



Off-Street Bike Path Final Report

City of Rohnert Park, California

Submitted to:
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Executive Summary

Fugro Roadware, Inc. (Fugro) is pleased to provide this Final Report to the City of Rohnert Park (City) for the Bike Path Inventory and Condition Rating Project. This Final Report provides information with regards to the collected bike path pavement distress data, bike path network level pavement repair options, budget analysis with annual and multi-year programming, impact of varying levels of budgets, and cost-effective pavement repair recommendations.

Fugro performed pavement condition distress surveys for the City's entire bike path network in October and November of 2017. The overall network PCI was 50 as of April 23, 2018, which is in the Metropolitan Transportation Commission (MTC) designated "Good" condition category.

Fugro created an inventory in MTC's StreetSaver program and entered the results of the data collection. In addition, Fugro with the assistance of the City developed a decision tree for the maintenance and rehabilitation treatments for the City's bike paths. Fugro documented the City's budget assumptions, interest and inflation rates, assessed decision trees, and unit costs and provided a multi-year network level M&R work plan. The results have been incorporated into this Final Report.

Background

In October and November 2017, Fugro performed pavement condition distress surveys for the City's bike path network based on MTC's distress definitions and descriptions published in "Pavement Condition Index Distress Identification Manual for Flexible Pavements," 4th Edition, March 2016, and the "Pavement Condition Index Distress Identification Manual for Rigid Pavements," 3rd Edition, March 2016. The City maintains approximately 12.23 centerline miles of paved bike paths. Table 1 shows the summary statistics of the bike paths.

Table 1. Network Summary Statistics.

Functional Class	Sections	Centerline Miles	Lane Miles	% of the Entire Network (by Pavement Area)
Other	43	12.23	12.23	100%

Fugro used the software called StreetSaver (www.streetsaveronline.com) developed by MTC to inventory the bike paths, assess and forecast pavement condition, record M&R activities, evaluate budget needs, evaluate impacts of funding on network wide pavement condition overtime. This software is also used to update the City's Pavement Management Program (PMP) periodically.

Purpose of Project

The purpose of this project was to create a pavement management system for the City to manage their bike paths and to develop decision trees with maintenance & rehabilitation (M&R) options in order to develop budget options for the City. These analyses assist decision makers at the City to prioritize where funds are expended. The format for this report is similar to the City's Pavement Management Program (PMP) report that is done for their roadway network every two years.

Network Level Analysis

This Final Report examines the overall PCI condition of the entire network and provides recommendations for improving the current network level PCI. These recommendations are developed by conducting various budget and/or target driven scenarios. By varying the budget amounts available for bike path M&R, the impact of the different funding strategies can be shown on the City's bike path network overtime (i.e., 5 years). Although this report will provide a 5-year bike path repair program, the bike path management program should be reassessed on an annual basis due to unforeseen funding events.

In addition, recommendations provided in this report are for network level budgeting and planning purposes. The treatments that are assigned to sections of the City's bike path network are based on a decision tree. When a project has been selected by the City, engineering judgment and project level analysis should be applied to ensure that the treatment is appropriate and cost effective for the City's bike path network section. This can include revisiting and reevaluating the visual distress ratings, coring and materials tests to establish underlying structural problems, etc.

Terminology

Pavement Condition Index or PCI is a measurement of the pavement network condition and ranges from 0 – 100. A newly constructed street would have a PCI of 100, while a failed street would have a PCI of 25 or less. The PCI is calculated based on pavement distresses identified in the field from a visual survey as per MTC’s most current distress manuals.

Unit costs in StreetSaver are the treatment cost per linear foot or square yard. As a minimum the unit cost should be based on local and regional bids. In addition, the unit cost should take into account items such as material costs, labor costs to do repair, rental equipment cost related to the project, pavement striping costs, repair of curbs and gutters, staff costs, project design costs, construction engineering costs, mobilization costs, etc.

Decision tree in StreetSaver lists all the treatments and corresponding unit costs that are utilized by the jurisdiction. It also assigns an appropriate M&R strategy to a section based on its functional classification, surface type, and condition category. It is important to utilize the City’s or regional information to match the City’s repair strategies.

Deferred maintenance or unfunded backlog consists of pavement maintenance that is needed, but it cannot be performed due to lack of funding. Shrinking budgets have forced many agencies to defer much needed street maintenance.

Preventive maintenance program is a schedule of cost-effective planned maintenance actions aimed at the prevention of failure of the City’s network. The purpose of preventive maintenance is to extend the service life of a pavement by detecting, precluding and mitigating any degradation of a section.

Stop gap are localized surface treatments or activities performed to keep the pavement operational and in a safe condition. Stop gap measures are typically reactive maintenance activities such as pothole repairs and surface patching. These measures are applied to deteriorated pavement sections as needed until funding becomes available for M&R treatments.

Bike Path Condition

Data Collection

The City provided Fugro with a map of the bike paths to be collected. Fugro MTC certified distress raters walked all the bike paths and performed the pavement condition distress surveys as per MTC guidelines on October 31 and November 1, 2017. The bike paths included Asphalt Concrete (AC) and Portland Cement Concrete (PCC) sections.

Network Inventory Information

The City provided Fugro with construction dates for all bike paths. This information was added to StreetSaver section inventory.

Network Replacement Value

It is important to consider the overall investment the City has in its bike paths. The cost to reconstruct all bike paths (full replacement of the pavement, base, and structure) is estimated to be over \$10 million.

Current Overall Network PCI

The overall network PCI is 50 as of April 23, 2018. Appendix A provides the section inventory as well as the PCI for each section. Please note that these values are projected and area-weighted calculations from StreetSaver. Figure 1 shows the five StreetSaver pavement condition categories and PCI breakpoints, which are critical decision points at which different treatments would be applied to sections by functional class and surface types. The overall network PCI is in the MTC designated “Good” pavement condition.

Very Good [I]		100 90 (PCI Cap)*
		70
Good [II] (non-load)	Good [III] (load-related)	50
Poor [IV]		25
Very Poor [V]		0
Pavement Condition [Condition Category]		PCI

**Above PCI of 90, no M&R is recommended.*

Figure 1. Pavement Condition Categories by PCI.

Figure 2 shows the centerline miles by pavement condition. About 30% of the centerline miles are “Excellent” or “Very Good” pavement condition categories (between PCI 100-70), 30% of the centerline miles are in the “Good” pavement condition category (between PCI 69-50), and 40% of the centerline miles are in the “Poor” or “Very Poor/Failed” pavement condition categories (between PCI 49-0).

Fugro furthered investigated the difference in performance based on surface type (i.e., AC versus PCC). There is a total of 3.55 centerline miles of PCC bike paths and 8.68 centerline miles of AC or AC/AC bike paths. Bike paths with PCC surface type are all in “Excellent” or “Very Good” pavement condition categories. All the centerline miles (i.e., 1.51 miles) in the “Excellent” condition category are PCC bike paths. In the “Very Good” condition category, 2.04 centerline miles of the 2.21 centerline miles are PCC bike paths. Some of the PCC sections have estimated construction dates of 1980 and still have PCIs between 70 and 100. This is likely due to lack of traffic loading on the bike paths. The remainder centerline mileage in the “Very Good” condition category is one AC bike path section (i.e., Cole-03). The “Good”, “Poor” and “Very Poor” pavement condition categories are all AC bike path sections.

Centerline Miles of Bike Paths by Pavement Condition

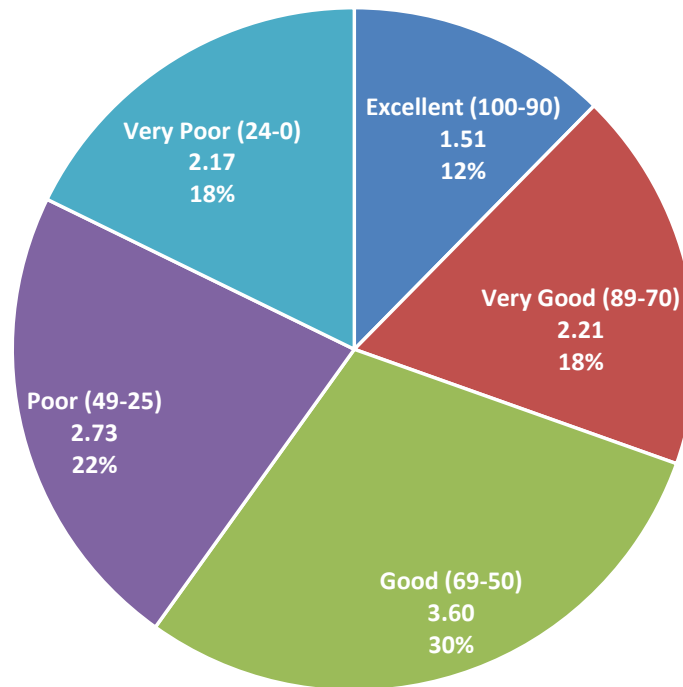


Figure 2. Centerline Miles of Bike Paths by Pavement Condition.

Budget Needs

Maintenance Strategies

Fugro with the City’s assistance developed the maintenance strategy for the bike paths. The City’s decision tree for the “Other” functional class is provided in Appendix B. Table 2 shows the City’s maintenance strategy for the bike paths. The City preferred to move toward PCC bike paths based on their longevity and performance. For the “Excellent” and “Very Good” pavement conditions, the maintenance treatment is “Do Nothing” and therefore no preventive maintenance. As the pavement condition deteriorates and is in the “Good” pavement condition category, crack sealing is performed on pavements with load related distresses. For pavements in “Poor” condition, patching is considered. For pavement in “Very Poor” condition, the City’s preferred maintenance strategy is to reconstruct the structure as PCC.

Table 2. Rohnert Park Maintenance Strategy for Bike Paths.

