collector	$488,460	$104,276	$0	$84,611
Residential/Local	$507,518	$66,715	$0	$206,382
Grand Total:	$1,374,726	$185,268	$0	$394,614

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Scenarios - Network Condition Summary

Interest: 3% Inflation: 3% Printed: 04/11/2019

Scenario: $165K per year

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2019	$165,000	$50,000	2023	$165,000	$0	2027	$165,000	$0
2020	$165,000	$0	2024	$165,000	$0	2028	$165,000	$0
2021	$165,000	$0	2025	$165,000	$0			
2022	$165,000	$0	2026	$165,000	$74,000			

Projected Network Average PCI by year

Year	Never Treated	With Selected Treatment	Treated Centerline Miles	Treated Lane Miles
2019	24	24	0.95	1.97
2020	20	22	0.48	0.96
2021	18	21	0.22	0.44
2022	17	20	1.03	2.13
2023	15	20	0.72	1.44
2024	14	20	0.38	0.76
2025	13	19	1.27	2.61
2026	12	19	1.36	2.73
2027	11	19	0.41	0.96
2028	10	19	0.59	1.44

Percent Network Area by Functional Class and Condition Category

Condition in base year 2019, prior to applying treatments.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	3.9%	4.7%	0.0%	8.5%
II / III	5.4%	1.6%	4.2%	0.0%	11.2%
IV	2.7%	1.8%	10.2%	0.0%	14.7%
V	18.1%	14.6%	32.9%	0.0%	65.6%
Total	26.3%	21.8%	51.8%	0.0%	100.0%

Condition in year 2019 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	3.9%	7.8%	0.0%	11.6%
II / III	5.4%	1.6%	1.8%	0.0%	8.9%
IV	2.7%	1.8%	9.4%	0.0%	13.9%
V	18.1%	14.6%	32.9%	0.0%	65.6%
Total	26.3%	21.8%	51.8%	0.0%	100.0%

Condition in year 2028 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	2.4%	6.7%	10.6%	0.0%	19.7%
IV	4.1%	0.0%	0.0%	0.0%	4.1%
V	19.8%	15.1%	41.3%	0.0%	76.2%

Scenarios Criteria:

City of San Joaquin
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Scenarios - Network Condition Summary

Interest: 3% Inflation: 3% Printed: 04/11/2019

Scenario: $165K per year

Total	26.3%	21.8%	51.8%	0.0%	100.0%

City of San Joaquin
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Scenarios - Cost Summary

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $320K per Year

Year	PM	Budget	Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2019	$50,000	$320,000	II $28,357	Non-Project	$59,715	$0	$11,376,203	Funded	$0
			III $203,749					Unmet	$176,394
			IV $27,820	Project	$0				
			V $0						
			Total $259,926						
			Project $0						
2020	$0	$320,000	II $14,176	Non-Project	$0	$0	$11,609,157	Funded	$0
			III $202,439					Unmet	$0
			IV $0	Project	$0				
			V $102,089						
			Total $318,704						
			Project $0						
2021	$0	$320,000	II $0	Non-Project	$0	$0	$11,720,153	Funded	$0
			III $0					Unmet	$0
			IV $179,648	Project	$0				
			V $130,007						
			Total $309,655						
			Project $0						
2022	$0	$320,000	II $25,879	Non-Project	$484	$0	$11,904,003	Funded	$0
			III $15,874					Unmet	$0
			IV $50,115	Project	$0				
			V $227,625						
			Total $319,493						
			Project $0						
2023	$0	$320,000	II $0	Non-Project	$266	$0	$11,998,146	Funded	$0
			III $0					Unmet	$0
			IV $23,595	Project	$0				
			V $295,150						
			Total $318,745						
			Project $0						

Year	PM	Budget		Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2024	$0	$320,000	II	$18,391	Non-Project	$167	$0	$12,130,995	Funded	$0
			III	$0					Unmet	$206,657
			IV	$0	Project	$0				
			V	$296,891						
			Total	$315,282						
			Project	$0						
2025	$0	$320,000	II	$5,583	Non-Project	$16,993	$0	$12,256,423	Funded	$0
			III	$0					Unmet	$0
			IV	$0	Project	$0				
			V	$295,285						
			Total	$300,868						
			Project	$0						
2026	$74,000	$320,000	II	$0	Non-Project	$78,397	$0	$12,466,717	Funded	$0
			III	$0					Unmet	$0
			IV	$68,769	Project	$0				
			V	$167,686						
			Total	$236,455						
			Project	$0						
2027	$0	$320,000	II	$0	Non-Project	$353	$0	$12,607,386	Funded	$0
			III	$0					Unmet	$0
			IV	$0	Project	$0				
			V	$318,579						
			Total	$318,579						
			Project	$0						
2028	$0	$320,000	II	$0	Non-Project	$779	$0	$12,741,822	Funded	$0
			III	$0					Unmet	$0
			IV	$0	Project	$0				
			V	$309,740						
			Total	$309,740						
			Project	$0						

Summary

Functional Class	Rehabilitation	Prev. Maint.	Funded Stop Gap	Unmet Stop Gap
Arterial	$2,225,116	$30,893	$0	$88,783
Collector	$257,150	$75,000	$0	$87,283
Residential/Local	$525,181	$51,261	$0	$206,984
Grand Total:	$3,007,447	$157,154	$0	$383,051

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Scenarios - Network Condition Summary

Interest: 3% Inflation: 3% Printed: 04/11/2019

Scenario: $320K per Year

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2019	$320,000	$50,000	2023	$320,000	$0	2027	$320,000	$0
2020	$320,000	$0	2024	$320,000	$0	2028	$320,000	$0
2021	$320,000	$0	2025	$320,000	$0			
2022	$320,000	$0	2026	$320,000	$74,000			

Projected Network Average PCI by year

Year	Never Treated	With Selected Treatment	Treated Centerline Miles	Treated Lane Miles
2019	24	25	1.30	3.09
2020	20	23	0.55	1.54
2021	18	23	0.26	0.51
2022	17	23	1.29	2.97
2023	15	23	0.65	2.06
2024	14	24	0.84	2.13
2025	13	24	1.73	3.87
2026	12	25	1.18	3.12
2027	11	26	0.57	1.48
2028	10	26	1.13	2.32

Percent Network Area by Functional Class and Condition Category

Condition in base year 2019, prior to applying treatments.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	3.9%	4.7%	0.0%	8.5%
II / III	5.4%	1.6%	4.2%	0.0%	11.2%
IV	2.7%	1.8%	10.2%	0.0%	14.7%
V	18.1%	14.6%	32.9%	0.0%	65.6%
Total	26.3%	21.8%	51.8%	0.0%	100.0%

Condition in year 2019 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	2.0%	3.9%	7.8%	0.0%	13.6%
II / III	3.4%	1.6%	1.3%	0.0%	6.3%
IV	2.7%	1.8%	9.9%	0.0%	14.4%
V	18.1%	14.6%	32.9%	0.0%	65.6%
Total	26.3%	21.8%	51.8%	0.0%	100.0%

Condition in year 2028 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	15.1%	5.3%	10.3%	0.0%	30.7%
IV	0.0%	0.0%	0.6%	0.0%	0.6%
V	11.2%	16.6%	40.9%	0.0%	68.7%

Scenarios Criteria:

Total	26.3%	21.8%	51.8%	0.0%	100.0%

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Scenarios - Cost Summary

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $1.06m per year

Year	PM	Budget	Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2019	$0	$1,060,000	II $28,357	Non-Project	$4,009	$0	$10,639,359	Funded	$0
			III $385,765					Unmet	$167,263
			IV $183,402	Project	$0				
			V $454,951						
			Total $1,052,475						
			Project $0						
2020	$0	$1,060,000	II $14,176	Non-Project	$0	$0	$10,116,132	Funded	$0
			III $14,963					Unmet	$0
			IV $0	Project	$0				
			V $1,023,642						
			Total $1,052,781						
			Project $0						
2021	$0	$1,060,000	II $0	Non-Project	$9,854	$0	$9,451,072	Funded	$0
			III $31,792					Unmet	$0
			IV $228,303	Project	$0				
			V $786,387						
			Total $1,046,482						
			Project $0						
2022	$0	$1,060,000	II $25,879	Non-Project	$93	$0	$8,832,588	Funded	$0
			III $16,871					Unmet	$0
			IV $169,154	Project	$0				
			V $842,847						
			Total $1,054,751						
			Project $0						
2023	$0	$1,060,000	II $0	Non-Project	$685	$0	$8,101,413	Funded	$0
			III $0					Unmet	$0
			IV $23,595	Project	$0				
			V $1,028,327						
			Total $1,051,922						
			Project $0						

Year	PM	Budget	Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2024	$10,000	$1,060,000	II $18,391	Non-Project	$26,910	$0	$7,381,665	Funded	$0
			III $0					Unmet	$127,403
			IV $0	Project	$0				
			V $1,006,371						
			Total $1,024,762						
			Project $0						
2025	$10,000	$1,060,000	II $142,011	Non-Project	$16,757	$0	$6,711,631	Funded	$0
			III $0					Unmet	$0
			IV $0	Project	$0				
			V $890,106						
			Total $1,032,117						
			Project $0						
2026	$10,000	$1,060,000	II $0	Non-Project	$35,602	$0	$6,010,285	Funded	$0
			III $0					Unmet	$0
			IV $0	Project	$0				
			V $1,010,156						
			Total $1,010,156						
			Project $0						
2027	$10,000	$1,060,000	II $0	Non-Project	$22,265	$0	$5,283,607	Funded	$0
			III $0					Unmet	$0
			IV $0	Project	$0				
			V $1,030,923						
			Total $1,030,923						
			Project $0						
2028	$10,000	$1,060,000	II $0	Non-Project	$21,235	$0	$4,509,151	Funded	$0
			III $0					Unmet	$0
			IV $0	Project	$0				
			V $1,038,312						
			Total $1,038,312						
			Project $0						

Summary

Functional Class	Rehabilitation	Prev. Maint.	Funded Stop Gap	Unmet Stop Gap
Arterial	$3,767,063	$73,982	$0	$39,155
Collector	$3,009,157	$26,533	$0	$49,817
Residential/Local	$3,618,461	$36,895	$0	$205,694
Grand Total:	$10,394,681	$137,410	$0	$294,666

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Scenarios - Network Condition Summary

Interest: 3% Inflation: 3% Printed: 04/11/2019

Scenario: $1.06m per year

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2019	$1,060,000	$0	2023	$1,060,000	$0	2027	$1,060,000	$10,000
2020	$1,060,000	$0	2024	$1,060,000	$10,000	2028	$1,060,000	$10,000
2021	$1,060,000	$0	2025	$1,060,000	$10,000			
2022	$1,060,000	$0	2026	$1,060,000	$10,000			

Projected Network Average PCI by year

Year	Never Treated	With Selected Treatment	Treated Centerline Miles	Treated Lane Miles
2019	24	28	1.33	4.61
2020	20	31	1.21	3.50
2021	18	35	1.17	3.19
2022	17	39	1.18	2.56
2023	15	44	1.88	5.65
2024	14	49	2.18	6.38
2025	13	53	2.28	5.72
2026	12	57	1.80	4.02
2027	11	61	1.72	3.77
2028	10	65	1.80	3.67

Percent Network Area by Functional Class and Condition Category

Condition in base year 2019, prior to applying treatments.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	3.9%	4.7%	0.0%	8.5%
II / III	5.4%	1.6%	4.2%	0.0%	11.2%
IV	2.7%	1.8%	10.2%	0.0%	14.7%
V	18.1%	14.6%	32.9%	0.0%	65.6%
Total	26.3%	21.8%	51.8%	0.0%	100.0%

Condition in year 2019 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	8.6%	3.9%	7.0%	0.0%	19.5%
II / III	1.3%	1.6%	1.8%	0.0%	4.7%
IV	1.3%	1.8%	10.2%	0.0%	13.3%
V	15.1%	14.6%	32.9%	0.0%	62.5%
Total	26.3%	21.8%	51.8%	0.0%	100.0%

Condition in year 2028 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	26.3%	21.8%	28.6%	0.0%	76.7%
V	0.0%	0.0%	23.3%	0.0%	23.3%
Total	26.3%	21.8%	51.8%	0.0%	100.0%

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Scenarios - Cost Summary

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $1.43M per year

Year	PM	Budget	Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2019	0%	$1,430,000	II	$28,357	Non-Project	$9,288	$0	$10,266,687	Funded	$0
			III	$400,292					Unmet	$161,381
			IV	$211,222	Project	$0				
			V	$779,998						
			Total	$1,419,869						
			Project	$0						
2020	0%	$1,430,000	II	$14,176	Non-Project	$0	$0	$9,357,507	Funded	$0
			III	$15,903					Unmet	$0
			IV	$47,238	Project	$0				
			V	$1,350,238						
			Total	$1,427,555						
			Project	$0						
2021	0%	$1,430,000	II	$0	Non-Project	$0	$0	$8,282,525	Funded	$0
			III	$0					Unmet	$0
			IV	$492,996	Project	$0				
			V	$935,093						
			Total	$1,428,089						
			Project	$0						
2022	0%	$1,430,000	II	$25,879	Non-Project	$29,234	$0	$7,273,638	Funded	$0
			III	$32,745					Unmet	$0
			IV	$73,290	Project	$0				
			V	$1,264,967						
			Total	$1,396,881						
			Project	$0						
2023	0%	$1,430,000	II	$0	Non-Project	$398	$0	$6,118,506	Funded	$0
			III	$0					Unmet	$0
			IV	$23,595	Project	$0				
			V	$1,405,969						
			Total	$1,429,564						
			Project	$0						

Year	PM	Budget	Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2024	0%	$1,430,000	II $18,391	Non-Project	$1,226	$0	$4,972,156	Funded	$0
			III $0					Unmet	$87,266
			IV $0	Project	$0				
			V $1,399,236						
			Total $1,417,627						
			Project $0						
2025	0%	$1,430,000	II $142,011	Non-Project	$17,200	$0	$3,876,077	Funded	$0
			III $0					Unmet	$0
			IV $0	Project	$0				
			V $1,228,564						
			Total $1,370,575						
			Project $0						
2026	0%	$1,430,000	II $0	Non-Project	$82,426	$0	$2,742,030	Funded	$0
			III $0					Unmet	$0
			IV $0	Project	$0				
			V $1,343,789						
			Total $1,343,789						
			Project $0						
2027	0%	$1,430,000	II $17,434	Non-Project	$25,723	$0	$1,583,491	Funded	$0
			III $0					Unmet	$0
			IV $0	Project	$0				
			V $1,382,608						
			Total $1,400,042						
			Project $0						
2028	0%	$1,430,000	II $0	Non-Project	$17,505	$0	$357,056	Funded	$0
			III $0					Unmet	$0
			IV $0	Project	$0				
			V $1,411,935						
			Total $1,411,935						
			Project $0						

