Final Report

2021/2022 Pavement Management Program Update

City of Ferndale

November 2022

NCE

Richmond, CA

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Prepared for:

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Executive Summary

The Humboldt County Association of Governments (HCAOG) is a Joint Powers Agency composed of the seven incorporated cities (Arcata, Blue Lake, Eureka, Ferndale, Fortuna, Rio Dell, Trinidad), and the County of Humboldt. It is the designated Regional Transportation Planning Agency (RTPA) as well as the Service Authority for Freeway Emergencies (SAFE). As a part of this process, in 2021, HCAOG acquired the services of an engineering consultant, Nichols Consulting Engineers, Chtd. (NCE), to provide professional and technical services preparing pavement management program (PMP) updates for the county and the cities under HCOAG.

This report summarizes the results of the 2021/2022 update for the City of Ferndale (City) and its purpose is to help educate policy makers about the current condition of the pavement network and the impact of various funding scenarios on future network condition.

The City's pavement network consists of 9.3 centerline miles of streets, which represents a substantial investment of approximately $19 million. In 2022, NCE collected pavement condition data using the Metropolitan Transportation Commission's (MTC) modified ASTM survey procedures. The survey data were entered into the StreetSaver® database, which the City uses as a PMP decision-support tool.

Overall, the City's pavement network is currently in "Fair" bordering "Poor" condition with an average pavement condition index (PCI) of 49. Approximately one-third of the network is in "Good" condition while about half of the network is in "Poor" and "Failed" conditions.

The budget needs analysis indicated that the City needs to spend $10.6 million over the next ten years to bring the street network to a condition that can be maintained with on-going preventive maintenance in the most cost-effective way. Four alternative budget scenarios were performed to illustrate the impacts of different funding levels and inflation rates. The following table lists each scenario with its corresponding ten-year budget, the PCI and deferred maintenance at the end of the analysis period.

NCE recommends that the City pursue Scenario 3, which will increase the network PCI to 65 throughout the next decade. This scenario will increase the portion of the network in "Good" condition and decrease the deferred maintenance significantly. It will require $9.1 million over the next ten years.

Scenario	Description	10-Year Budget ($M)	2032 PCI	2032 Deferred Maintenance ($M)
1	Funding Level of $31K/Year (4% Inflation Rate)	0.31	26	15.6
2	Maintain PCI at 49 (4% Inflation Rate)	5.80	49	8.4
3	Improve PCI to 65 (4% Inflation Rate)	9.10	65	4.5
4	Funding Level of $31K/Year (8.5% Inflation Rate)	0.31	26	22.9

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1 Introduction and Background

In 2021, the Humboldt County Association of Governments (HCAOG) solicited interest among its member agencies in participating in a collaborative region-wide pavement management program (PMP) update. The last region wide PMP update was performed in 2017.

The engineering consultant acquired to provide professional and technical services for the PMP updates in the Humboldt region was Nichols Consulting Engineers, Chtd. (NCE). The eight participating member agencies included the Cities of Arcata, Blue Lake, Eureka, Ferndale, Fortuna, Rio Dell, Trinidad, and the County of Humboldt.

In general, PMPs are "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.[1]"

The goals of the 2021/2022 update were to:

- Update the existing pavement network inventory to include new streets,
- Perform pavement condition surveys,
- Update historical maintenance records (e.g. previously resurfaced pavements),
- Update the maintenance and rehabilitation decision tree and associated costs,
- Perform budgetary analyses and determine funding needs, and
- Prepare a final PMP report documenting the results of the update.

To update City's PMP, NCE performed walking condition survey using the Metropolitan Transportation Commission's (MTC) modified[2] ASTM D6433[3] survey procedures for the entire network. Walking surveys were performed by one or two-person crews to record all pavement distresses. The surveys did not include non-pavement issues such as traffic, safety and road hazards, geometric issues, shoulders, sidewalks, curb and gutters, drainage issues, or immediate maintenance needs. All survey data were entered into the City's StreetSaver® database, and pavement condition index (PCI) calculations were performed. NCE then met with

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

[2] PCI Distress Identification Manuals (AC 4th Edition, PCC 3rd Edition), Metropolitan Transportation Commission, San Francisco, CA March 2016.

[3] ASTM D6433-18 Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys, ASTM International, West Conshohocken, PA, 2018, www.astm.org.

agency staff and reviewed and updated the City's decision tree including maintenance and rehabilitation (M&R) strategies and treatment unit costs. A budget needs analysis was then performed, and four budget scenarios were analyzed for the street network.

This report answers the following questions for the City of Ferndale (City):

- What does the City's pavement network include?
- What is the current condition of the pavement network?
- What are the City's current M&R strategies?
- How much funding is required to perform all needed M&R treatments over the next ten years?
- What effect with the City's existing funding have on the network condition and overall deferred maintenance?
- What effect will other funding levels have on the network condition and deferred maintenance?
- What is the effect of inflation rate on the required funding to perform all needed M&R treatments over the next ten years

2 Network Summary

The City is responsible for maintaining approximately 9.3 centerline miles of streets (or 61 pavement sections). The network is composed entirely of asphalt concrete (AC) pavement. Table 1 summarizes the street network by functional classification.

Table 1. Network Summary Statistics

Functional Class	Number of Sections	Centerline Miles	Lane Miles	Network Area (%)
Rural Major Collector	7	2.3	4.6	24.1
Residential	54	7.0	14.0	75.9
Total	**61**	**9.3**	**18.6**	**100.0**

The street network replacement cost is estimated to be approximately $19 million. This can be viewed as the value of the pavement network and is the amount needed to fund a reconstruction of the entire paved network. This is approximately 42% higher than estimate provided in 2017 PMP update. The replacement cost is calculated by multiplying the total pavement area by the unit cost of reconstruction of the pavement structure. The unit cost of reconstruction has increased by an average of more than 40% for all functional classes since the last update due to changes in treatment strategies and increased material costs. As a result, the replacement cost has increased overall. It does not include related infrastructure assets such as sidewalks, signals, markings, signs, or storm drains.

3 Pavement Condition

Pavement condition is typically quantified using the pavement condition index (PCI), which ranges from 100 (best) to 0 (worst). Pavement condition is affected by the environment, traffic loads and volumes, construction materials, and age. Figure 1 shows examples of streets with varying PCIs.

The PCI scale is divided into four general condition categories. Pavements in "Good" condition have a PCI above 70, pavements in "Fair" condition have a PCI between 50 and 69, pavements in "Poor" condition have a PCI between 25 and 49, and finally pavements in "Failed" condition have a PCI below 25.

Figure 1. Examples of Streets with Different PCIs

A list of all sections in the network along with their attributes, including the PCI at the time of last inspection, is provided in Appendix A. For convenience, two versions are provided – one sorted alphabetically by street name and the other sorted by descending PCI.

3.1 CITY'S PAVEMENT CONDITION INDEX

The current average PCI for the City's network is 49. The PCI was 52 in 2017 PMP update. This value is an area-weighted calculation performed in StreetSaver® and is based on the condition survey performed in 2022.