Pavement Condition	PCI Range	Typical Maintenance Treatment	Unit Cost
Excellent	100-90	Do Nothing	-
Very Good	89-70	Do Nothing	-
Good	69-50	Seal Cracks (i.e., Load Related)	\$1.00 per linear foot
Poor	49-25	Patch	\$3.50 per square yard
Very Poor	0-24	Reconstruct Structure (PCC)	\$165.00 per square yard

Budget Needs Analysis (Unconstrained)

Based on the City's M&R decision tree and the PCIs of the sections, StreetSaver selected a maintenance or rehabilitation action and computed the total costs over a period of five years. The budget needs analysis represents the "ideal world" or unconstrained funding levels. An interest rate of 5% and an inflation factor of 3% were used to project the costs for the next five years. The summary results from the analysis are shown in Table 3 and the details are presented in Appendix C. If the City followed the maintenance and rehabilitation strategies recommended by the program and had unconstrained funding, the average network PCI increase to 77 by the end of year 2022. If, however, no maintenance or rehabilitation occurred in the next five years, the average network PCI would deteriorate to 42 by the end of year 2022. The unconstrained budget was \$3.8 million for rehabilitation or reconstruction treatments.

Table 3. Budget Needs Project PCI and Cost Summary.

	Year					Total Cost
	2018	2019	2020	2021	2022	
PCI Treated	69	74	72	78	77	
PCI Untreated	50	48	46	44	42	
Preventive Cost	\$0	\$0	\$0	\$0	\$0	\$0
Rehab Cost	\$2,174,868	\$783,712	\$8,982	\$820,538	\$12,694	\$3,800,794
Total Cost	\$2,174,868	\$783,712	\$8,982	\$820,538	\$12,694	\$3,800,794

Budget Scenarios & Results

Based on the unconstrained analysis and input from the City, Fugro developed several "what-if" analyses using StreetSaver's budget scenario module. This allows us to evaluate the impacts of various budget "scenarios" on PCI, deferred maintenance (unfunded backlog), and average remaining service life of the network. Please note that for the scenarios 1) stop gap funds are not taken from preventive maintenance funds and 2) surplus preventive maintenance funds are limited as much as possible. The following scenarios were evaluated.

Scenario 1: Current Investment Level

The City provided the expected budget per year as follows: year 1 - \$750,000, year 2 - \$440,000, years 3, 4 and 5 - \$400,000. The total budget would be \$2.39 million. The result shows that by 2022 the deferred maintenance increase from \$1.4 million to \$1.8 million and the overall PCI will increase from 57 to 63 as shown in Figure 3. Because there are only 43 sections and the types of available treatments, the entire annual budget may not be used. If an M&R project costs more than the money available, the project cannot be done. For example, in year 2018 the budget is \$750,000. The sections selected for patching and reconstruction totals \$733,444 and therefore there is \$16,556 leftover. In the StreetSaver program analysis and selection, there is not a project that can be completed (due to the limited number of sections and types of available treatments) with a budget of \$16,556 so the money is not used. It should be noted that the StreetSaver PMS is a network level programming tool. The specific project M&R details and associated costs are defined at the project level and by City engineers and support staff. All detailed reports are provided in Appendix D.

Scenario 2: Maintain Current PCI

This scenario aims to ensure that the overall pavement network PCI does not drop below the current PCI of 50 (as of 04/23/2018) over the next five years. A total of \$655,000 will be required to maintain the PCI with all money allocated to the appropriate decision tree treatments. The deferred maintenance will increase from \$2.2 million to \$3.5 million in 2022 as shown in Figure 3. All detailed reports are provided in Appendix E.

Scenario 3: Increase PCI by 5

This scenario aims to ensure that the overall pavement network PCI will improve 5 points to 55 over five years. A total of \$1.25 million is required to increase the PCI by 5 points with all money allocated to the appropriate decision tree treatments. The deferred maintenance will increase from \$2.2 million to \$2.9 million in 2022 as shown in Figure 3. All detailed reports are provided in Appendix F.

Pavement Condition Changes Based on Budget Scenarios

Figure 4 shows what the pavement condition of the City's bike paths will be in 2022 based on the different budget scenarios. The greatest expenses that the City would foresee are in the "Poor" and "Very Poor" pavement condition categories because these would require reconstruction. For the purposes of this discussion, Fugro highlighted the differences seen in the "Poor" and "Very Poor" pavement condition categories for each scenario. By 2022 for Scenario 1 – Current Investment Level, the "Poor" and "Very Poor" pavement condition would approximately decrease 26% and 5%, respectively. For Scenario 2 – Maintain Current PCI, the "Poor" and "Very Poor" pavement conditions would decrease approximately 26% and increase approximately 9%, respectively. For Scenario 3 – Increase PCI by 5, the "Poor" and "Very Poor" pavement conditions would decrease approximately 26% and increase approximately 4%, respectively.

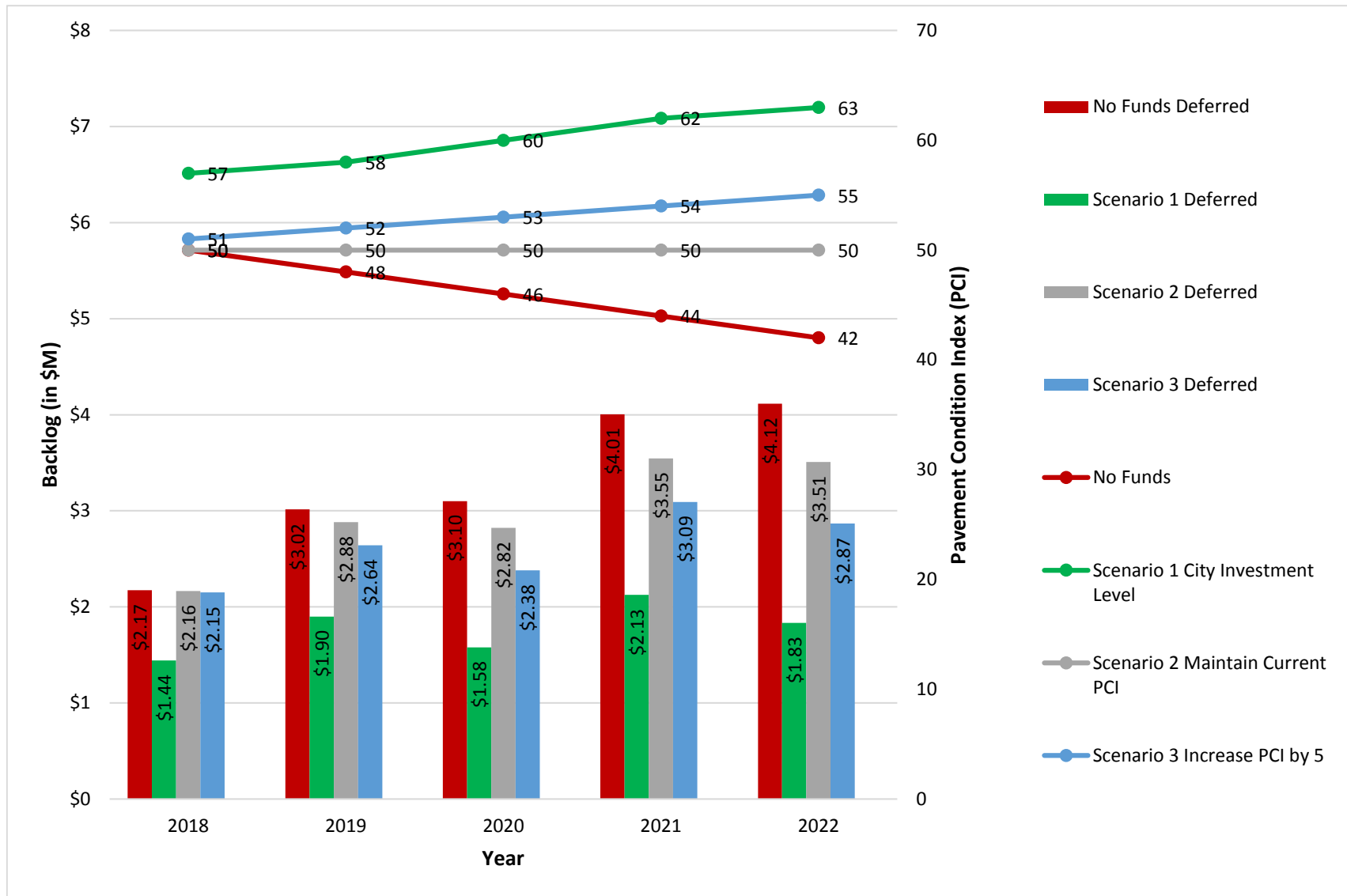


Figure 3. Scenario Breakdown of PCI and Deferred Maintenance for 2018 to 2022.