Summary

Functional Class	Rehabilitation	Prev. Maint.	Funded Stop Gap	Unmet Stop Gap
Arterial	$3,721,837	$120,208	$0	$33,643
Collector	$2,861,468	$25,371	$0	$38,457
Residential/Local	$7,462,621	$37,421	$0	$176,547
Grand Total:	$14,045,926	$183,000	$0	$248,647

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Scenarios - Network Condition Summary

Interest: 3% Inflation: 3% Printed: 04/11/2019

Scenario: $1.43M per year

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2019	$1,430,000	0%	2023	$1,430,000	0%	2027	$1,430,000	0%
2020	$1,430,000	0%	2024	$1,430,000	0%	2028	$1,430,000	0%
2021	$1,430,000	0%	2025	$1,430,000	0%			
2022	$1,430,000	0%	2026	$1,430,000	0%			

Projected Network Average PCI by year

Year	Never Treated	With Selected Treatment	Treated Centerline Miles	Treated Lane Miles
2019	24	30	1.77	5.94
2020	20	36	1.61	4.69
2021	18	41	1.11	2.60
2022	17	48	1.81	4.12
2023	15	55	1.72	5.48
2024	14	62	3.39	9.07
2025	13	68	3.17	6.66
2026	12	74	2.01	5.22
2027	11	80	2.30	4.93
2028	10	85	2.98	6.02

Percent Network Area by Functional Class and Condition Category

Condition in base year 2019, prior to applying treatments.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	3.9%	4.7%	0.0%	8.5%
II / III	5.4%	1.6%	4.2%	0.0%	11.2%
IV	2.7%	1.8%	10.2%	0.0%	14.7%
V	18.1%	14.6%	32.9%	0.0%	65.6%
Total	26.3%	21.8%	51.8%	0.0%	100.0%

Condition in year 2019 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	10.8%	3.9%	7.8%	0.0%	22.4%
II / III	1.3%	1.6%	1.3%	0.0%	4.2%
IV	1.3%	1.8%	9.9%	0.0%	13.0%
V	12.9%	14.6%	32.9%	0.0%	60.3%
Total	26.3%	21.8%	51.8%	0.0%	100.0%

Condition in year 2028 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	26.3%	21.8%	51.8%	0.0%	100.0%
Total	26.3%	21.8%	51.8%	0.0%	100.0%

Appendix F

Sections Selected for Treatment Scenario 3: $1.06 Million per year (Improve Network PCI to 65)

Sections Selected for Treatment

Based on the recommended annual budget of $1.06 million (Scenario 3), the "Sections Selected for Treatment" list provides the City with potential candidates for treatment based on each section's functional classification, PCI, treatment history, and available funding.

This list should not be blindly followed when preparing a street maintenance program. Engineering judgment and project level analysis should be applied to ensure that the treatment is appropriate and cost effective.

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Scenarios - Sections Selected for Treatment

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $1.06m per year

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2019	$1,060,000	$0	2023	$1,060,000	$0	2027	$1,060,000	$10,000
2020	$1,060,000	$0	2024	$1,060,000	$10,000	2028	$1,060,000	$10,000
2021	$1,060,000	$0	2025	$1,060,000	$10,000			
2022	$1,060,000	$0	2026	$1,060,000	$10,000			

Year: 2019

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
COLORADO	FIFTH ST	SIXTH ST	COLORADO	0300	886	46	40,756	A	AC		24	22	100	$208,309	14,635	FDR W/ 3" HMA OVERLAY
COLORADO	TWELFTH TH	MANNING AVE	COLORADO	0600	928	52	48,256	A	AC		25	23	100	$246,642	14,635	FDR W/ 3" HMA OVERLAY
													Treatment Total	$454,951		
COLORADO	WIDTH CHANGE	FIFTH ST	COLORADO	0200	886	46	40,756	A	AC		45	44	100	$183,402	17,897	2" HMA W/ CIR+BASE REPAIR
													Treatment Total	$183,402		
COLORADO	SUTTER AVE	WIDTH CHANGE	COLORADO	0100	1,108	53	58,724	A	AC		62	61	100	$189,222	21,107	2" MILL W/ 2" HMA OVERLAY+BASE REPAIR
COLORADO	SIXTH ST	NINTH ST	COLORADO	0400	1,173	52	60,996	A	AC		66	65	100	$196,543	19,682	2" MILL W/ 2" HMA OVERLAY+BASE REPAIR
													Treatment Total	$385,765		
FIRST	550' N/O COLORADO AVE	ANNABELLA AVE	1ST	0200	180	37	6,660	R	AC		66	66	75	$2,775	27,592	CRACK SEAL+SLURRY SEAL
SECOND	ANNABELLA AVE	ELM AVE	2ND	0100	509	36	18,324	R	AC		65	65	74	$7,635	27,381	CRACK SEAL+SLURRY SEAL
SECOND CT	CDS WEST	SECOND ST	2ND CT	0100	114	40	4,560	R	AC		66	66	75	$1,900	27,592	CRACK SEAL+SLURRY SEAL
SIXTH	CALIFORNIA AVE	NORTH END	6TH	0300	336	37	12,432	R	AC		65	65	74	$5,180	27,381	CRACK SEAL+SLURRY SEAL
COLUSA	WIDTH CHANGE	MANNING AVE WEST	COLUSA	0200	652	40	26,080	R	AC		65	65	74	$10,867	27,380	CRACK SEAL+SLURRY SEAL
NEVADA AVE	THIRD ST	260' E/O THIRD ST	NEVADA	0100	260	37	9,620	R	AC		76	76	84	$4,009	28,082	CRACK SEAL+SLURRY SEAL
													Treatment Total	$32,366		
					Year 2019 Area Total		327,164						Year 2019 Total	$1,056,484		

** - Treatment from Project Selection

Scenarios Criteria:

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Scenarios - Sections Selected for Treatment

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $1.06m per year

Year: 2020

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
THIRD	ANNABELLA AVE	382' N/O ANNABELLA AVE	3RD	0100	382	37	14,134	R	AC		62	60	71	$14,963	12,726	CRACK SEAL+SLURRY SEAL+BASE REPAIR
												Treatment Total		$14,963		
COLORADO	NINTH ST	TWELFTH ST	COLORADO	0500	1,223	52	63,596	A	AC		18	12	100	$334,798	14,209	FDR W/ 3" HMA OVERLAY
COLORADO	MANNING AVE	PLACER AVE	COLORADO	0700	1,653	42	69,426	A	AC		17	11	100	$365,490	14,209	FDR W/ 3" HMA OVERLAY
MANNING	SUTTEN AVE	PINE AVE	MANNING	0200	1,401	30	42,030	A	AC		7	1	100	$221,265	14,209	FDR W/ 3" HMA OVERLAY
MANNING	WIDTH CHANGE	PLACER AVE	MANNING	0700	606	32	19,392	A	AC		7	1	100	$102,089	14,209	FDR W/ 3" HMA OVERLAY
												Treatment Total		$1,023,642		
ELM	PAVEMENT CHANGE	THIRD ST	ELM	0200	1,101	30	33,030	R	AC		71	69	78	$14,176	27,350	CRACK SEAL+SLURRY SEAL
												Treatment Total		$14,176		
					Year 2020 Area Total		241,608					Year 2020 Total		$1,052,781		