Figure 2 illustrates the City's historical network PCI for the streets. There is a clear downward trend in pavement condition over the last decade due to restricted City's paving funding.

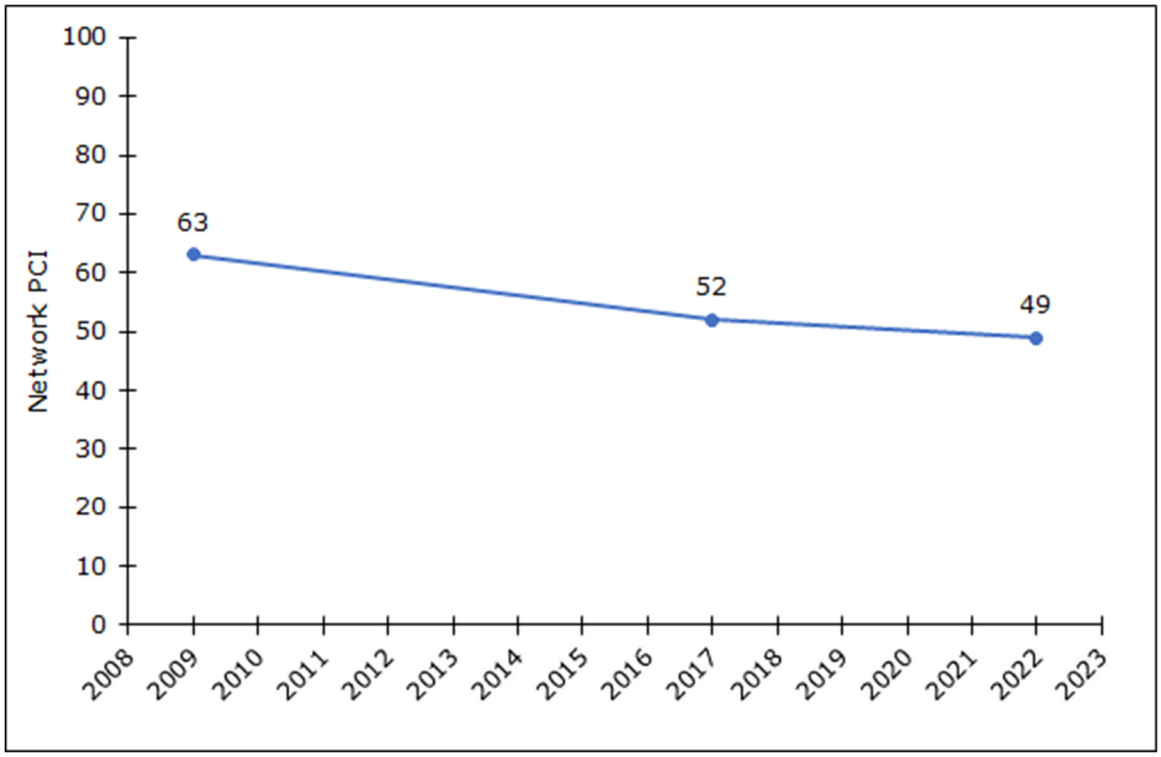


Figure 2. Historical Network PCI since 2009

3.2 CITY'S NETWORK CONDITION BREAKDOWN

Figure 3 breaks down the current street network PCI by functional classification. The average pavement condition for collectors is the highest with a PCI of 65, while the average PCIs for the residentials is 43. Table 2 summarizes the street network by condition category and functional classification. Less than one-third of the street network is in "Good" condition while more than half of street network is in "Poor" and "Failed" conditions.

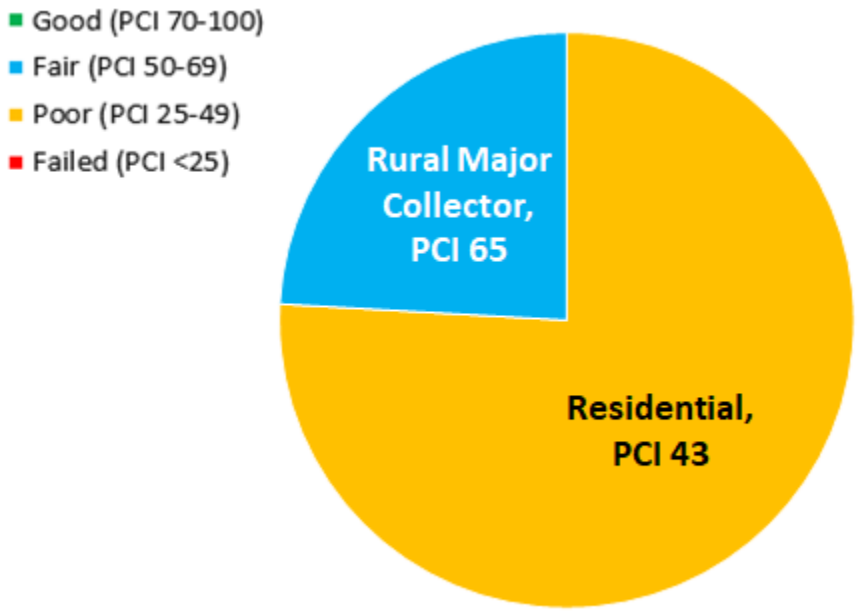


Figure 3. Network Condition Breakdown by Functional Classification

Table 2. Pavement Condition Breakdown by Functional Class

Condition Category	PCI Range	Rural Major Collectors (%)	Residentials (%)	Entire Network (%)
Good	70-100	18.5	12.5	31.0
Fair	50-69	0.0	14.9	14.9
Poor	25-49	1.7	36.3	38.0
Failed	<25	3.9	12.2	16.1
Total	-	**24.1**	**75.9**	**100.0**

3.3 PCI COMPARISON WITH NEIGHBORING AGENCIES

Figure 4 shows the City's average network PCI compared to other HCAOG agencies as well as the statewide average PCI from the 2020 California Statewide Local Streets and Roads Needs Assessment[4]. As illustrated, the City's average network

[4] "California Statewide Local Streets and Roads Needs Assessment 2020 Update". Nichols Consulting Engineers, Chtd., CA, 2021.

PCI is the lowest compared to all HCAOG agencies and is seventeen points below the 2020 statewide average.