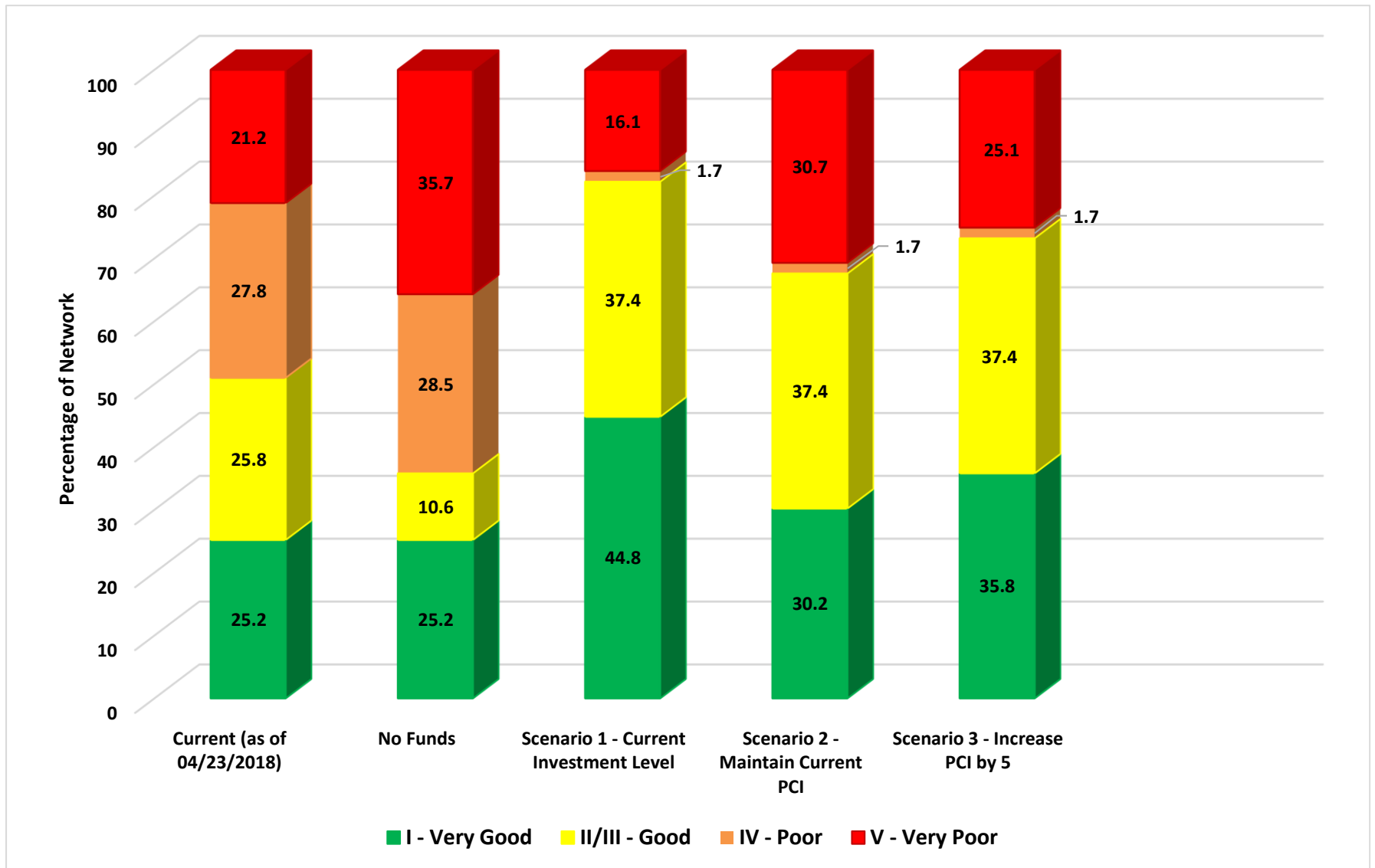


Figure 4. Pavement Condition for Each Scenario in 2022.

Recommendations

The City has a substantial investment of \$10 million in their bike path network of 12.23 centerline miles. The City's overall network PCI is 50 (as of 04/23/2018), which is "Good" in the MTC pavement condition categories. Approximately 60% of the network is "Excellent", "Very Good" or "Good" and 40% is "Poor" and "Very Poor." The bike paths in the worst condition have AC as the surface type.

The budget needs analysis indicated that the City would have to spend approximately \$3.8 million in M&R over the next five years to basically repair all bike paths. This is the ideal situation where all bike paths would be in "Very Good" or "Good" condition and just need regular preventive maintenance. For this report, Fugro has evaluated and presented several scenarios for the City to consider.

Budget

Based on the PCI (i.e., 50 and "Good" condition) and slowing the growth of the deferred maintenance (unfunded backlog), Fugro recommends Scenario 1 – Current Investment Level. This scenario has a total budget of \$2.39 million over five years. The breakdown is \$750,000 for year 1, \$440,000 for year 2, \$400,000 for year 3, \$400,000 for year 4, and \$400,000 for year 5. The PCI will increase from 50 at 63 and the deferred maintenance increases from \$1.4 million to \$1.8 million.

Re-inspection

Fugro recommends that the City continue to maintain its bike path management program. The bike paths should be re-inspected as needed or as a minimum every five years.

StreetSaver Updates

Fugro has the following recommendations regarding StreetSaver:

- Add GIS shapefiles and link bike paths to section inventory information.
- Review and update decision tree M&R strategies annually.
- Review and update decision tree unit costs annually to reflect new construction bid costs and ensure the budget analysis is more accurate.
- Update the pavement network when bike paths are reconstructed including GIS shape files.
- Enter in M&R activities annually, which will help the City track performance of past treatment strategies to determine their effectiveness.

Appendix A – Section Inventory Report

(Sorted Alphabetically by Street ID)

(Sorted by Descending PCI)

Section Inventory Report Description

This report lists section information for each of the City's pavement sections. It lists the street ID, Section ID, section limit, functional class, surface type, number of lanes, length, width, area, 2017 PCI. The report is sorted alphabetically by Street Name and Section ID. The field descriptions in this report are listed below:

COLUMN	DESCRIPTION
Street ID	Street Identification - A code up to ten characters/digits to identify the street. Generally, the street name is truncated to six characters. The Street ID should be unique for each street.
Section ID	Section Identification - A code up to ten characters/digits to identify the section number. The Section ID must be unique for each section of one street.
Street Name	The name of the street.
Begin Location	Beginning limit of the section.
End Location	Ending limit of the section.
Lanes	Number of travel lanes.
Functional Class	Functional Classification (A = Arterial, C = Collector, R = Residential).
Length (feet)	Length of the section in feet.
Width (feet)	Average width of the section in feet.
Area (square foot)	Calculated area based on average length and width.
Surface Type	Surface Type (AC = AC Pavement, O = AC Overlay of AC Pavement, AC/PCC = AC Overlay of PCC Pavement, PCC = PCC Pavement, ST = Surface treatment over gravel base/subgrade).
PCI Date	Date of PCI is from inspection or maintenance data.
PCI	Average PCI for the section. The value is inspected/projected for 2017 and is based on the last calculated PCI (i.e. from inspection or maintenance data).

Sorted Alphabetically by Street ID

Street ID	Section ID	Street Name	Beg Location	End Location	Lanes	Functional Class	Length	Width	Area	Surface Type	PCI Date	PCI
CAMI	01	CAMINO COLEGIO - CAMINO	MAGNOLIA AVENUE	BEND	1	O - Other	1348	8	10784	A - AC	10/31/2017	24
COLE	01	COLEMAN CREEK - COLEMA	HILLVIEW WAY	SNYDER LANE	1	O - Other	1161	9	10449	A - AC	11/1/2017	16
COLE	02	COLEMAN CREEK - COLEMA	SNYDER LANE	BEND	1	O - Other	843	9	7587	A - AC	11/1/2017	0
COLE	03	COLEMAN CREEK - COLEMA	BEND	GOLF COURSE DRIVE	1	O - Other	895	9	8055	A - AC	11/1/2017	77
COMM	01	COMMERCE - COMMER	5879 COMMERCE BOULEVARD	UTILITY COURT	1	O - Other	3051	7	21357	A - AC	10/31/2017	55
COMM	02	COMMERCE - COMMER	7300 COMMERCE BOULEVARD	N OR AVRAM AVENUE	1	O - Other	2270	10	22700	A - AC	10/31/2017	51
COPE	01	COPELAND CREEK - COPELA	WEST CITY LIMIT	BEND	1	O - Other	3502	8	28016	A - AC	10/31/2017	61
COPE	02	COPELAND CREEK - COPELA	BEND	REDWOOD DRIVE	1	O - Other	2927	9	26343	A - AC	10/31/2017	54
COPE	03A	COPELAND CREEK - COPELA	SEED FARM DRIVE	END OF PCC	1	O - Other	1660	9	14940	P - PCC	10/31/2017	100
COPE	03B	COPELAND CREEK - COPELA	AC	END OF AC	1	O - Other	751	10	7510	A - AC	10/31/2017	33
COPE	03C	COPELAND CREEK - COPELA	PCC	COMMERCE BOULEVARD	1	O - Other	1310	5	6550	P - PCC	10/31/2017	94
COPE	04A	COPELAND CREEK - COPELA	COMMERCE BOULEVARD	END OF PCC	1	O - Other	1098	8	8784	P - PCC	10/31/2017	95
COPE	04B	COPELAND CREEK - COPELA	AC	SEED FARM DRIVE	1	O - Other	2071	9	18639	A - AC	10/31/2017	65
COPE	05	COPELAND CREEK - COPELA	COUNTRY CLUB DRIVE	RAILROAD	1	O - Other	819	12	9828	A - AC	11/1/2017	25
COPE	06	COPELAND CREEK - COPELA	RAILROAD	COUNTRY CLUB DRIVE	1	O - Other	844	10	8440	A - AC	11/1/2017	19
COPE	07	COPELAND CREEK - COPELA	SNYDER LANE	COUNTRY CLUB DRIVE	1	O - Other	2769	11	30459	A - AC	11/1/2017	26
COPE	08	COPELAND CREEK - COPELA	COUNTRY CLUB DRIVE	SNYDER LANE	1	O - Other	2694	9	24246	A - AC	11/1/2017	56
COPE	09	COPELAND CREEK - COPELA	START (NEAR SONOMA STATE)	SNYDER LANE	1	O - Other	1213	4	4852	P - PCC	11/1/2017	81
COPE	10	COPELAND CREEK - COPELA	SNYDER LANE	END	1	O - Other	1565	9	14085	P - PCC	11/1/2017	93
CRAN	01	CRANE CREEK - CRANEC	SNYDER LANE	BEND	1	O - Other	959	11	10549	A - AC	11/1/2017	4
FIVE	01	FIVE CREEK - FIVECR	PARK	HINEBAUGH CREEK	1	O - Other	2177	10	21770	O - AC/AC	11/1/2017	41
FIVE	03	FIVE CREEK - FIVECR	SNYDER LANE	PARK	1	O - Other	2154	9	19386	A - AC	11/1/2017	9
FIVE	04	FIVE CREEK - FIVECR	BEND	END	1	O - Other	1472	9	13248	A - AC	11/1/2017	44
HINE	06	HINEBAUGH CREEK - HINEBA	BEND	LABATH AVENUE	1	O - Other	1034	9	9306	A - AC	10/31/2017	40
HINE	07	HINEBAUGH CREEK - HINEBA	REDWOOD DRIVE	LABATH AVENUE	1	O - Other	1264	10	12640	A - AC	10/31/2017	56
HINE	10	HINEBAUGH CREEK - HINEBA	REDWOOD DRIVE	HAMPTON INN	1	O - Other	779	9	7011	A - AC	10/31/2017	16