Year: 2021

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
THIRD	ANNABELLA AVE	382' N/O ANNABELLA AVE	3RD	0100	382	37	14,134	R	AC		62	69	79	$15,412	14,573	CRACK SEAL+SLURRY SEAL+BASE REPAIR
FIFTH	928' N/O COLORADO AVE	CALIFORNIA AVE	5TH	0200	406	37	15,022	R	AC		64	60	71	$16,380	10,084	CRACK SEAL+SLURRY SEAL+BASE REPAIR
												Treatment Total		$31,792		
COLORADO	PLACER AVE	SPRINGFIELD AVE	COLORADO	0800	2,247	42	94,374	A	AC		12	0	100	$511,732	13,795	FDR W/ 3" HMA OVERLAY
MANNING	PINE AVE	WIDTH CHANGE	MANNING	0300	702	38	26,676	A	AC		13	1	100	$144,648	13,795	FDR W/ 3" HMA OVERLAY
MANNING	RAILROAD AVE	COLORADO AVE	MANNING	0500	648	37	23,976	A	AC		2	0	100	$130,007	13,795	FDR W/ 3" HMA OVERLAY
												Treatment Total		$786,387		
MANNING	CITY LIMIT SOUTH	SUTTER AVE	MANNING	0100	710	53	37,630	A	AC		55	48	100	$179,648	16,414	2" HMA W/ CIR+BASE REPAIR
												Treatment Total		$179,648		
EIGHTH	CALIFORNIA AVE	333' N/O CALIFORNIA AVE	8TH	0200	333	37	12,321	R	AC		48	43	100	$48,655	12,689	2" MILL W/ 2" HMA OVERLAY+BASE REPAIR

** - Treatment from Project Selection

Scenarios Criteria:

City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

Scenarios - Sections Selected for Treatment

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $1.06m per year

											Treatment Total			$48,655		
COLUSA	SOUTH CITY LIMIT	WIDTH CHANGE	COLUSA	0100	743	30	22,290	R	AC		75	71	80	$9,854	26,818	CRACK SEAL+SLURRY SEAL
											Treatment Total			$9,854		
					Year 2021 Area Total		246,423				Year 2021 Total			$1,056,336		

Year: 2022

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
FIFTH	928' N/O COLORADO AVE	CALIFORNIA AVE	5TH	0200	406	37	15,022	R	AC		64	69	78	$16,871	10,439	CRACK SEAL+SLURRY SEAL+BASE REPAIR
											Treatment Total			$16,871		
CALIFORNIA	MAIN ST	ELEVENTH ST	CALIFORNIA	0400	373	46	17,158	C	AC		9	0	100	$89,579	11,232	FDR W/ 3" HMA OVERLAY
MANNING	WIDTH CHANGE	RAILROAD AVE	MANNING	0400	1,550	62	96,100	A	AC		7	0	100	$536,724	13,393	FDR W/ 3" HMA OVERLAY
MANNING	COLORADO AVE	WIDTH CHANGE	MANNING	0600	718	54	38,772	A	AC		35	22	100	$216,544	13,393	FDR W/ 3" HMA OVERLAY
											Treatment Total			$842,847		
TWELFTH	CALIFORNIA AVE	ARIZONA AVE	12TH	0200	637	37	23,569	R	AC		48	41	100	$95,864	12,472	2" MILL W/ 2" HMA OVERLAY+BASE REPAIR
EIGHTH	333' N/O CALIFORNIA AVE	NORTH END	8TH	0300	487	37	18,019	R	AC		55	49	100	$73,290	11,818	2" MILL W/ 2" HMA OVERLAY+BASE REPAIR
											Treatment Total			$169,154		
SECOND	ANNABELLA AVE	ELM AVE	2ND	0100	509	36	18,324	R	AC		65	69	79	$8,343	25,868	CRACK SEAL+SLURRY SEAL
SIXTH	CALIFORNIA AVE	NORTH END	6TH	0300	336	37	12,432	R	AC		65	69	79	$5,661	25,868	CRACK SEAL+SLURRY SEAL
COLUSA	WIDTH CHANGE	MANNING AVE WEST	COLUSA	0200	652	40	26,080	R	AC		65	69	79	$11,875	25,865	CRACK SEAL+SLURRY SEAL
											Treatment Total			$25,879		
FIRST	550' N/O COLORADO AVE	ANNABELLA AVE	1ST	0200	180	37	6,660	R	AC		66	70	73	$35	642,302	SEAL CRACKS
SECOND CT	CDS WEST	SECOND ST	2ND CT	0100	114	40	4,560	R	AC		66	70	73	$24	642,302	SEAL CRACKS
NEVADA AVE	THIRD ST	260' E/O THIRD ST	NEVADA	0100	260	37	9,620	R	AC		76	79	81	$34	753,569	SEAL CRACKS
											Treatment Total			$93		
					Year 2022 Area Total		286,316				Year 2022 Total			$1,054,844		

City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

Scenarios - Sections Selected for Treatment

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $1.06m per year

Year: 2023

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
THIRD	382' N/O ANNABELLA AVE	CALIFORNIA AVE	3RD	0200	376	37	13,912	R	AC		26	12	100	$74,811	9,176	FDR W/ 3" HMA OVERLAY
NINTH	PINE AVE	RAILROAD AVE	9TH	0100	1,441	60	86,460	C	AC		4	0	100	$464,933	10,905	FDR W/ 3" HMA OVERLAY
NINTH	RAILROAD AVE	COLORADO AVE	9TH	0200	429	62	26,598	C	AC		30	5	100	$143,029	10,905	FDR W/ 3" HMA OVERLAY
NINTH	COLORADO AVE	CALIFORNIA AVE	9TH	0300	1,326	46	60,996	C	AC		6	0	100	$328,002	10,905	FDR W/ 3" HMA OVERLAY
ANNABELLA	PAVEMENT CHANGE	FOURTH ST	ANNAB	0200	102	32	3,264	R	AC		6	0	100	$17,552	9,176	FDR W/ 3" HMA OVERLAY
													Treatment Total	$1,028,327		
COLORADO CT	COLORADO AVE	NORHT END	COLO CT	0100	176	32	5,632	R	AC		56	48	100	$23,595	11,564	2" MILL W/ 2" HMA OVERLAY+BASE REPAIR
													Treatment Total	$23,595		
COLORADO	SUTTER AVE	WIDTH CHANGE	COLORADO	0100	1,108	53	58,724	A	AC		62	84	86	$106	1,811,864	SEAL CRACKS
COLORADO	WIDTH CHANGE	FIFTH ST	COLORADO	0200	886	46	40,756	A	AC		45	84	86	$74	1,811,864	SEAL CRACKS
COLORADO	FIFTH ST	SIXTH ST	COLORADO	0300	886	46	40,756	A	AC		24	84	85	$108	1,053,147	SEAL CRACKS
COLORADO	SIXTH ST	NINTH ST	COLORADO	0400	1,173	52	60,996	A	AC		66	84	86	$110	1,811,864	SEAL CRACKS
COLORADO	TWELFTH TH	MANNING AVE	COLORADO	0600	928	52	48,256	A	AC		25	84	85	$127	1,053,147	SEAL CRACKS
ELM	PAVEMENT CHANGE	THIRD ST	ELM	0200	1,101	30	33,030	R	AC		71	73	76	$160	670,111	SEAL CRACKS
													Treatment Total	$685		
					Year 2023 Area Total		479,380				Year 2023 Total			$1,052,607		