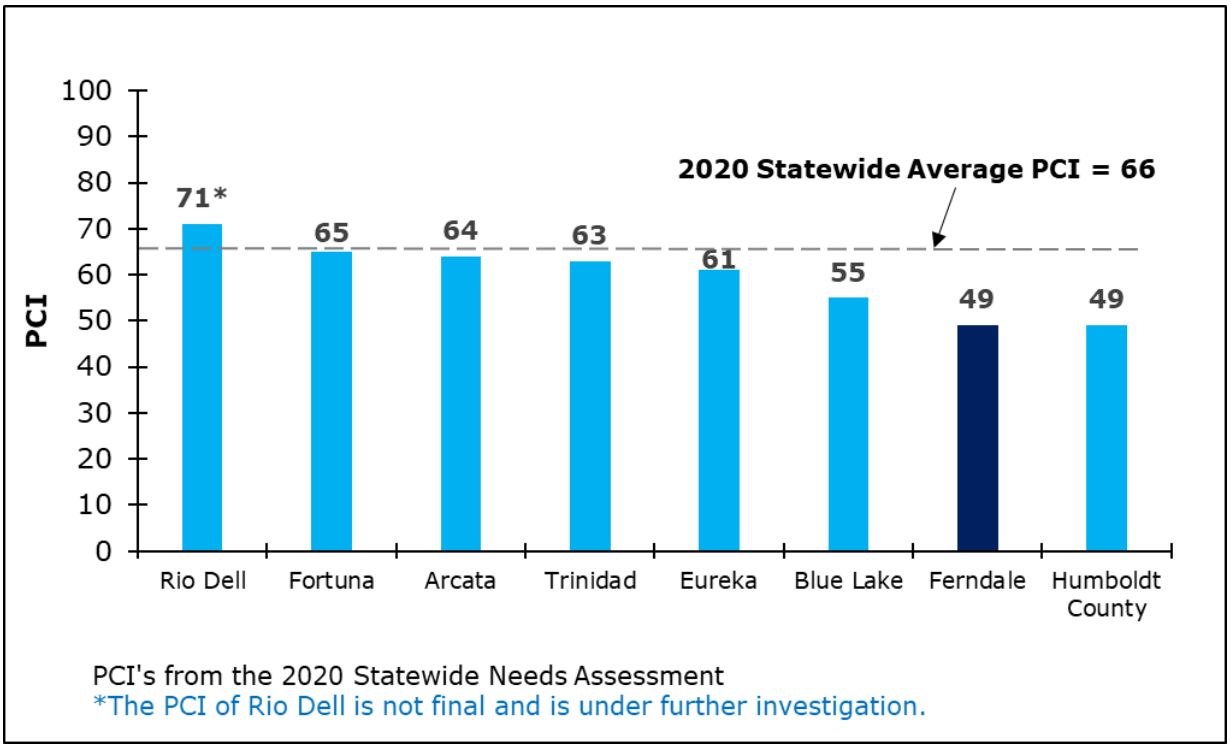


Figure 4. Comparison of Network PCI to Other HCAOG Agencies

4 Maintenance and Rehabilitation Strategies

The City's current M&R strategies include cost-effective preventive treatments. In general, slurry seals will be applied to pavements in "Good" condition; pavements in "Fair" condition will receive a slurry seal with dig-out or a thin hot mix asphalt (HMA) overlay; pavements in "Poor" and "Failed" conditions will receive thick mill and HMA overlay. The City's M&R strategies are formalized into a decision tree[5] (presented in Appendix B), which is instrumental in performing the budget needs analysis and budget scenarios. Note that pavement strategies were modified based on City's comments in this update.

Experience and research have shown that it costs much less to maintain pavement in good condition than to repair pavement that has already failed. Figure 5 shows the treatment unit cost for residentials. As shown, by allowing pavements to deteriorate, streets that once cost $5.25/square yard (SY) to seal may soon cost $77.75 to overlay. In other words, delaying repairs can significantly increase M&R costs. Note that a slurry seal can be placed on approximately 15 times as many lane miles as those requiring thick HMA overlay for the pavements with failed condition.

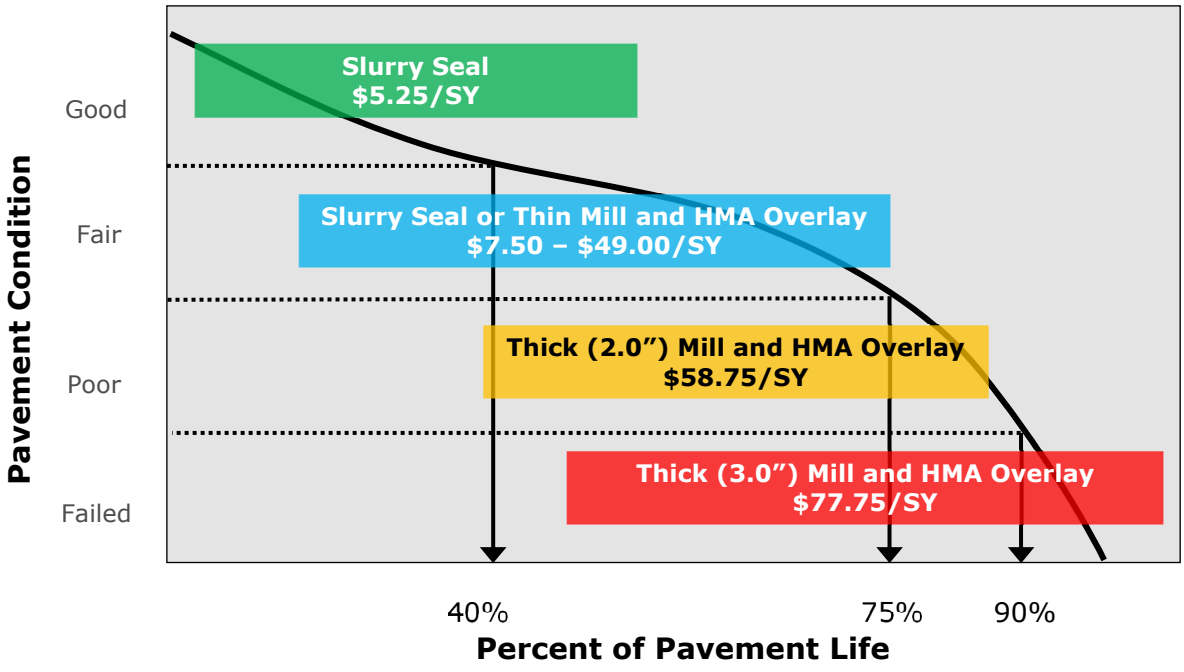


Figure 5. Costs of Maintaining Residentials Pavements Over Time

[5] Note: The StreetSaver® "Maintenance and Rehabilitation Decision Tree" divides the "Fair" condition category to separate pavements with primarily non-load-related distresses (e.g., longitudinal cracking) from those with load-related distresses (e.g., fatigue cracking).

5 Budget Analyses

Based on the principle that it costs less to maintain streets in good condition than it does to repair those that have failed, cost-effective PMPs employ strategies that eliminate the deferred maintenance[6] and then maintain the network with on-going preventive maintenance. Such strategies bring the network condition to an optimal PCI that can be maintained over time.

The first step in developing such a cost-effective strategy is to determine the total maintenance budget needs of the network. The next step is to conduct alternative budget scenario analyses. In consultation with the City, four funding scenarios were selected for the analysis and performed using StreetSaver® where the first three scenarios were performed at an inflation rate of four percent

- **Scenario 1: Funding Level of $31K/Year** – This scenario assumes the City will spend RMRA funding[7] of approximately $31,000 per year on pavement M&R for the next ten years with inflation rate of 4.0%.
- **Scenario 2: Maintain PCI** – This scenario aims to maintain the existing network PCI of 49 over the next ten years under 4% inflation rate.
- **Scenario 3: Improve PCI** – This aims to improve the network PCI to 65 over the next ten years under 4% inflation rate.
- **Scenario 4: Funding Level of $31K/Year with Inflation Rate of 8.5%** – This scenario assumes the City will spend approximately $31,000 per year on pavement M&R for the next ten years under higher inflation rate of 8.5%.