Sorted Alphabetically by Street ID

Street ID	Section ID	Street Name	Beg Location	End Location	Lanes	Functional Class	Length	Width	Area	Surface Type	PCI Date	PCI
HINE	13	HINEBAUGH CREEK - HINEBA	STATE FARM DRIVE	COMMERCE BOULEVARD	1	O - Other	960	9	8640	A - AC	10/31/2017	34
HINE	14	HINEBAUGH CREEK - HINEBA	COMMERCE BOULEVARD	STATE FARM DRIVE	1	O - Other	953	9	8577	A - AC	10/31/2017	33
HINE	15	HINEBAUGH CREEK - HINEBA	RAILROAD	STATE FARM DRIVE	1	O - Other	615	10	6150	A - AC	10/31/2017	61
HINE	16	HINEBAUGH CREEK - HINEBA	STATE FARM DRIVE	RAILROAD	1	O - Other	623	9	5607	A - AC	10/31/2017	61
HINE	17	HINEBAUGH CREEK - HINEBA	COUNTRY CLUB DRIVE	RAILROAD	1	O - Other	1486	10	14860	A - AC	11/1/2017	7
HINE	19	HINEBAUGH CREEK - HINEBA	BEND	COUNTRY CLUB DRIVE	1	O - Other	1165	9	10485	A - AC	11/1/2017	27
HINE	20	HINEBAUGH CREEK - HINEBA	NEAR SAN BENITO COURT	NEAR SAN MATEO COURT	1	O - Other	700	9	6300	A - AC	11/1/2017	47
HINE	22	HINEBAUGH CREEK - HINEBA	NEAR SAN MATEO COURT	SNYDER LANE	1	O - Other	1635	9	14715	A - AC	11/1/2017	32
HINE	24	HINEBAUGH CREEK - HINEBA	SNYDER LANE	END OF AC	1	O - Other	1286	10	12860	A - AC	11/1/2017	22
HINE	26	HINEBAUGH CREEK - HINEBA	PCC	END OF BASIN	1	O - Other	475	8	3800	P - PCC	11/1/2017	96
RPX	01	ROHNERT PARK EXPRESSWAY - ROHNER	COUNTRY CLUB DRIVE	RAILROAD	1	O - Other	1508	7	10556	P - PCC	11/1/2017	84
RPX	02	ROHNERT PARK EXPRESSWAY - ROHNER	RAILROAD	COUNTRY CLUB ROAD	1	O - Other	1503	7	10521	P - PCC	11/1/2017	83
RPX	03A	ROHNERT PARK EXPRESSWAY - ROHNER	SNYDER LANE	END OF AC	1	O - Other	613	9	5517	A - AC	11/1/2017	20
RPX	03B	ROHNERT PARK EXPRESSWAY - ROHNER	PCC	COUNTRY CLUB DRIVE	1	O - Other	2330	7	16310	P - PCC	11/1/2017	85
RPX	04	ROHNERT PARK EXPRESSWAY - ROHNER	COUNTRY CLUB DRIVE	SNYDER LANE	1	O - Other	3085	7	21595	P - PCC	11/1/2017	82
RPX	05	ROHNERT PARK EXPRESSWAY - ROHNER	NEW DEVELOPMENT	SNYDER LANE	1	O - Other	1878	6	11268	P - PCC	11/1/2017	98
RPX	06	ROHNERT PARK EXPRESSWAY - ROHNER	SNYDER LANE	JASMINE CIRCLE	1	O - Other	1135	7	7945	P - PCC	11/1/2017	82

Sorted by Descending PCI

Street ID	Section ID	Street Name	Beg Location	End Location	Lanes	Functional Class	Length	Width	Area	Surface Type	PCI Date	PCI
COPE	03A	COPELAND CREEK - COPELA	SEED FARM DRIVE	END OF PCC	1	O - Other	1660	9	14940	P - PCC	10/31/2017	100
RPX	05	ROHNERT PARK EXPRESSWAY - ROHNER	NEW DEVELOPMENT	SNYDER LANE	1	O - Other	1878	6	11268	P - PCC	11/1/2017	98
HINE	26	HINEBAUGH CREEK - HINEBA	PCC	END OF BASIN	1	O - Other	475	8	3800	P - PCC	11/1/2017	96
COPE	04A	COPELAND CREEK - COPELA	COMMERCE BOULEVARD	END OF PCC	1	O - Other	1098	8	8784	P - PCC	10/31/2017	95
COPE	03C	COPELAND CREEK - COPELA	PCC	COMMERCE BOULEVARD	1	O - Other	1310	5	6550	P - PCC	10/31/2017	94
COPE	10	COPELAND CREEK - COPELA	SNYDER LANE	END	1	O - Other	1565	9	14085	P - PCC	11/1/2017	93
RPX	03B	ROHNERT PARK EXPRESSWAY - ROHNER	PCC	COUNTRY CLUB DRIVE	1	O - Other	2330	7	16310	P - PCC	11/1/2017	85
RPX	01	ROHNERT PARK EXPRESSWAY - ROHNER	COUNTRY CLUB DRIVE	RAILROAD	1	O - Other	1508	7	10556	P - PCC	11/1/2017	84
RPX	02	ROHNERT PARK EXPRESSWAY - ROHNER	RAILROAD	COUNTRY CLUB ROAD	1	O - Other	1503	7	10521	P - PCC	11/1/2017	83
RPX	04	ROHNERT PARK EXPRESSWAY - ROHNER	COUNTRY CLUB DRIVE	SNYDER LANE	1	O - Other	3085	7	21595	P - PCC	11/1/2017	82
RPX	06	ROHNERT PARK EXPRESSWAY - ROHNER	SNYDER LANE	JASMINE CIRCLE	1	O - Other	1135	7	7945	P - PCC	11/1/2017	82
COPE	09	COPELAND CREEK - COPELA	START (NEAR SONOMA STATE)	SNYDER LANE	1	O - Other	1213	4	4852	P - PCC	11/1/2017	81
COLE	03	COLEMAN CREEK - COLEMA	BEND	GOLF COURSE DRIVE	1	O - Other	895	9	8055	A - AC	11/1/2017	77
COPE	04B	COPELAND CREEK - COPELA	AC	SEED FARM DRIVE	1	O - Other	2071	9	18639	A - AC	10/31/2017	65
COPE	01	COPELAND CREEK - COPELA	WEST CITY LIMIT	BEND	1	O - Other	3502	8	28016	A - AC	10/31/2017	61
HINE	15	HINEBAUGH CREEK - HINEBA	RAILROAD	STATE FARM DRIVE	1	O - Other	615	10	6150	A - AC	10/31/2017	61
HINE	16	HINEBAUGH CREEK - HINEBA	STATE FARM DRIVE	RAILROAD	1	O - Other	623	9	5607	A - AC	10/31/2017	61
COPE	08	COPELAND CREEK - COPELA	COUNTRY CLUB DRIVE	SNYDER LANE	1	O - Other	2694	9	24246	A - AC	11/1/2017	56
HINE	07	HINEBAUGH CREEK - HINEBA	REDWOOD DRIVE	LABATH AVENUE	1	O - Other	1264	10	12640	A - AC	10/31/2017	56
COMM	01	COMMERCE - COMMER	5879 COMMERCE BOULEVARD	UTILITY COURT	1	O - Other	3051	7	21357	A - AC	10/31/2017	55
COPE	02	COPELAND CREEK - COPELA	BEND	REDWOOD DRIVE	1	O - Other	2927	9	26343	A - AC	10/31/2017	54
COMM	02	COMMERCE - COMMER	7300 COMMERCE BOULEVARD	N OR AVRAM AVENUE	1	O - Other	2270	10	22700	A - AC	10/31/2017	51
HINE	20	HINEBAUGH CREEK - HINEBA	NEAR SAN BENITO COURT	NEAR SAN MATEO COURT	1	O - Other	700	9	6300	A - AC	11/1/2017	47
FIVE	04	FIVE CREEK - FIVECR	BEND	END	1	O - Other	1472	9	13248	A - AC	11/1/2017	44
FIVE	01	FIVE CREEK - FIVECR	PARK	HINEBAUGH CREEK	1	O - Other	2177	10	21770	O - AC/AC	11/1/2017	41