Year: 2024

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
CALIFORNIA	FIFTH ST	EIGHTH ST	CALIFORNIA	0200	1,160	46	53,360	C	AC		6	0	100	$295,548	10,587	FDR W/ 3" HMA OVERLAY
CALIFORNIA	EIGHTH ST	MAIN ST	CALIFORNIA	0300	780	46	35,880	C	AC		7	0	100	$198,731	10,587	FDR W/ 3" HMA OVERLAY
CALIFORNIA	ELEVENTH ST	END	CALIFORNIA	0500	536	46	24,656	C	AC		32	0	100	$136,564	10,587	FDR W/ 3" HMA OVERLAY
MAIN ST	MANNING AVE	RR TRACKS	MAIN	0100	1,130	60	67,800	C	AC		14	0	100	$375,528	10,587	FDR W/ 3" HMA OVERLAY
													Treatment Total	$1,006,371		

City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

Scenarios - Sections Selected for Treatment

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $1.06m per year

Year: 2024

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
ANNABELLA	ELM AVE	PAVEMENT CHANGE	ANNAB	0100	1,029	37	38,073	R	AC		77	69	78	$18,391	24,219	CRACK SEAL+SLURRY SEAL
MAIN ST	CALIFORNIAAVE	164' N/O ARIZONA AVE	MAIN	0300	848	64	54,272	C	AC		82	70	79	$26,216	24,087	CRACK SEAL+SLURRY SEAL
												Treatment Total		$44,607		
THIRD	ANNABELLA AVE	382' N/O ANNABELLA AVE	3RD	0100	382	37	14,134	R	AC		62	75	78	$65	956,324	SEAL CRACKS
COLORADO	NINTH ST	TWELFTH ST	COLORADO	0500	1,223	52	63,596	A	AC		18	84	85	$173	1,022,472	SEAL CRACKS
COLORADO	MANNING AVE	PLACER AVE	COLORADO	0700	1,653	42	69,426	A	AC		17	84	85	$188	1,022,472	SEAL CRACKS
COLUSA	SOUTH CITY LIMIT	WIDTH CHANGE	COLUSA	0100	743	30	22,290	R	AC		75	76	78	$101	674,334	SEAL CRACKS
MANNING	SUTTEN AVE	PINE AVE	MANNING	0200	1,401	30	42,030	A	AC		7	84	85	$114	1,022,472	SEAL CRACKS
MANNING	WIDTH CHANGE	PLACER AVE	MANNING	0700	606	32	19,392	A	AC		7	84	85	$53	1,022,472	SEAL CRACKS
												Treatment Total		$694		
					Year 2024 Area Total		504,909				Year 2024 Total			$1,051,672		

Year: 2025

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
FIRST CT	FIRST ST	CDS WEST	1ST CT	0100	240	36	8,640	R	AC		38	20	100	$49,291	8,650	FDR W/ 3" HMA OVERLAY
NINTH	CALIFORNIA AVE	PUNJAB	9TH	0400	396	37	14,652	C	AC		51	21	100	$83,589	10,279	FDR W/ 3" HMA OVERLAY
CALIFORNIA	THRID ST	FIFTH ST	CALIFORNIA	0100	656	48	31,488	C	AC		52	23	100	$179,637	10,279	FDR W/ 3" HMA OVERLAY
MAIN ST	RR TRACKS	CALIFORNIA AVE	MAIN	0200	1,534	66	101,244	C	AC		0	0	100	$577,589	10,279	FDR W/ 3" HMA OVERLAY
												Treatment Total		$890,106		
MAIN ST	164' N/O ARIZONA AVE	NORTH CITY LIMIT	MAIN	0400	1,544	37	57,128	C	AC		82	67	100	$136,428	19,902	1.5" MILL W/ 1.5" HMA OVERLAY
												Treatment Total		$136,428		
FIRST	550' N/O COLORADO AVE	ANNABELLA AVE	1ST	0200	180	37	6,660	R	AC		66	68	77	$3,314	23,494	CRACK SEAL+SLURRY SEAL
SECOND CT	CDS WEST	SECOND ST	2ND CT	0100	114	40	4,560	R	AC		66	68	77	$2,269	23,494	CRACK SEAL+SLURRY SEAL
IDAHO	PINE AVE	NINTH AVE	IDAHO	0100	886	36	31,896	R	AC		88	78	86	$15,869	22,904	CRACK SEAL+SLURRY SEAL
												Treatment Total		$21,452		

City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

Scenarios - Sections Selected for Treatment

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $1.06m per year

Year: 2025

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
SECOND	ANNABELLA AVE	ELM AVE	2ND	0100	509	36	18,324	R	AC		65	74	76	$93	633,947	SEAL CRACKS
FIFTH	928' N/O COLORADO AVE	CALIFORNIA AVE	5TH	0200	406	37	15,022	R	AC		64	73	76	$78	630,902	SEAL CRACKS
SIXTH	CALIFORNIA AVE	NORTH END	6TH	0300	336	37	12,432	R	AC		65	74	76	$63	633,947	SEAL CRACKS
COLORADO	PLACER AVE	SPRINGFIELD AVE	COLORADO	0800	2,247	42	94,374	A	AC		12	84	85	$264	992,692	SEAL CRACKS
COLUSA	WIDTH CHANGE	MANNING AVE WEST	COLUSA	0200	652	40	26,080	R	AC		65	74	76	$132	633,862	SEAL CRACKS
MANNING	CITY LIMIT SOUTH	SUTTER AVE	MANNING	0100	710	53	37,630	A	AC		55	84	86	$72	1,707,856	SEAL CRACKS
MANNING	PINE AVE	WIDTH CHANGE	MANNING	0300	702	38	26,676	A	AC		13	84	85	$75	992,692	SEAL CRACKS
MANNING	RAILROAD AVE	COLORADO AVE	MANNING	0500	648	37	23,976	A	AC		2	84	85	$67	992,692	SEAL CRACKS
NEVADA AVE	THIRD ST	260' E/O THIRD ST	NEVADA	0100	260	37	9,620	R	AC		76	76	78	$44	668,454	SEAL CRACKS
													Treatment Total	$888		
							Year 2025 Area Total			520,402			Year 2025 Total	$1,048,874		