The budget needs analysis and budget scenarios are presented in the following subsections. The detailed results of the budget needs analysis are provided in Appendix C. The detailed results of the budget scenarios are provided in Appendix D. Additionally, maps illustrating the current pavement condition and the projected 2032 pavement condition for each scenario are provided in Appendix E.

[6] Deferred maintenance is M&R not performed due to insufficient funding.
[7] It was mentioned in 2017 PMP update that the City will start receiving RMRA (Road Maintenance and Rehabilitation Account) funding starting FY 2018/19.

5.1 BUDGET NEEDS ANALYSIS

The total budget needs for the network represents the cost associated with performing M&R treatments at the optimal time – optimal meaning the PCI is maximized and the cost is minimized – over the analysis period. This was done by performing a budget needs analysis in StreetSaver® with an inflation rate of four percent for an analysis period of ten years. An additional budget analysis was also performed per City's request to figure out the effect of eight and half percent inflation rate on the network maintenance cost and condition.

The results of the budget needs analysis are presented in Table 3. The total budget needs for the City for the next ten years is estimated to be $10.6 million when an inflation rate of four percent is used in the analysis. Of the total budget needs, approximately $1.1 million (10.8 percent) is devoted to preventive maintenance, while the rest is allocated for rehabilitation and reconstruction treatments. With an inflation rate of eight and half percent, the total budget that City needs for the next ten years is estimated to be $11.3 million which is around $0.8 million higher compared to the needs under four percent inflation rate. Of the total budget needs, approximately $1.6 million (13.9 percent) is devoted to preventive maintenance.

Table 3. Summary Results for Budget Needs Analysis

Year	2023	2024	2025	2026	2027	2028	2029	2030	2023	2032	Total
Budget Needs ($K); 4% inflation	8,109	104	511	0	0	0	0	832	185	817	10,558
Budget Needs ($K); 8.5% inflation	8,109	108	557	0	0	0	0	1,119	260	1,196	11,349
Treated PCI (for both inflation rates)	93	88	88	86	84	82	80	81	81	83	NA
Treated PCI (for both inflation rates)	48	45	43	40	37	35	32	30	27	25	NA

If the City follows this ideal, cost-effective strategy, the average network PCI will immediately increase as a large amount of deferred maintenance is addressed in the first year, and then stabilize in the low-80s. This type of budget, that addresses all the deferred maintenance in the first year, is known as front-loaded. Alternatively, if no maintenance is performed over the next ten years, the network PCI will drop to 25 by 2032. As shown, the inflation rate does not impact the PCI as the City has a small network and all the deferred maintenance will be addressed in the first year with small amount of preventative maintenance needed in the following years.

5.2 SCENARIO 1: FUNDING LEVEL OF $31K/YEAR (4% INFLATION RATE)

This scenario assumes the City will have $31,000 per year for pavement M&R for the next ten years. The source of this funding is RMRA based on 2017 PMP update. The City has two scheduled projects in 2023 which are "Washington and Berding Street Intersection Improvements" and "Brown and Berding Street Intersection Improvements". Since these scheduled projects are intersection improvement and are not a full street projects, they were not included in the analysis. Since the City has a very small annual budget, the StreetSaver® program was not able to spend the entire amount of $31,000 on each year because of individual high project cost and lack of eligible projects within small budget amount. Consequently, the budgets that was not used in each fiscal year was accumulated to the following years. As shown in Table 4 and Figure 6, the network PCI will decrease to 26 and the deferred maintenance will increase to $15.6 million by 2032. Additionally, percent of the network in "Failed" condition will increase to more than half while the portion of network in "Good" condition will be only 4.5 percent. A list of sections selected for treatment are provided in Appendix F.

Table 4. Summary Results for Scenario 1

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total
Budget ($K)	0	19	31	39	0	65	0	55	28	25	262
Deferred Maintenance ($M)	8.1	8.8	10.1	10.8	12.0	12.7	13.4	14.0	14.6	15.6	NA
Treated PCI	48	45	43	40	38	36	33	31	28	26	NA

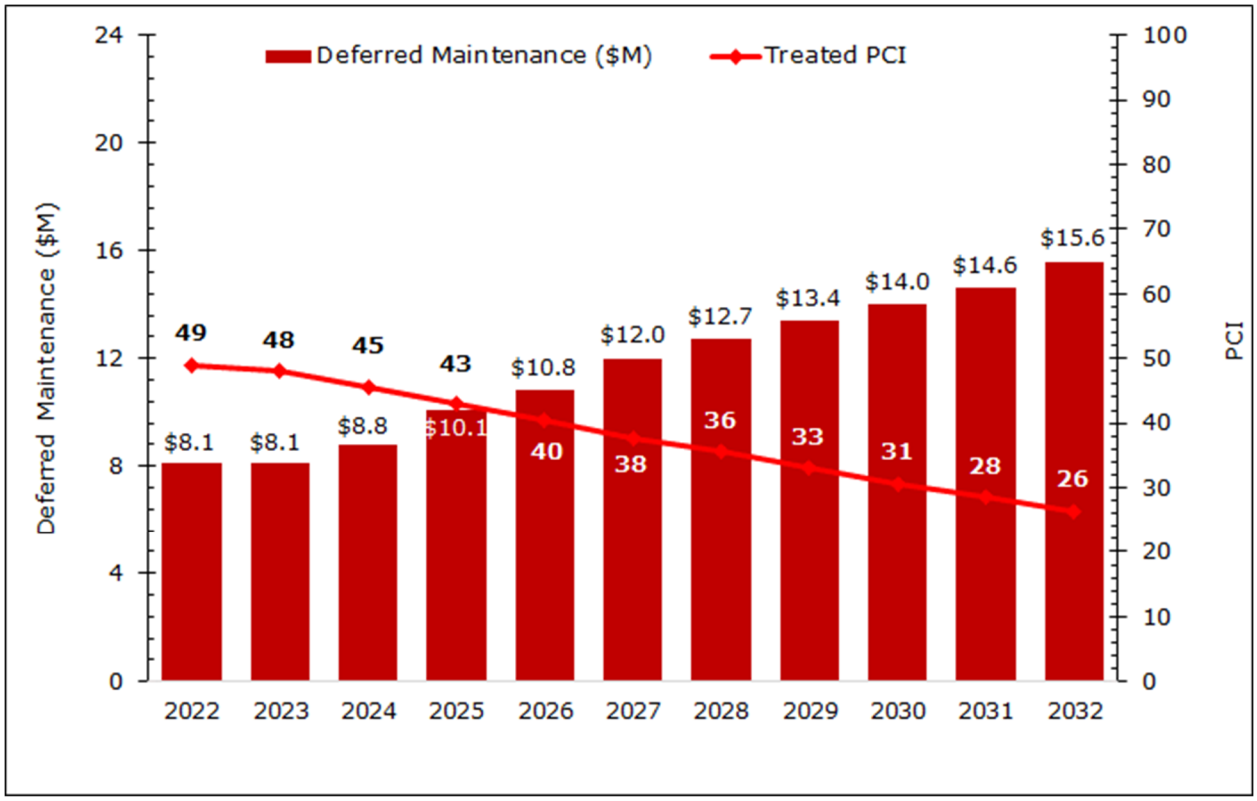


Figure 6. PCI vs Deferred Maintenance for Scenario 1

5.3 SCENARIO 2: MAINTAIN PCI AT 49 ($5.8M/10 YEARS, 4% INFLATION RATE)

This scenario aims to maintain the existing network PCI at 49 over the analysis period. As shown in Table 5 and Figure 7, the financial commitment required to accomplish this goal is $5.8 million over ten years. This will result in 44.7 percent of the network being in "Good" condition with 40.3 percent in "Failed" condition. The deferred maintenance will slightly increase to $8.4 million by 2032.