Sorted by Descending PCI

Street ID	Section ID	Street Name	Beg Location	End Location	Lanes	Functional Class	Length	Width	Area	Surface Type	PCI Date	PCI
HINE	06	HINEBAUGH CREEK - HINEBA	BEND	LABATH AVENUE	1	O - Other	1034	9	9306	A - AC	10/31/2017	40
HINE	13	HINEBAUGH CREEK - HINEBA	STATE FARM DRIVE	COMMERCE BOULEVARD	1	O - Other	960	9	8640	A - AC	10/31/2017	34
COPE	03B	COPELAND CREEK - COPELA	AC	END OF AC	1	O - Other	751	10	7510	A - AC	10/31/2017	33
HINE	14	HINEBAUGH CREEK - HINEBA	COMMERCE BOULEVARD	STATE FARM DRIVE	1	O - Other	953	9	8577	A - AC	10/31/2017	33
HINE	22	HINEBAUGH CREEK - HINEBA	NEAR SAN MATEO COURT	SNYDER LANE	1	O - Other	1635	9	14715	A - AC	11/1/2017	32
HINE	19	HINEBAUGH CREEK - HINEBA	BEND	COUNTRY CLUB DRIVE	1	O - Other	1165	9	10485	A - AC	11/1/2017	27
COPE	07	COPELAND CREEK - COPELA	SNYDER LANE	COUNTRY CLUB DRIVE	1	O - Other	2769	11	30459	A - AC	11/1/2017	26
COPE	05	COPELAND CREEK - COPELA	COUNTRY CLUB DRIVE	RAILROAD	1	O - Other	819	12	9828	A - AC	11/1/2017	25
CAMI	01	CAMINO COLEGIO - CAMINO	MAGNOLIA AVENUE	BEND	1	O - Other	1348	8	10784	A - AC	10/31/2017	24
HINE	24	HINEBAUGH CREEK - HINEBA	SNYDER LANE	END OF AC	1	O - Other	1286	10	12860	A - AC	11/1/2017	22
RPX	03A	ROHNERT PARK EXPRESSWAY - ROHNER	SNYDER LANE	END OF AC	1	O - Other	613	9	5517	A - AC	11/1/2017	20
COPE	06	COPELAND CREEK - COPELA	RAILROAD	COUNTRY CLUB DRIVE	1	O - Other	844	10	8440	A - AC	11/1/2017	19
COLE	01	COLEMAN CREEK - COLEMA	HILLVIEW WAY	SNYDER LANE	1	O - Other	1161	9	10449	A - AC	11/1/2017	16
HINE	10	HINEBAUGH CREEK - HINEBA	REDWOOD DRIVE	HAMPTON INN	1	O - Other	779	9	7011	A - AC	10/31/2017	16
FIVE	03	FIVE CREEK - FIVECR	SNYDER LANE	PARK	1	O - Other	2154	9	19386	A - AC	11/1/2017	9
HINE	17	HINEBAUGH CREEK - HINEBA	COUNTRY CLUB DRIVE	RAILROAD	1	O - Other	1486	10	14860	A - AC	11/1/2017	7
CRAN	01	CRANE CREEK - CRANEC	SNYDER LANE	BEND	1	O - Other	959	11	10549	A - AC	11/1/2017	4
COLE	02	COLEMAN CREEK - COLEMA	SNYDER LANE	BEND	1	O - Other	843	9	7587	A - AC	11/1/2017	0

Appendix B – Decision Tree

Maintenance and Rehabilitation (M&R) Decision Tree

This appendix presents the current M&R decision tree in StreetSaver. The decision tree forms the basis for all of the budgetary computations that are included in this Final Report. 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 Pavement Condition Category I – Very Good. All preventive maintenance treatment listings are assigned only to sections in Condition Category I where the PCI greater than 70. Sections with PCI values less than 70 are assigned to treatments listed in Categories II through V.

For the preventive maintenance category (PCI \geq 70), there are several treatments that can be performed. A time sequence is used to identify the appropriate treatment and cost. Each preventive maintenance treatment description consists of three treatments: 1) Crack, 2) Surface, and 3) Restoration. These three treatments can have different time periods between applications. For example, before a restoration treatment is performed, the user can specify that a number of slurry seals should be performed first.


Rehabilitation treatments are assigned to sections in Condition Categories II through V (PCI \leq 70). Each line is defined by a specific combination of functional classification, surface type, and condition category.

COLUMN	DESCRIPTION
Functional Class	Functional classification.
Surface	Surface type.
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. slurry sealing). Third Row (Restoration Treatment) indicates surface restoration (e.g. overlay).
Treatment	Name of treatments from the "Treatment Descriptions" report.
Cost/Sq. Yd.	Unit cost (\$ per square yard) for the treatment shown. In the case of crack sealing, the unit cost is \$ per linear foot.
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).
Number of Sequential Seals	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.

Decision Tree

Printed: 04/20/2018


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	DO NOTHING	\$0.00	4		
			Surface Treatment	DO NOTHING	\$0.00		8	
			Restoration Treatment	DO NOTHING	\$0.00			3
		II - Good, Non-Load Related		DO NOTHING	\$0.00			
		III - Good, Load Related		SEAL CRACKS	\$1.00			
		IV - Poor		PATCH	\$3.50			
		V - Very Poor		RECONSTRUCT STRUCTURE (PCC)	\$165.00			
	AC/AC	I - Very Good	Crack Treatment	DO NOTHING	\$0.00	4		
			Surface Treatment	DO NOTHING	\$0.00		8	
			Restoration Treatment	DO NOTHING	\$0.00			3
		II - Good, Non-Load Related		DO NOTHING	\$0.00			
		III - Good, Load Related		SEAL CRACKS	\$1.00			
		IV - Poor		PATCH	\$3.50			
	AC/PCC	I - Very Good	Crack Treatment	DO NOTHING	\$0.00	4		
			Surface Treatment	DO NOTHING	\$0.00		8	
Restoration Treatment			DO NOTHING	\$0.00			3	
II - Good, Non-Load Related			DO NOTHING	\$0.00				
III - Good, Load Related			SEAL CRACKS	\$1.00				
IV - Poor			PATCH	\$3.50				
V - Very Poor			RECONSTRUCT STRUCTURE (PCC)	\$165.00				
PCC	I - Very Good	Crack Treatment	DO NOTHING	\$0.00	9			
		Surface Treatment	DO NOTHING	\$0.00		99		
		Restoration Treatment	DO NOTHING	\$0.00			100	
	II - Good, Non-Load Related		DO NOTHING	\$0.00				
	III - Good, Load Related		SEAL CRACKS	\$1.00				
	IV - Poor		PATCH	\$3.50				
	V - Very Poor		RECONSTRUCT STRUCTURE (PCC)	\$165.00				

 Functional Class and Surface combination not used

Decision Tree

Printed: 04/20/2018

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	ST	I - Very Good	Crack Treatment	DO NOTHING	\$0.00	9		
			Surface Treatment	DO NOTHING	\$0.00		99	
			Restoration Treatment	DO NOTHING	\$0.00			100
		II - Good, Non-Load Related		DO NOTHING	\$0.00			
		III - Good, Load Related		SEAL CRACKS	\$1.00			
		IV - Poor		PATCH	\$3.50			
		V - Very Poor		RECONSTRUCT STRUCTURE (PCC)	\$165.00			

 Functional Class and Surface combination not used

Appendix C – Budget Needs Analysis

Budget Needs Reports

Budget Needs reports included in this appendix are listed below:

- Needs - Projected PCI/Cost Summary
- Needs - Rehabilitation Treatment/Cost Summary

Needs - Projected PCI/Cost Summary

This report summarizes and projects the City's network PCI values over a five-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 five-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 five-year period.

Needs - Rehabilitation Treatment/Cost Summary

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

COLUMN	DESCRIPTION
Treatment	Type of rehabilitation treatments needed.
Year	Year in the analysis period (i.e., 2018, 2019, 2020...2022).
Area Treated	Quantities in square yard.
Cost	Rehabilitation treatment cost.

Needs - Projected PCI/Cost Summary

Inflation Rate = 3.00 % Printed: 04/20/2018

Year	PCI Treated	PCI Untreated	PM Cost	Rehab Cost	Cost
2018	69	50	\$0	\$2,174,868	\$2,174,868
2019	74	48	\$0	\$783,712	\$783,712
2020	72	46	\$0	\$8,982	\$8,982
2021	78	44	\$0	\$820,538	\$820,538
2022	77	42	\$0	\$12,694	\$12,694
		% PM	PM Total Cost	Rehab Total Cost	Total Cost
		0.00%	\$0	\$3,800,794	\$3,800,794

Needs - Rehabilitation Treatment/Cost Summary

Inflation Rate = 3.00 % Printed: 04/20/2018

Treatment	Year	Area Treated	Cost
PATCH	2018	7,113.11 sq.yd.	\$24,897
	2019	2,927 sq.yd.	\$10,552
	2020	2,418.89 sq.yd.	\$8,982
	2021	7,943.44 sq.yd.	\$30,382
	2022	3,222.22 sq.yd.	\$12,694
	Total	23,624.67 sq.yd.	\$87,507
RECONSTRUCT STRUCTURE (PCC)	2018	13,030.11 sq.yd.	\$2,149,971
	2019	4,549.33 sq.yd.	\$773,160
	2021	4,382.44 sq.yd.	\$790,156
	Total	21,961.89 sq.yd.	\$3,713,287
Total Cost			\$3,800,794

Appendix D – Budget Analysis Scenario 1 – Current Investment Level

Budget Analysis Reports

Budget analysis reports included in this appendix are listed below:

- Scenarios Cost Summary
- Scenarios Network Condition Summary
- Scenarios Sections Selected for Treatment

Scenarios Cost Summary

This report provides a breakdown of the estimated costs for the recommended treatments by year and condition category. It also totals the costs by functional classification and shows the amount of deferred maintenance arising from the input budget and City's decision tree.

Scenarios Network Condition Summary

This report provides a breakdown of the network condition by functional classification and condition category before and after the recommended treatments are applied. It also shows the projected network PCI if the recommended treatments are applied and if they are not.