Year: 2026

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
ELEVENTH	COLORADO AVE	NEVADA AVE	11TH	0100	641	37	23,717	R	AC		4	0	100	$139,363	8,398	FDR W/ 3" HMA OVERLAY
ELEVENTH	NEVADA AVE	CALIFORNIA AVE	11TH	0200	660	37	24,420	R	AC		5	0	100	$143,494	8,398	FDR W/ 3" HMA OVERLAY
TWELFTH	COLORADO AVE	CALIFORNIA AVE	12TH	0100	1,349	37	49,913	R	AC		6	0	100	$293,292	8,398	FDR W/ 3" HMA OVERLAY
FIRST	COLORADO AVE	550' N/O COLORADO AVE	1ST	0100	550	37	20,350	R	AC		13	0	100	$119,578	8,398	FDR W/ 3" HMA OVERLAY
FOURTH	ANNABELLA AVE	NEVADA AVE	4TH	0100	255	32	8,160	R	AC		12	0	100	$47,949	8,398	FDR W/ 3" HMA OVERLAY
FIFTH	COLORADO AVE	928' N/O COLORADO AVE	5TH	0100	928	35	32,480	R	AC		10	0	100	$190,855	8,398	FDR W/ 3" HMA OVERLAY
AMAN	PUNJAB	ARIZONA AVE	AMAN	0100	390	33	12,870	R	AC		28	3	100	$75,625	8,398	FDR W/ 3" HMA OVERLAY
													Treatment Total	$1,010,156		
COLORADO	SUTTER AVE	WIDTH CHANGE	COLORADO	0100	1,108	53	58,724	A	AC		62	81	88	$30,093	38,114	CRACK SEAL+SLURRY SEAL
NEVADA AVE	THIRD ST	260' E/O THIRD ST	NEVADA	0100	260	37	9,620	R	AC		76	77	85	$4,930	22,582	CRACK SEAL+SLURRY SEAL
													Treatment Total	$35,023		

** - Treatment from Project Selection

Scenarios Criteria:

City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

Scenarios - Sections Selected for Treatment

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $1.06m per year

Year: 2026

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
ELM	PAVEMENT CHANGE	THIRD ST	ELM	0200	1,101	30	33,030	R	AC		71	71	73	$191	580,755	SEAL CRACKS
MANNING	WIDTH CHANGE	RAILROAD AVE	MANNING	0400	1,550	62	96,100	A	AC		7	84	85	$276	963,778	SEAL CRACKS
MANNING	COLORADO AVE	WIDTH CHANGE	MANNING	0600	718	54	38,772	A	AC		35	84	85	$112	963,778	SEAL CRACKS
												Treatment Total		$579		
				Year 2026 Area Total			408,156					Year 2026 Total		$1,045,758		

Year: 2027

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
SIXTH	COLORADO AVE	NEVADA AVE	6TH	0100	656	35	22,960	R	AC		4	0	100	$138,962	8,153	FDR W/ 3" HMA OVERLAY
SIXTH	NEVADA AVE	CALIFORNIA AVE	6TH	0200	684	37	25,308	R	AC		0	0	100	$153,173	8,153	FDR W/ 3" HMA OVERLAY
SEVENTH	COLORADO AVE	NEVADA AVE	7TH	0100	640	37	23,680	R	AC		0	0	100	$143,320	8,153	FDR W/ 3" HMA OVERLAY
EIGHTH	COLORADO AVE	NEVADA AVE	8TH	0100	637	37	23,569	R	AC		39	15	100	$142,648	8,153	FDR W/ 3" HMA OVERLAY
ARIZONA	EIGHTH ST	MAIN ST	ARIZONA	0100	761	37	28,157	R	AC		23	0	100	$170,416	8,153	FDR W/ 3" HMA OVERLAY
ARIZONA	MAIN ST	EAST END	ARIZONA	0200	897	30	26,910	R	AC		32	5	100	$162,869	8,153	FDR W/ 3" HMA OVERLAY
DEEP	PUNJAB	ARIZONA AVE	DEEP	0100	372	33	12,276	R	AC		22	0	100	$74,299	8,153	FDR W/ 3" HMA OVERLAY
ORLANDO	CALIFORNIA AVE	CDS NORTH	ORLANDO	0100	202	37	7,474	R	AC		42	19	100	$45,236	8,153	FDR W/ 3" HMA OVERLAY
												Treatment Total		$1,030,923		
COLORADO	WIDTH CHANGE	FIFTH ST	COLORADO	0200	886	46	40,756	A	AC		45	79	87	$21,512	39,123	CRACK SEAL+SLURRY SEAL
												Treatment Total		$21,512		
THIRD	ANNABELLA AVE	382' N/O ANNABELLA AVE	3RD	0100	382	37	14,134	R	AC		62	74	77	$74	844,870	SEAL CRACKS
EIGHTH	CALIFORNIA AVE	333' N/O CALIFORNIA AVE	8TH	0200	333	37	12,321	R	AC		48	84	85	$29	864,672	SEAL CRACKS
ANNABELLA	ELM AVE	PAVEMENT CHANGE	ANNAB	0100	1,029	37	38,073	R	AC		77	73	75	$210	593,398	SEAL CRACKS
COLUSA	SOUTH CITY LIMIT	WIDTH CHANGE	COLUSA	0100	743	30	22,290	R	AC		75	73	75	$123	592,907	SEAL CRACKS
MAIN ST	CALIFORNIAAVE	164' N/O ARIZONA AVE	MAIN	0300	848	64	54,272	C	AC		82	71	74	$317	545,651	SEAL CRACKS

City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

Scenarios - Sections Selected for Treatment

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $1.06m per year

		Treatment Total	$753
Year 2027 Area Total	352,180	Year 2027 Total	$1,053,188

Year: 2028

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
DONNA	SOUTH END	MANNING AVE WEST	DONNA	0100	659	37	24,383	R	AC		16	0	100	$152,002	7,916	FDR W/ 3" HMA OVERLAY
ELM	COLORADO AVE	PAVEMENT CHANGE	ELM	0100	775	48	37,200	R	AC		28	0	100	$231,902	7,916	FDR W/ 3" HMA OVERLAY
IDAHO	NINTH ST	MAIN ST	IDAHO	0200	850	36	30,600	R	AC		4	0	100	$190,758	7,916	FDR W/ 3" HMA OVERLAY
IDAHO	MAIN ST	MANNING AVE WEST	IDAHO	0300	310	36	11,160	R	AC		1	0	100	$69,571	7,916	FDR W/ 3" HMA OVERLAY
KAREN	DONNA	COLUSA ST	KAREN	0100	519	37	19,203	R	AC		11	0	100	$119,710	7,916	FDR W/ 3" HMA OVERLAY
NEVADA AVE	260' E/O THIRD ST	FIFTH ST	NEVADA	0200	341	32	10,912	R	AC		12	0	100	$68,025	7,916	FDR W/ 3" HMA OVERLAY
NEVADA AVE	FIFTH ST	591' S/O FIFTH ST	NEVADA	0300	291	50	14,550	R	AC		4	0	100	$90,704	7,916	FDR W/ 3" HMA OVERLAY
NEVADA AVE	NINTH ST	MAIN ST	NEVADA	0500	371	50	18,550	R	AC		5	0	100	$115,640	7,916	FDR W/ 3" HMA OVERLAY
												Treatment Total		$1,038,312		
MANNING	CITY LIMIT SOUTH	SUTTER AVE	MANNING	0100	710	53	37,630	A	AC		55	81	88	$20,458	35,926	CRACK SEAL+SLURRY SEAL
												Treatment Total		$20,458		
TWELFTH	CALIFORNIA AVE	ARIZONA AVE	12TH	0200	637	37	23,569	R	AC		48	84	85	$57	839,487	SEAL CRACKS
FIRST	550' N/O COLORADO AVE	ANNABELLA AVE	1ST	0200	180	37	6,660	R	AC		66	72	75	$39	566,982	SEAL CRACKS
SECOND	ANNABELLA AVE	ELM AVE	2ND	0100	509	36	18,324	R	AC		65	71	74	$111	554,865	SEAL CRACKS
SECOND CT	CDS WEST	SECOND ST	2ND CT	0100	114	40	4,560	R	AC		66	72	75	$27	566,982	SEAL CRACKS
THIRD	382' N/O ANNABELLA AVE	CALIFORNIA AVE	3RD	0200	376	37	13,912	R	AC		26	84	85	$42	612,797	SEAL CRACKS
FIFTH	928' N/O COLORADO AVE	CALIFORNIA AVE	5TH	0200	406	37	15,022	R	AC		64	71	73	$93	544,985	SEAL CRACKS
SIXTH	CALIFORNIA AVE	NORTH END	6TH	0300	336	37	12,432	R	AC		65	71	74	$75	554,865	SEAL CRACKS
EIGHTH	333' N/O CALIFORNIA AVE	NORTH END	8TH	0300	487	37	18,019	R	AC		55	84	85	$44	839,487	SEAL CRACKS
ANNABELLA	PAVEMENT CHANGE	FOURTH ST	ANNAB	0200	102	32	3,264	R	AC		6	84	85	$10	612,797	SEAL CRACKS
COLUSA	WIDTH CHANGE	MANNING AVE WEST	COLUSA	0200	652	40	26,080	R	AC		65	71	74	$158	554,590	SEAL CRACKS
IDAHO	PINE AVE	NINTH AVE	IDAHO	0100	886	36	31,896	R	AC		88	81	83	$121	634,741	SEAL CRACKS