Table 5. Summary Results for Scenario 2

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total
Budget ($K)	130	687	682	686	665	642	648	688	575	398	5,801
Deferred Maintenance ($M)	8.0	8.0	8.6	8.6	8.7	8.7	8.4	8.6	8.4	8.4	NA
Treated PCI	49	49	49	49	49	49	49	49	49	49	NA

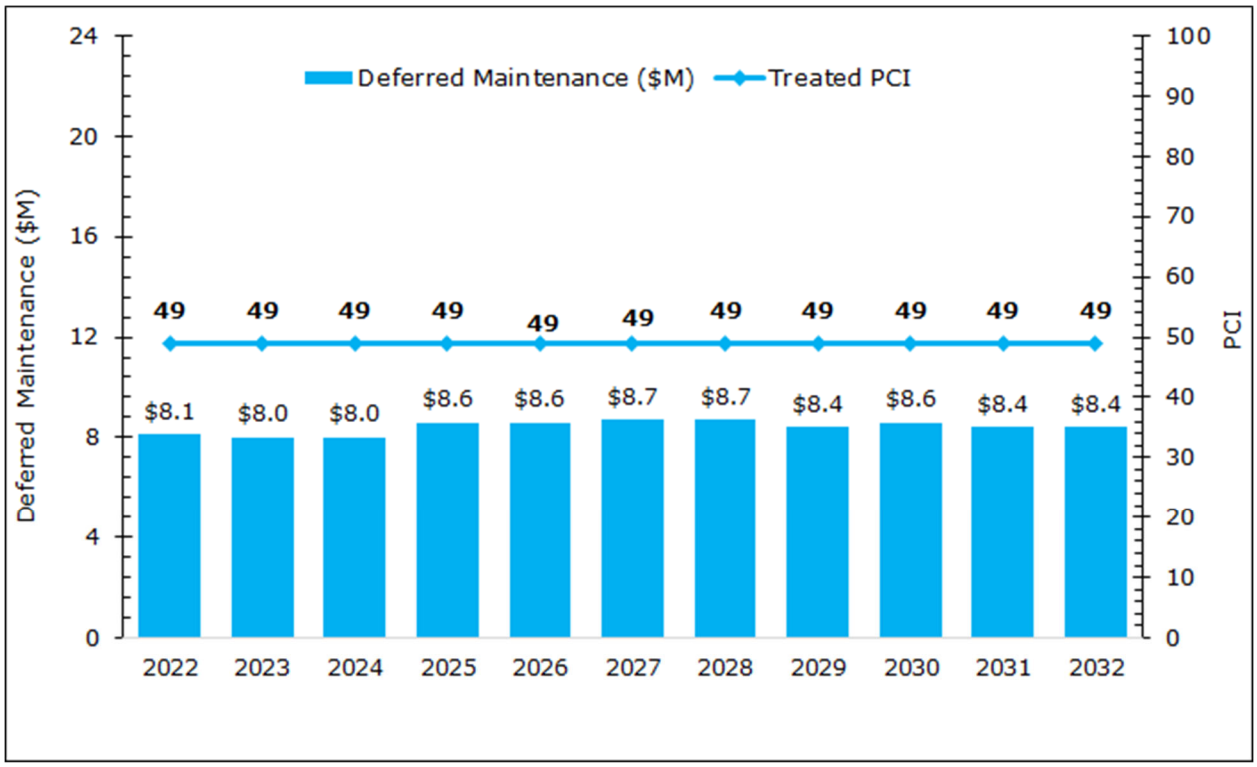


Figure 7. PCI vs Deferred Maintenance for Scenario 2

5.4 SCENARIO 3: IMPROVE PCI TO 65 ($9.1M/10 YEARS, 4% INFLATION RATE)

This scenario aims to improve the network PCI to 65 by 2032. As shown in Table 6 and Figure 8, the financial commitment required for this goal is $9.1 million over ten years. This will result in 63.2 percent of the network being "Good" condition with approximately 21.7 percent still in "Failed" condition. The deferred maintenance will decrease significantly to $4.5 million by 2032.

Table 6. Summary Results for Scenario 3

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total
Budget ($M)	446	982	977	913	997	924	903	983	995	931	9,051
Deferred Maintenance ($M)	7.7	7.3	7.7	7.4	7.0	6.6	6.0	5.8	5.2	4.5	NA
Treated PCI	50	52	53	54	55	57	59	60	62	65	NA