Scenarios Sections Selected for Treatment

This report provides a listing of sections selected for treatment based on decision tree and budget constraints. It contains the following information: street name, beginning and ending locations, street ID, section ID, functional classification, surface type, estimated cost of the recommended treatment, and treatment. The records are grouped by year and then in alphabetical order by street name and section ID. Please note that these are network level recommendations. A project level evaluation must be performed before applying a treatment.

Interest: 5.00%

Inflation: 3.00%

Printed: 04/20/2018

Scenario: Scenario 1: Current Level Investment

Year	PM	Budget	Rehabilitation	Preventative Maintenance	Surplus PM	Deferred	Stop Gap		
2018	0%	\$750,000	II	\$0	Non-Project	\$0	\$1,441,422	Funded	\$0
			III	\$0				Unmet	\$6,814
			IV	\$24,897	Project	\$0			
			V	\$708,547					
			Total	\$733,444					
			Project	\$0					
2019	0%	\$440,000	II	\$0	Non-Project	\$0	\$1,899,248	Funded	\$0
			III	\$0				Unmet	\$3,655
			IV	\$10,552	Project	\$0			
			V	\$358,577					
			Total	\$369,129					
			Project	\$0					
2020	0%	\$400,000	II	\$0	Non-Project	\$0	\$1,579,171	Funded	\$0
			III	\$0				Unmet	\$0
			IV	\$8,982	Project	\$0			
			V	\$377,055					
			Total	\$386,037					
			Project	\$0					
2021	0%	\$400,000	II	\$0	Non-Project	\$0	\$2,125,797	Funded	\$0
			III	\$0				Unmet	\$3,024
			IV	\$30,382	Project	\$0			
			V	\$290,905					
			Total	\$321,287					
			Project	\$0					
2022	0%	\$400,000	II	\$0	Non-Project	\$0	\$1,834,309	Funded	\$0
			III	\$0				Unmet	\$0
			IV	\$12,694	Project	\$0			
			V	\$355,262					
			Total	\$367,956					
			Project	\$0					

Summary				
Functional Class	Rehabilitation	Prev. Maint.	Funded Stop Gap	Unmet Stop Gap
Other	\$2,177,853	\$0	\$0	\$13,493
Grand Total:	\$2,177,853	\$0	\$0	\$13,493

Scenarios - Network Condition Summary

Interest: 5%

Inflation: 3%

Printed: 04/20/2018

Scenario: Scenario 1: Current Level Investment

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2018	\$750,000	0%	2020	\$400,000	0%	2022	\$400,000	0%
2019	\$440,000	0%	2021	\$400,000	0%			

Projected Network Average PCI by year

Year	Never Treated	With Selected Treatment	Treated Centerline Miles	Treated Lane Miles
2018	50	57	2.04	2.04
2019	48	58	0.90	0.90
2020	46	60	0.82	0.82
2021	44	62	1.90	1.90
2022	42	63	0.92	0.92

Percent Network Area by Functional Class and Condition Category

Condition in base year 2018, prior to applying treatments.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	0.0%	0.0%	25.2%	25.2%
II / III	0.0%	0.0%	0.0%	25.8%	25.8%
IV	0.0%	0.0%	0.0%	27.8%	27.8%
V	0.0%	0.0%	0.0%	21.2%	21.2%
Total	0.0%	0.0%	0.0%	100.0%	100.0%

Condition in year 2018 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	0.0%	0.0%	32.2%	32.2%
II / III	0.0%	0.0%	0.0%	37.4%	37.4%
IV	0.0%	0.0%	0.0%	16.2%	16.2%
V	0.0%	0.0%	0.0%	14.2%	14.2%
Total	0.0%	0.0%	0.0%	100.0%	100.0%

Condition in year 2022 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	0.0%	0.0%	44.8%	44.8%
II / III	0.0%	0.0%	0.0%	37.4%	37.4%
IV	0.0%	0.0%	0.0%	1.7%	1.7%
V	0.0%	0.0%	0.0%	16.1%	16.1%
Total	0.0%	0.0%	0.0%	100.0%	100.0%

Scenarios - Sections Selected for Treatment

Interest: 5.00%

Inflation: 3.00%

Printed: 04/20/2018

Scenario: Scenario 1: Current Level Investment

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2018	\$750,000	0%	2020	\$400,000	0%	2022	\$400,000	0%
2019	\$440,000	0%	2021	\$400,000	0%			

Year: 2018

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	Surf FC	Type	Current PCI	Treatment		Cost	Rating	Treatment			
											PCI Before	PCI After						
COMMERCE	7300 COMMERCE BOULEVARD	N OR AVRAM AVENUE	COMM	02	2,270	10	22,700	O	AC	49	49	58	\$8,828	13,100	PATCH			
FIVE CREEK	PARK	HINEBAUGH CREEK	FIVE	01	2,177	10	21,770	O	AC/AC	39	40	52	\$8,467	14,546	PATCH			
FIVE CREEK	BEND	END	FIVE	04	1,472	9	13,248	O	AC	42	43	54	\$5,152	13,910	PATCH			
HINEBAUGH CREEK	NEAR SAN BENITO COURT	NEAR SAN MATEO COURT	HINE	20	700	9	6,300	O	AC	45	46	56	\$2,450	14,698	PATCH			
												Treatment Total		\$24,897				
CAMINO COLEGIO	MAGNOLIA AVENUE	BEND	CAMI	01	1,348	8	10,784	O	AC	22	23	100	\$197,707	2,894	RECONSTRUCT STRUCTURE (PCC)			
COLEMAN CREEK	HILLVIEW WAY	SNYDER LANE	COLE	01	1,161	9	10,449	O	AC	14	15	100	\$191,565	2,894	RECONSTRUCT STRUCTURE (PCC)			
COLEMAN CREEK	SNYDER LANE	BEND	COLE	02	843	9	7,587	O	AC	0	0	100	\$139,095	2,894	RECONSTRUCT STRUCTURE (PCC)			
COPELAND CREEK	COUNTRY CLUB DRIVE	RAILROAD	COPE	05	819	12	9,828	O	AC	23	24	100	\$180,180	2,894	RECONSTRUCT STRUCTURE (PCC)			
												Treatment Total		\$708,547				
							Year 2018 Area Total		102,666		Year 2018 Total		\$733,444					

Year: 2019

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	Surf FC	Type	Current PCI	Treatment		Cost	Rating	Treatment			
											PCI Before	PCI After						
COPELAND CREEK	BEND	REDWOOD DRIVE	COPE	02	2,927	9	26,343	O	AC	53	49	58	\$10,552	13,253	PATCH			
												Treatment Total		\$10,552				
COPELAND CREEK	RAILROAD	COUNTRY CLUB DRIVE	COPE	06	844	10	8,440	O	AC	17	15	100	\$159,376	2,810	RECONSTRUCT STRUCTURE (PCC)			
CRANE CREEK	SNYDER LANE	BEND	CRAN	01	959	11	10,549	O	AC	2	0	100	\$199,201	2,810	RECONSTRUCT STRUCTURE (PCC)			

** - Treatment from Project Selection

Scenarios Criteria:

Scenarios - Sections Selected for Treatment

Interest: 5.00% Inflation: 3.00% Printed: 04/20/2018
Scenario: Scenario 1: Current Level Investment

											Treatment Total		\$358,577			
Year 2019 Area Total											45,332		Year 2019 Total		\$369,129	
Year: 2020																
											Treatment					
Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	PCI Before	PCI After	Cost	Rating	Treatment	
FIVE CREEK	PARK	HINEBAUGH CREEK	FIVE	01	2,177	10	21,770	O	AC/AC	39	48	57	\$8,982	13,958	PATCH	
											Treatment Total		\$8,982			
FIVE CREEK	SNYDER LANE	PARK	FIVE	03	2,154	9	19,386	O	AC	7	0	100	\$377,055	2,728	RECONSTRUCT STRUCTURE (PCC)	
											Treatment Total		\$377,055			
Year 2020 Area Total											41,156		Year 2020 Total		\$386,037	

Year: 2021

											Treatment					
Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	PCI Before	PCI After	Cost	Rating	Treatment	
COMMERCE	5879 COMMERCE BOULEVARD	UTILITY COURT	COMM	01	3,051	7	21,357	O	AC	54	48	57	\$9,076	12,436	PATCH	
COPELAND CREEK	COUNTRY CLUB DRIVE	SNYDER LANE	COPE	08	2,694	9	24,246	O	AC	55	49	58	\$10,304	13,714	PATCH	
FIVE CREEK	BEND	END	FIVE	04	1,472	9	13,248	O	AC	42	48	57	\$5,630	12,968	PATCH	
HINEBAUGH CREEK	REDWOOD DRIVE	LABATH AVENUE	HINE	07	1,264	10	12,640	O	AC	55	49	58	\$5,372	12,499	PATCH	
											Treatment Total		\$30,382			
COPELAND CREEK	AC	END OF AC	COPE	03B	751	10	7,510	O	AC	31	23	100	\$150,451	2,648	RECONSTRUCT STRUCTURE (PCC)	
HINEBAUGH CREEK	REDWOOD DRIVE	HAMPTON INN	HINE	10	779	9	7,011	O	AC	14	4	100	\$140,454	2,648	RECONSTRUCT STRUCTURE (PCC)	
											Treatment Total		\$290,905			
Year 2021 Area Total											86,012		Year 2021 Total		\$321,287	