** - Treatment from Project Selection

Scenarios Criteria:

City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

Scenarios - Sections Selected for Treatment

Interest: 3.00% Inflation: 3.00% Printed: 04/11/2019

Scenario: $1.06m per year

		Treatment Total	$777
Year 2028 Area Total	377,926	Year 2028 Total	$1,059,547
Total Section Area:	3,744,464	Grand Total	$10,532,091

Appendix G

GIS Maps

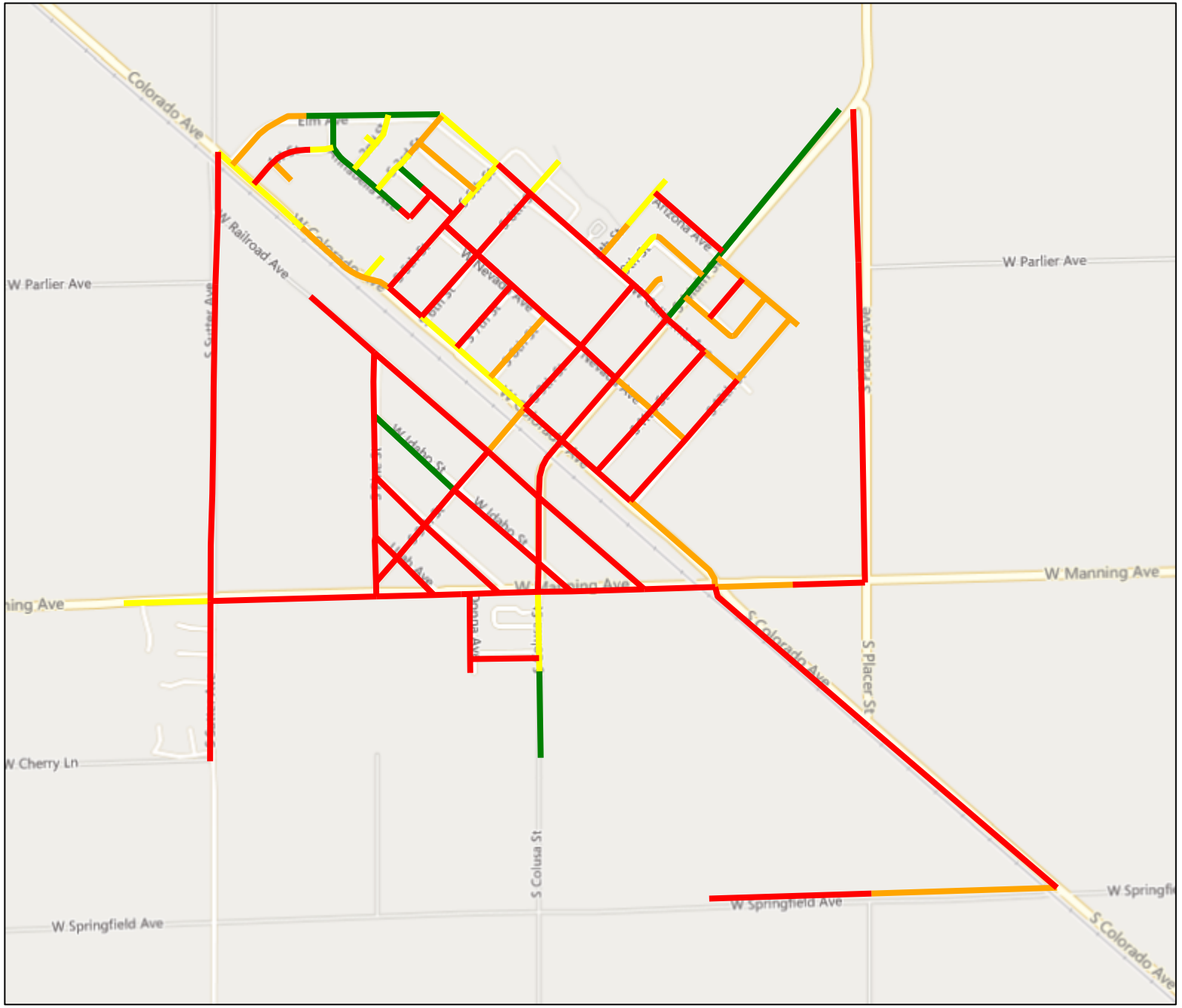
City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

2019 PCI Condition

Printed: 4/11/2019

Feature Legend

- Category I - Very Good
- Category II - Good (Non-Load)
- Category III - Good (Load)
- Category IV - Poor
- Category V - Very Poor