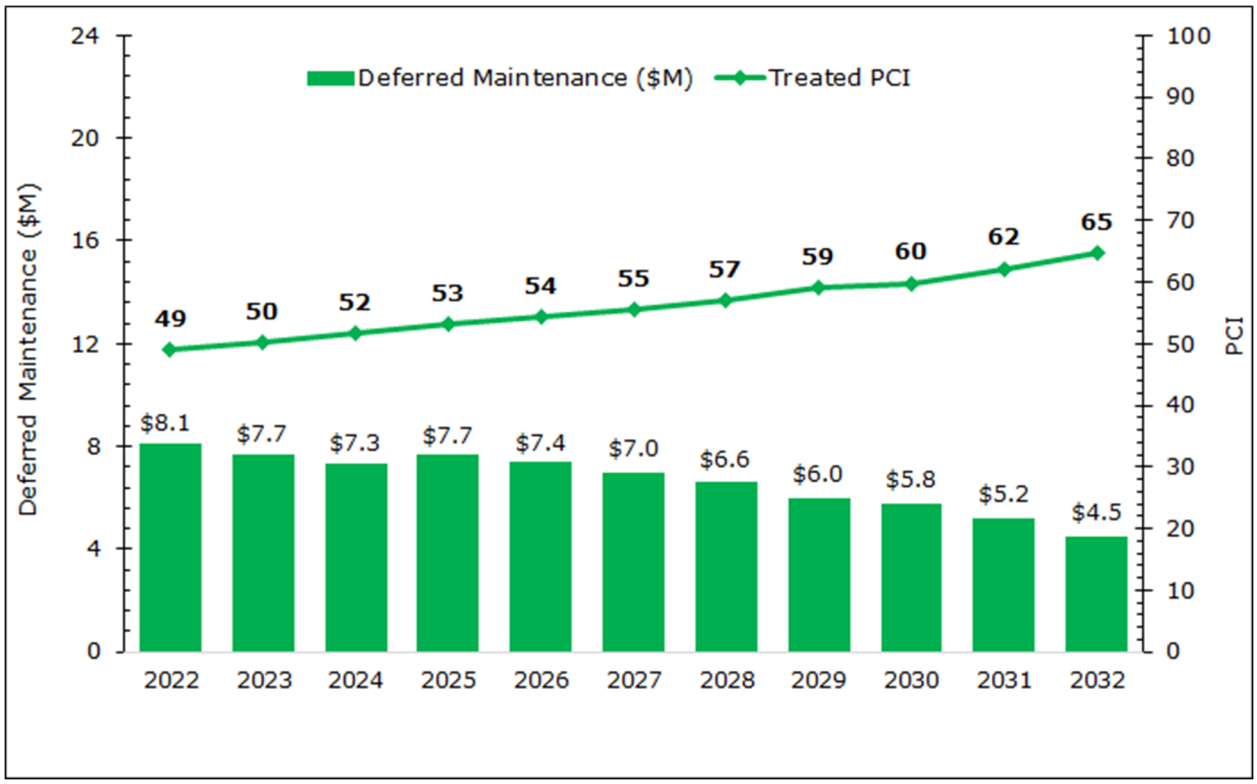


Figure 8. PCI vs Deferred Maintenance for Scenario 3

5.5 SCENARIO 4: FUNDING LEVEL OF $31K/YEAR (8.5% INFLATION RATE)

This scenario incorporates the same RMRA funding level of $31,000 per year but with a higher inflation rate of eight and half percent for the budget analysis for the next ten years. Similar to Scenario 1, the budget that was not used in each fiscal year was accumulated to the following years for the analysis. As shown in Table 7 and Figure 9, same as Scenario 1, the network PCI will decrease to 26. However, the deferred maintenance will increase to $22.9 million. Similar to Scenario 1, more than half of the network will be in "Failed" condition with only 4.8% in "Good" condition.

Table 7. Summary Results for Scenario 4

Year	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total
Budget ($M)	0	29	22	0	55	0	69	0	72	30	277
Deferred Maintenance ($M)	8.1	9.1	11.0	12.3	14.2	15.8	17.2	18.9	20.5	22.9	NA
Treated PCI	48	46	43	40	38	35	33	30	28	26	NA

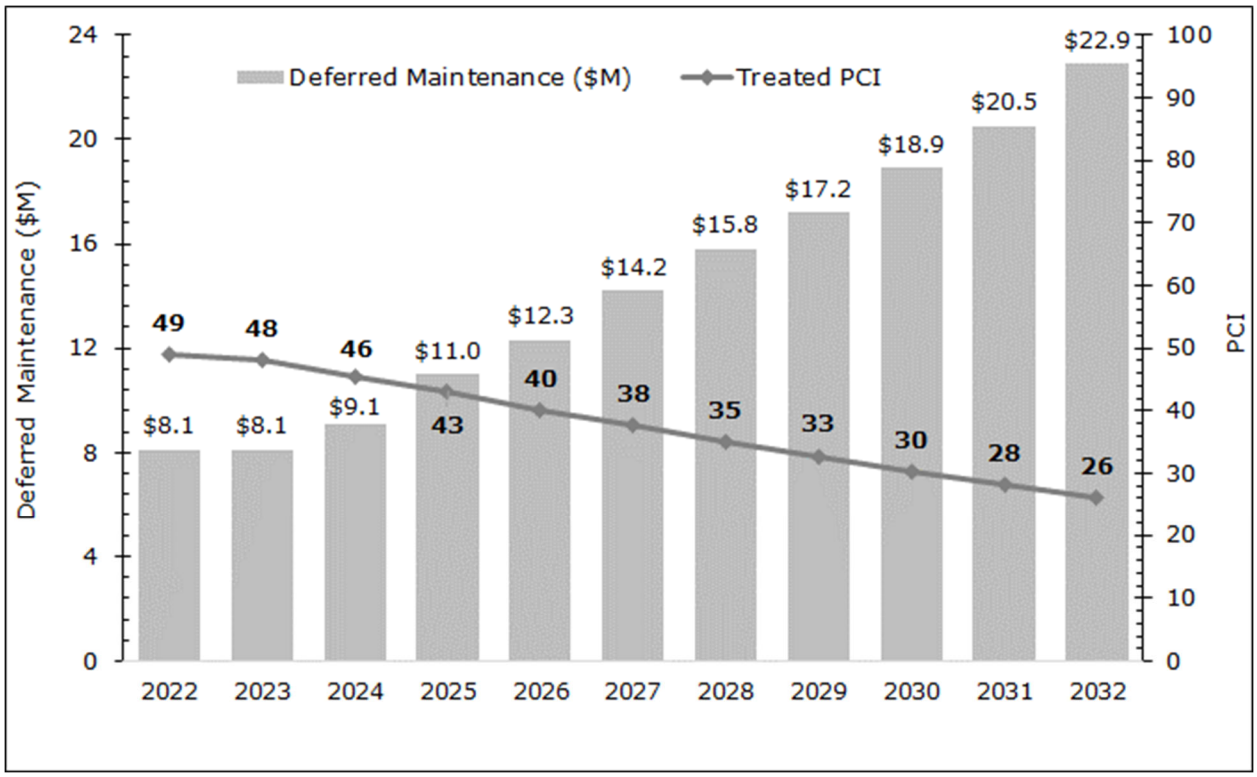


Figure 9. PCI vs Deferred Maintenance for Scenario 4

5.6 SCENARIO COMPARISONS

Figure 10 graphically compares the annual changes in PCI for each of the four scenarios. As previously noted, the average network PCI will decrease to 26 in Scenarios 1 and 4, be maintained at 49 in Scenario 2, and increase to 65 in Scenario 3.