** - Treatment from Project Selection

Scenarios - Sections Selected for Treatment

Interest: 5.00%

Inflation: 3.00%

Printed: 04/20/2018

Scenario: Scenario 1: Current Level Investment

Year: 2022

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	Treatment		Cost	Rating	Treatment		
											PCI Before	PCI After					
COMMERCE	7300 COMMERCE BOULEVARD	N OR AVRAM AVENUE	COMM	02	2,270	10	22,700	O	AC	49	49	58	\$9,936	11,639	PATCH		
HINEBAUGH CREEK	NEAR SAN BENITO COURT	NEAR SAN MATEO COURT	HINE	20	700	9	6,300	O	AC	45	48	57	\$2,758	13,155	PATCH		
												Treatment Total		\$12,694			
HINEBAUGH CREEK	STATE FARM DRIVE	COMMERCE BOULEVARD	HINE	13	960	9	8,640	O	AC	32	21	100	\$178,281	2,571	RECONSTRUCT STRUCTURE (PCC)		
HINEBAUGH CREEK	COMMERCE BOULEVARD	STATE FARM DRIVE	HINE	14	953	9	8,577	O	AC	31	20	100	\$176,981	2,571	RECONSTRUCT STRUCTURE (PCC)		
												Treatment Total		\$355,262			
Year 2022 Area Total								46,217		Year 2022 Total		\$367,956					
Total Section Area:								321,383		Grand Total		\$2,177,853					

Appendix E – Budget Analysis Scenario 2 – Maintain Current PCI

Interest: 5.00%

Inflation: 3.00%

Printed: 04/23/2018

Scenario: Scenario 2: Maintain PCI

Year	PM	Budget	Rehabilitation	Preventative Maintenance	Surplus PM	Deferred	Stop Gap		
2018	0%	\$15,000	II	\$0	Non-Project	\$0	\$2,163,948	Funded	\$0
			III	\$0				Unmet	\$10,962
			IV	\$10,917	Project	\$0			
			V	\$0					
			Total	\$10,917					
			Project	\$0					
2019	0%	\$135,000	II	\$0	Non-Project	\$0	\$2,883,447	Funded	\$0
			III	\$0				Unmet	\$3,655
			IV	\$24,952	Project	\$0			
			V	\$104,180					
			Total	\$129,132					
			Project	\$0					
2020	0%	\$160,000	II	\$0	Non-Project	\$0	\$2,822,385	Funded	\$0
			III	\$0				Unmet	\$0
			IV	\$8,982	Project	\$0			
			V	\$147,566					
			Total	\$156,548					
			Project	\$0					
2021	0%	\$185,000	II	\$0	Non-Project	\$0	\$3,546,761	Funded	\$0
			III	\$0				Unmet	\$3,024
			IV	\$30,382	Project	\$0			
			V	\$150,451					
			Total	\$180,833					
			Project	\$0					
2022	0%	\$160,000	II	\$0	Non-Project	\$0	\$3,508,496	Funded	\$0
			III	\$0				Unmet	\$0
			IV	\$12,694	Project	\$0			
			V	\$144,668					
			Total	\$157,362					
			Project	\$0					

Summary				
Functional Class	Rehabilitation	Prev. Maint.	Funded Stop Gap	Unmet Stop Gap
Other	\$634,792	\$0	\$0	\$17,641
Grand Total:	\$634,792	\$0	\$0	\$17,641

Scenarios - Network Condition Summary

Interest: 5%

Inflation: 3%

Printed: 04/23/2018

Scenario: Scenario 2: Maintain PCI

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2018	\$15,000	0%	2020	\$160,000	0%	2022	\$160,000	0%
2019	\$135,000	0%	2021	\$185,000	0%			

Projected Network Average PCI by year

Year	Never Treated	With Selected Treatment	Treated Centerline Miles	Treated Lane Miles
2018	50	50	0.54	0.54
2019	48	50	1.38	1.38
2020	46	50	0.57	0.57
2021	44	50	1.75	1.75
2022	42	50	0.71	0.71

Percent Network Area by Functional Class and Condition Category

Condition in base year 2018, prior to applying treatments.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	0.0%	0.0%	25.2%	25.2%
II / III	0.0%	0.0%	0.0%	25.8%	25.8%
IV	0.0%	0.0%	0.0%	27.8%	27.8%
V	0.0%	0.0%	0.0%	21.2%	21.2%
Total	0.0%	0.0%	0.0%	100.0%	100.0%

Condition in year 2018 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	0.0%	0.0%	25.2%	25.2%
II / III	0.0%	0.0%	0.0%	30.9%	30.9%
IV	0.0%	0.0%	0.0%	22.7%	22.7%
V	0.0%	0.0%	0.0%	21.2%	21.2%
Total	0.0%	0.0%	0.0%	100.0%	100.0%

Condition in year 2022 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	0.0%	0.0%	30.2%	30.2%
II / III	0.0%	0.0%	0.0%	37.4%	37.4%
IV	0.0%	0.0%	0.0%	1.7%	1.7%
V	0.0%	0.0%	0.0%	30.7%	30.7%
Total	0.0%	0.0%	0.0%	100.0%	100.0%

Scenarios - Sections Selected for Treatment

Interest: 5.00%

Inflation: 3.00%

Printed: 04/23/2018

Scenario: Scenario 2: Maintain PCI

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2018	\$15,000	0%	2020	\$160,000	0%	2022	\$160,000	0%
2019	\$135,000	0%	2021	\$185,000	0%			

Year: 2018

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	Treatment		Cost	Rating	Treatment	
											PCI Before	PCI After				
FIVE CREEK	PARK	HINEBAUGH CREEK	FIVE	01	2,177	10	21,770	O	AC/AC	39	40	52	\$8,467	14,546	PATCH	
HINEBAUGH CREEK	NEAR SAN BENITO COURT	NEAR SAN MATEO COURT	HINE	20	700	9	6,300	O	AC	45	46	56	\$2,450	14,698	PATCH	
												Treatment Total		\$10,917		
Year 2018 Area Total										28,070		Year 2018 Total		\$10,917		

Year: 2019

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	Treatment		Cost	Rating	Treatment	
											PCI Before	PCI After				
COMMERCE	7300 COMMERCE BOULEVARD	N OR AVRAM AVENUE	COMM	02	2,270	10	22,700	O	AC	49	46	56	\$9,093	12,733	PATCH	
COPELAND CREEK	BEND	REDWOOD DRIVE	COPE	02	2,927	9	26,343	O	AC	52	49	58	\$10,552	13,253	PATCH	
FIVE CREEK	BEND	END	FIVE	04	1,472	9	13,248	O	AC	42	41	52	\$5,307	13,315	PATCH	
												Treatment Total		\$24,952		
ROHNERT PARK EXPRESSWAY	SNYDER LANE	END OF AC	RPX	03A	613	9	5,517	O	AC	18	16	100	\$104,180	2,810	RECONSTRUCT STRUCTURE (PCC)	
												Treatment Total		\$104,180		
Year 2019 Area Total										67,808		Year 2019 Total		\$129,132		

Year: 2020

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	Treatment		Cost	Rating	Treatment	
											PCI Before	PCI After				
FIVE CREEK	PARK	HINEBAUGH CREEK	FIVE	01	2,177	10	21,770	O	AC/AC	39	48	57	\$8,982	13,958	PATCH	
												Treatment Total		\$8,982		

** - Treatment from Project Selection

Scenarios Criteria:

Scenarios - Sections Selected for Treatment

Interest: 5.00%

Inflation: 3.00%

Printed: 04/23/2018

Scenario: Scenario 2: Maintain PCI

Year: 2020

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	Treatment		Cost	Rating	Treatment
											PCI Before	PCI After			
COLEMAN CREEK	SNYDER LANE	BEND	COLE	02	843	9	7,587	O	AC	0	0	100	\$147,566	2,728	RECONSTRUCT STRUCTURE (PCC)
												Treatment Total	\$147,566		
Year 2021 Area Total								29,357		Year 2021 Total		\$156,548			

Year: 2021

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	Treatment		Cost	Rating	Treatment
											PCI Before	PCI After			
COMMERCE	5879 COMMERCE BOULEVARD	UTILITY COURT	COMM	01	3,051	7	21,357	O	AC	54	48	57	\$9,076	12,436	PATCH
COPELAND CREEK	COUNTRY CLUB DRIVE	SNYDER LANE	COPE	08	2,694	9	24,246	O	AC	55	49	58	\$10,304	13,714	PATCH
FIVE CREEK	BEND	END	FIVE	04	1,472	9	13,248	O	AC	42	48	57	\$5,630	12,975	PATCH
HINEBAUGH CREEK	REDWOOD DRIVE	LABATH AVENUE	HINE	07	1,264	10	12,640	O	AC	55	49	58	\$5,372	12,499	PATCH
												Treatment Total	\$30,382		
COPELAND CREEK	AC	END OF AC	COPE	03B	751	10	7,510	O	AC	31	23	100	\$150,451	2,648	RECONSTRUCT STRUCTURE (PCC)
												Treatment Total	\$150,451		
Year 2021 Area Total								79,001		Year 2021 Total		\$180,833			

Year: 2022

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	Treatment		Cost	Rating	Treatment
											PCI Before	PCI After			
COMMERCE	7300 COMMERCE BOULEVARD	N OR AVRAM AVENUE	COMM	02	2,270	10	22,700	O	AC	49	49	58	\$9,936	11,631	PATCH
HINEBAUGH CREEK	NEAR SAN BENITO COURT	NEAR SAN MATEO COURT	HINE	20	700	9	6,300	O	AC	45	48	57	\$2,758	13,155	PATCH
												Treatment Total	\$12,694		
HINEBAUGH CREEK	REDWOOD DRIVE	HAMPTON INN	HINE	10	779	9	7,011	O	AC	14	0	100	\$144,668	2,571	RECONSTRUCT STRUCTURE (PCC)

** - Treatment from Project Selection

Scenarios Criteria:

Scenarios - Sections Selected for Treatment

Interest: 5.00%

Inflation: 3.00%

Printed: 04/23/2018

Scenario: Scenario 2: Maintain PCI

		Treatment Total	\$144,668
Year 2022 Area Total	36,011	Year 2022 Total	\$157,362
Total Section Area:	240,247	Grand Total	\$634,792