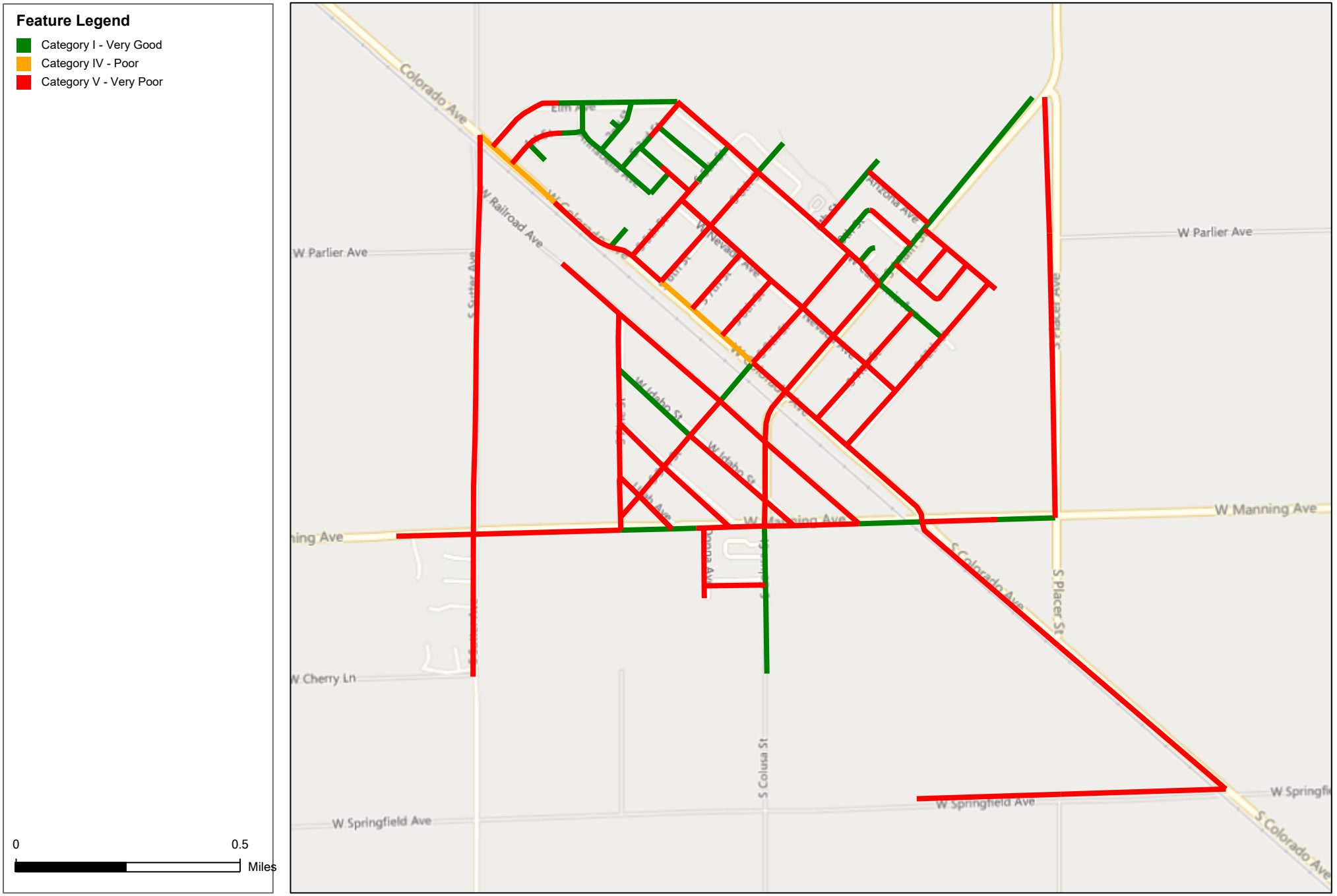


0 0.5 Miles

City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

Projected PCI Condition

Scenario 1: $165,000 per Year - 2028 Project PCI = 19



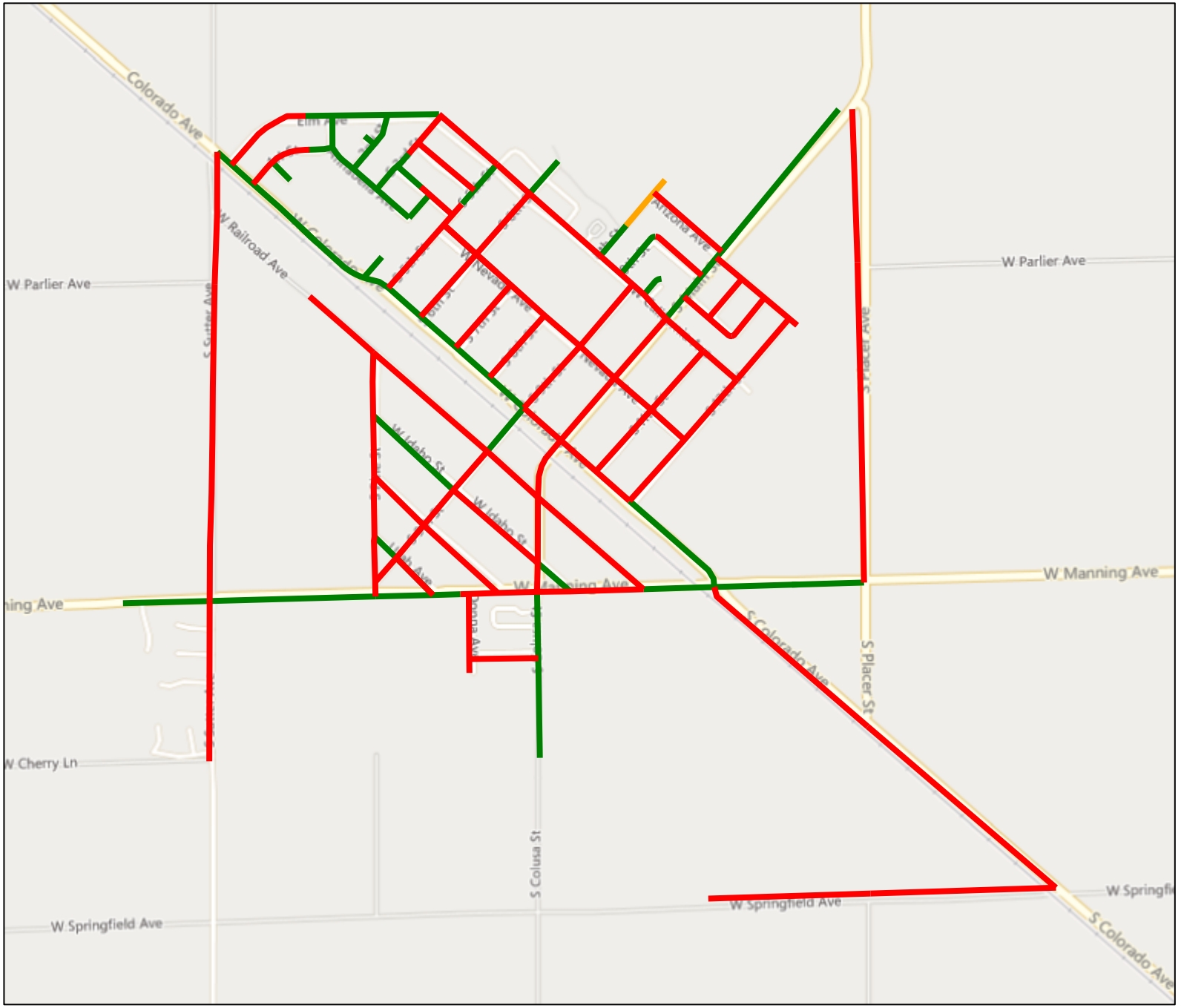
City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

Projected PCI Condition

Scenario 2: $320,000 per Year - 2028 Project PCI = 26

Feature Legend

- Category I - Very Good
- Category IV - Poor
- Category V - Very Poor



0 0.5 Miles

City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

Projected PCI Condition

Scenario 3: $1.06 million per Year - 2028 Project PCI = 65

Feature Legend

- Category I - Very Good
- Category V - Very Poor

0 0.5 Miles

City of San Joaquin
1900 Colorado Avenue
San Joaquin, CA 93660

Projected PCI Condition

Scenario 4: $1.43 million per Year - 2028 Project PCI = 85

Feature Legend

Category I - Very Good

0 0.5 Miles