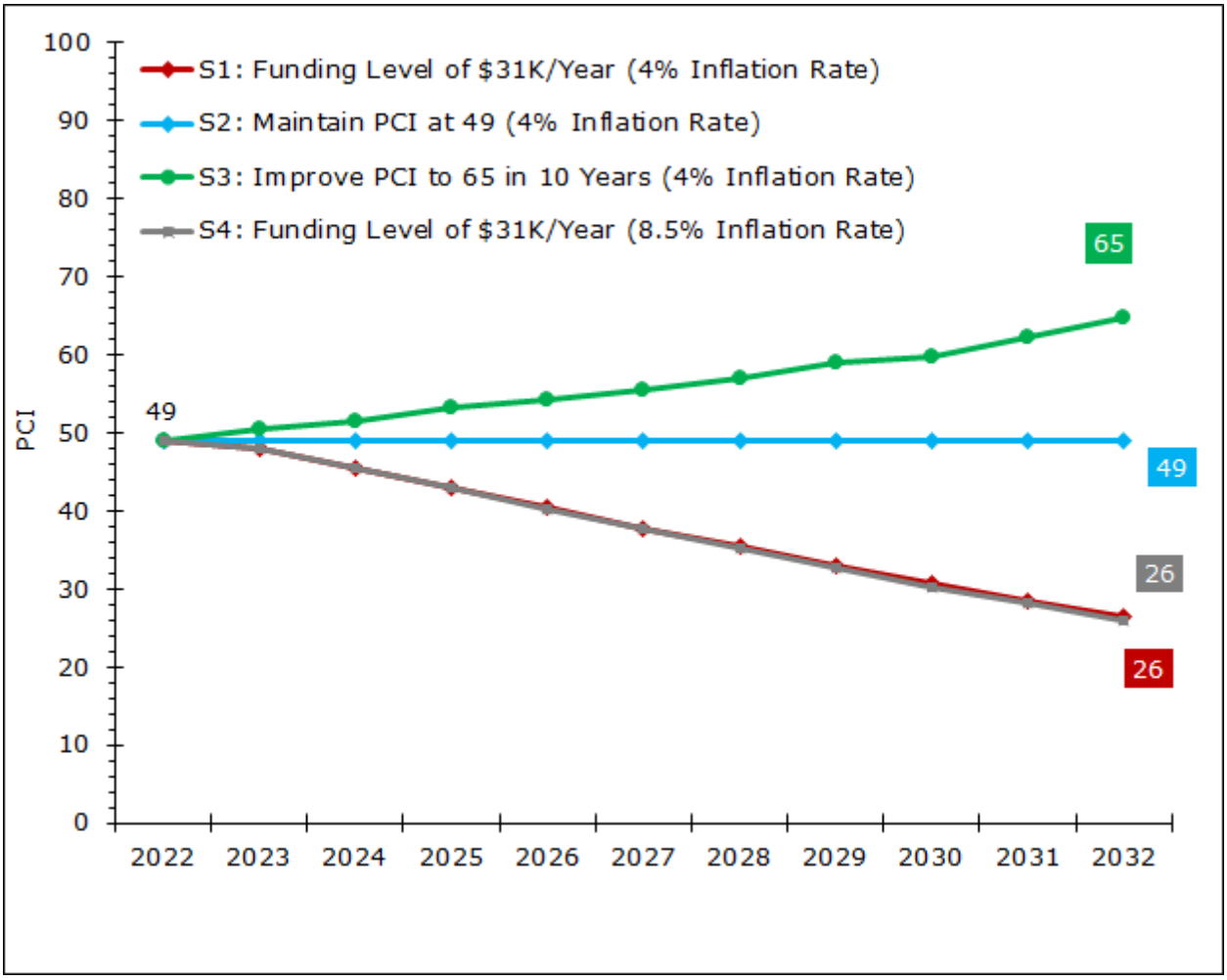


Figure 10. Comparison of Annual PCI by Scenario

Figure 11 illustrates the changes in deferred maintenance over time for each scenario. For Scenario 1, the deferred maintenance will be around double as $15.6 million by the end of the analysis period. In Scenario 2 ,the deferred maintenance will slightly increase to $8.4 million. In Scenario 3, the deferred maintenance will be nearly half of the current value. The deferred maintenance will increase to $22.9 million in Scenario 4 which is approximately 47 percent more than the Scenario 1 due to higher inflation rate that was used in Scenario 4.

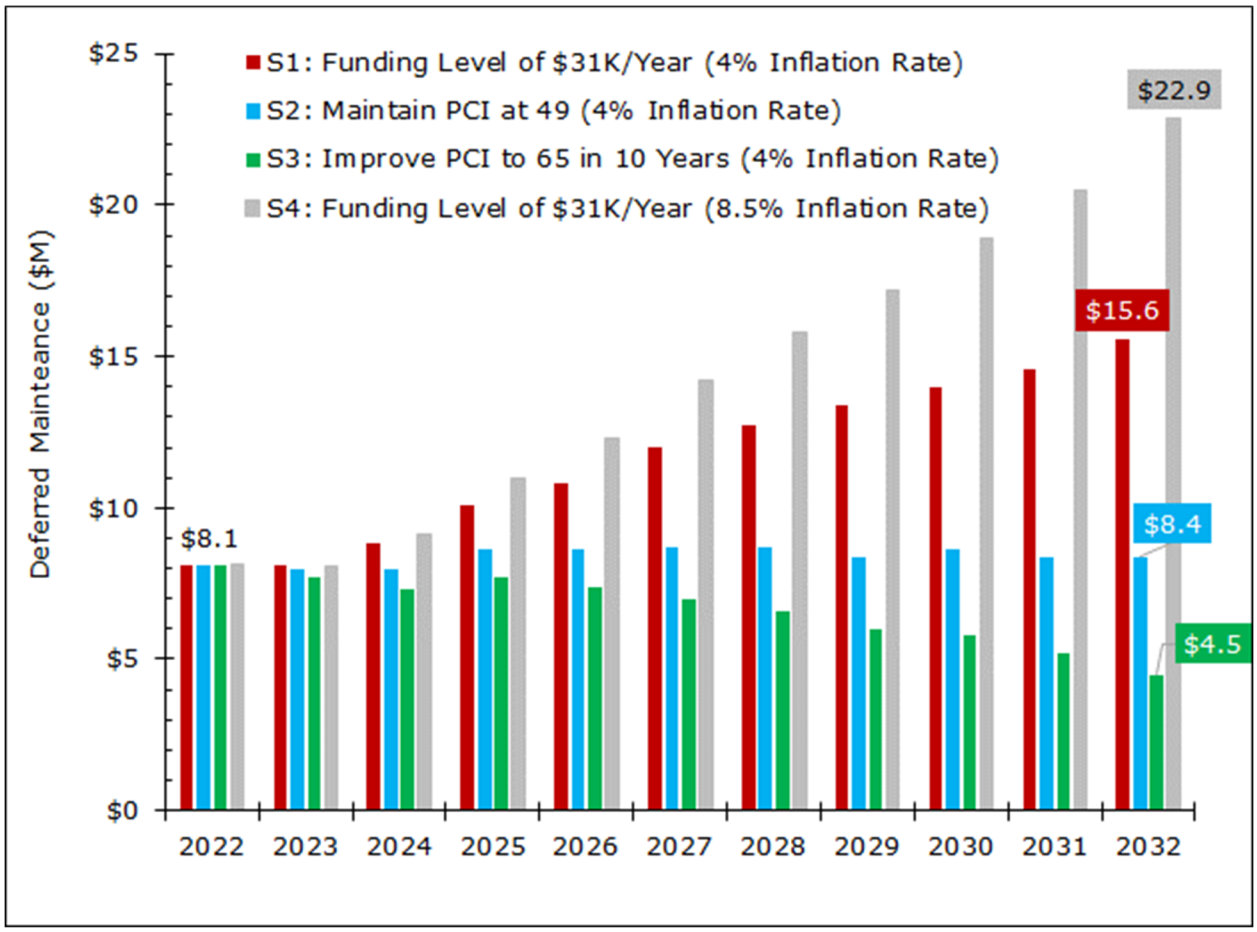


Figure 11. Comparison of Annual Deferred Maintenance by Scenario

Figure 12 illustrates the percent change in pavement condition for each scenario. As noted earlier, currently less than one-third of the network is in "Good" condition with over half of the network in "Poor" and "Failed" conditions. For all the four scenarios, the portion of the network in "Failed" condition will increase while the "poor" portion of the network will decrease. For Scenario 1, the portion of the network in "Good" condition will decrease significantly to below five percent, while the portion in "Failed" condition will increase to more than half. For both Scenarios 2 and 3, the portion of the network in "Good" condition will increase significantly. There is a negligible change in the portion of the pavement conditions between the Scenarios 1 and 4.