Appendix F – Budget Analysis Scenario 3 – Increase PCI by 5

Interest: 5.00%

Inflation: 3.00%

Printed: 04/23/2018

Scenario: Scenario 3: Increase PCI by 5

Year	PM	Budget	Rehabilitation	Preventative Maintenance	Surplus PM	Deferred	Stop Gap		
2018	0%	\$25,000	II	\$0	Non-Project	\$0	\$2,149,968	Funded	\$0
			III	\$0				Unmet	\$10,163
			IV	\$24,897	Project	\$0			
			V	\$0					
			Total	\$24,897					
			Project	\$0					
2019	0%	\$360,000	II	\$0	Non-Project	\$0	\$2,640,721	Funded	\$0
			III	\$0				Unmet	\$3,655
			IV	\$10,552	Project	\$0			
			V	\$346,906					
			Total	\$357,458					
			Project	\$0					
2020	0%	\$350,000	II	\$0	Non-Project	\$0	\$2,380,348	Funded	\$0
			III	\$0				Unmet	\$0
			IV	\$8,982	Project	\$0			
			V	\$339,595					
			Total	\$348,577					
			Project	\$0					
2021	0%	\$185,000	II	\$0	Non-Project	\$0	\$3,091,463	Funded	\$0
			III	\$0				Unmet	\$3,024
			IV	\$30,382	Project	\$0			
			V	\$150,451					
			Total	\$180,833					
			Project	\$0					
2022	0%	\$330,000	II	\$0	Non-Project	\$0	\$2,867,573	Funded	\$0
			III	\$0				Unmet	\$0
			IV	\$12,694	Project	\$0			
			V	\$316,635					
			Total	\$329,329					
			Project	\$0					

Summary				
Functional Class	Rehabilitation	Prev. Maint.	Funded Stop Gap	Unmet Stop Gap
Other	\$1,241,094	\$0	\$0	\$16,842
Grand Total:	\$1,241,094	\$0	\$0	\$16,842

Scenarios - Network Condition Summary

Interest: 5%

Inflation: 3%

Printed: 04/23/2018

Scenario: Scenario 3: Increase PCI by 5

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2018	\$25,000	0%	2020	\$350,000	0%	2022	\$330,000	0%
2019	\$360,000	0%	2021	\$185,000	0%			

Projected Network Average PCI by year

Year	Never Treated	With Selected Treatment	Treated Centerline Miles	Treated Lane Miles
2018	50	51	1.25	1.25
2019	48	52	0.97	0.97
2020	46	53	0.78	0.78
2021	44	54	1.75	1.75
2022	42	55	0.83	0.83

Percent Network Area by Functional Class and Condition Category

Condition in base year 2018, prior to applying treatments.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	0.0%	0.0%	25.2%	25.2%
II / III	0.0%	0.0%	0.0%	25.8%	25.8%
IV	0.0%	0.0%	0.0%	27.8%	27.8%
V	0.0%	0.0%	0.0%	21.2%	21.2%
Total	0.0%	0.0%	0.0%	100.0%	100.0%

Condition in year 2018 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	0.0%	0.0%	25.2%	25.2%
II / III	0.0%	0.0%	0.0%	37.4%	37.4%
IV	0.0%	0.0%	0.0%	16.2%	16.2%
V	0.0%	0.0%	0.0%	21.2%	21.2%
Total	0.0%	0.0%	0.0%	100.0%	100.0%

Condition in year 2022 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	0.0%	0.0%	35.8%	35.8%
II / III	0.0%	0.0%	0.0%	37.4%	37.4%
IV	0.0%	0.0%	0.0%	1.7%	1.7%
V	0.0%	0.0%	0.0%	25.1%	25.1%
Total	0.0%	0.0%	0.0%	100.0%	100.0%

Scenarios - Sections Selected for Treatment

Interest: 5.00%

Inflation: 3.00%

Printed: 04/23/2018

Scenario: Scenario 3: Increase PCI by 5

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2018	\$25,000	0%	2020	\$350,000	0%	2022	\$330,000	0%
2019	\$360,000	0%	2021	\$185,000	0%			

Year: 2018

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	Treatment		Cost	Rating	Treatment		
											PCI Before	PCI After					
COMMERCE	7300 COMMERCE BOULEVARD	N OR AVRAM AVENUE	COMM	02	2,270	10	22,700	O	AC	49	49	58	\$8,828	13,100	PATCH		
FIVE CREEK	PARK	HINEBAUGH CREEK	FIVE	01	2,177	10	21,770	O	AC/AC	39	40	52	\$8,467	14,546	PATCH		
FIVE CREEK	BEND	END	FIVE	04	1,472	9	13,248	O	AC	42	43	54	\$5,152	13,910	PATCH		
HINEBAUGH CREEK	NEAR SAN BENITO COURT	NEAR SAN MATEO COURT	HINE	20	700	9	6,300	O	AC	45	46	56	\$2,450	14,698	PATCH		
												Treatment Total		\$24,897			
Year 2018 Area Total									64,018		Year 2018 Total		\$24,897				

Year: 2019

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	Treatment		Cost	Rating	Treatment		
											PCI Before	PCI After					
COPELAND CREEK	BEND	REDWOOD DRIVE	COPE	02	2,927	9	26,343	O	AC	52	49	58	\$10,552	13,253	PATCH		
												Treatment Total		\$10,552			
CAMINO COLEGIO	MAGNOLIA AVENUE	BEND	CAMI	01	1,348	8	10,784	O	AC	22	20	100	\$203,638	2,810	RECONSTRUCT STRUCTURE (PCC)		
COLEMAN CREEK	SNYDER LANE	BEND	COLE	02	843	9	7,587	O	AC	0	0	100	\$143,268	2,810	RECONSTRUCT STRUCTURE (PCC)		
												Treatment Total		\$346,906			
Year 2019 Area Total									44,714		Year 2019 Total		\$357,458				

Year: 2020

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	Treatment		Cost	Rating	Treatment
											PCI Before	PCI After			
FIVE CREEK	PARK	HINEBAUGH CREEK	FIVE	01	2,177	10	21,770	O	AC/AC	39	48	57	\$8,982	13,958	PATCH

** - Treatment from Project Selection

Scenarios Criteria:

Scenarios - Sections Selected for Treatment

Interest: 5.00%

Inflation: 3.00%

Printed: 04/23/2018

Scenario: Scenario 3: Increase PCI by 5

										Treatment Total		\$8,982					
COLEMAN CREEK	HILLVIEW WAY	SNYDER LANE	COLE	01	1,161	9	10,449	O	AC	14	8	100	\$203,232	2,728	RECONSTRUCT STRUCTURE (PCC)		
HINEBAUGH CREEK	REDWOOD DRIVE	HAMPTON INN	HINE	10	779	9	7,011	O	AC	14	8	100	\$136,363	2,728	RECONSTRUCT STRUCTURE (PCC)		
										Treatment Total		\$339,595					
										Year 2020 Area Total		39,230		Year 2020 Total		\$348,577	

Year: 2021

										Treatment							
Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	PCI Before	PCI After	Cost	Rating	Treatment		
COMMERCE	5879 COMMERCE BOULEVARD	UTILITY COURT	COMM	01	3,051	7	21,357	O	AC	54	48	57	\$9,076	12,436	PATCH		
COPELAND CREEK	COUNTRY CLUB DRIVE	SNYDER LANE	COPE	08	2,694	9	24,246	O	AC	55	49	58	\$10,304	13,714	PATCH		
FIVE CREEK	BEND	END	FIVE	04	1,472	9	13,248	O	AC	42	48	57	\$5,630	12,968	PATCH		
HINEBAUGH CREEK	REDWOOD DRIVE	LABATH AVENUE	HINE	07	1,264	10	12,640	O	AC	55	49	58	\$5,372	12,499	PATCH		
										Treatment Total		\$30,382					
COPELAND CREEK	AC	END OF AC	COPE	03B	751	10	7,510	O	AC	31	23	100	\$150,451	2,648	RECONSTRUCT STRUCTURE (PCC)		
										Treatment Total		\$150,451					
										Year 2021 Area Total		79,001		Year 2021 Total		\$180,833	

Year: 2022

										Treatment						
Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	PCI Before	PCI After	Cost	Rating	Treatment	
COMMERCE	7300 COMMERCE BOULEVARD	N OR AVRAM AVENUE	COMM	02	2,270	10	22,700	O	AC	49	49	58	\$9,936	11,639	PATCH	
HINEBAUGH CREEK	NEAR SAN BENITO COURT	NEAR SAN MATEO COURT	HINE	20	700	9	6,300	O	AC	45	48	57	\$2,758	13,155	PATCH	
										Treatment Total		\$12,694				
COPELAND CREEK	COUNTRY CLUB DRIVE	RAILROAD	COPE	05	819	12	9,828	O	AC	23	11	100	\$202,795	2,571	RECONSTRUCT STRUCTURE (PCC)	

** - Treatment from Project Selection

Scenarios Criteria:

Scenarios - Sections Selected for Treatment

Interest: 5.00%

Inflation: 3.00%

Printed: 04/23/2018

Scenario: Scenario 3: Increase PCI by 5

Year: 2022

Street Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surf Type	Current PCI	Treatment		Cost	Rating	Treatment
											PCI Before	PCI After			
ROHNERT PARK EXPRESSWAY	SNYDER LANE	END OF AC	RPX	03A	613	9	5,517	O	AC	18	5	100	\$113,840	2,571	RECONSTRUCT STRUCTURE (PCC)
												Treatment Total	\$316,635		
							Year 2022 Area Total	44,345				Year 2022 Total	\$329,329		
							Total Section Area:	271,308				Grand Total	\$1,241,094		