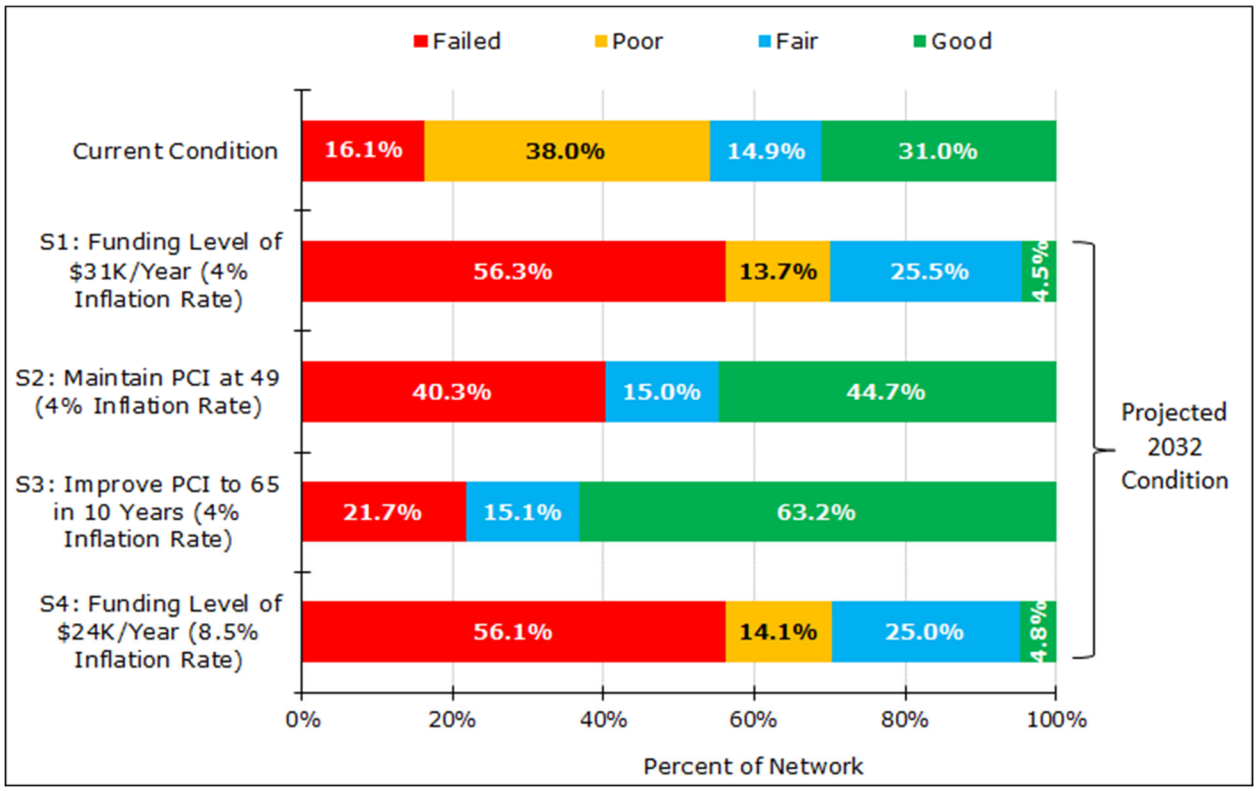


Figure 12. Comparison of Pavement Condition Breakdown by Scenario

6 Conclusion and Recommendations

In summary, the City of Ferndale has a substantial investment of $19 million in the pavement network. Overall, the City's streets are in "Fair" bordering "Poor" condition with a 2022 average network PCI of 49. Approximately 31.0 percent of the street network is in "Good" condition and 54.1 percent is in "Poor" and "Failed" conditions.

The analyses indicate that at an inflation rate of 4.0 percent, the City needs to spend approximately $10.6 million on maintenance and rehabilitation over the next ten years to optimally repair all pavement sections, thus bringing the network into a condition that can be maintained with on-going preventive maintenance. This needs amount will be $0.7 million higher if an inflation rate of 8.5 percent is used. In the long run, this strategy will save the City money by preventing future pavement deterioration to levels requiring rehabilitation or reconstruction.

Based on the data collected and the scenarios analyzed and presented in this report, NCE offers the following recommendations.

1. **Funding** - The primary goal of PMPs should be to offer users a safe and functional pavement network without unduly increasing the maintenance burden in the future. With that in mind, the recommended scenario for the City is Scenario 3, which requires approximately $9.1 million over the next ten years. This budget allocation will increase the overall network PCI to 65, double the portion of the network in "Good" condition, and decrease the deferred maintenance.

   To address the gap between the City's existing funding and the recommended scenario, NCE recommends the City pursue additional funding sources. Potential sources include:

<u>Federal Funding Sources</u>

- Bipartisan Infrastructure Investment and Jobs Act (IIJA)
- Regional Surface Transportation Program (RSTP)
- Surface Transportation Program (STP)
- Congestion Mitigation and Air Quality Improvement Program (CMAQ)
- Community Development Block Grants (CDBG)
- Highway Safety Improvement Program (HSIP)
- Federal Emergency Management Agency (FEMA)

<u>State Funding Sources</u>

- Active Transportation Program (ATP), which now includes the Bicycle Transportation Account (BTA) and Safe Routes to Schools (SR2S)
- State Transportation Improvement Program (STIP)
- AB 2766 (vehicle surcharge)

- Vehicle License Fees (VLF)
- CalRecycle grants
- State Water Resource Control Board
- Transportation Development Act (TDA)
- Traffic Safety Fund
- Transportation Uniform Mitigation Fee (TUMF)

Local/Regional Funding Sources

- Development impact fees
- General funds
- Various assessment districts (lighting, maintenance, flood control, community facilities)
- Traffic impact fees
- Utilities (e.g., stormwater, water, wastewater enterprise funds)
- Parcel/property taxes
- Vehicle registration fees
- Vehicle code fines

2. **Pavement Management Strategies –** Since a significant portion of the City's streets are currently in "Good" condition (31.0 percent), it is important to maintain that condition to the extent possible. Preservation occurs when streets with PCIs higher than 70 receive treatments such as surface seals (slurry, chip, microsurfacing, etc.,). Seals are relatively inexpensive treatments that prevent moisture ingress and thus preserve the integrity of the underlying base material. NCE recommends that the City balance preventive maintenance with rehabilitation and reconstruction projects to preserve pavements in "Good" condition, improve pavements in "Poor" condition, and avoid increasing the deferred maintenance.
3. **Reinspection Strategies –** In order to make appropriate management decisions based on current data, NCE recommends that the City perform condition inspections on collectors every 2 years and on residentials at least every 4 to 5 years. Additionally, since StreetSaver® and other prediction models do not yet take into account the effect of specialized materials such as asphalt-binders with rubber or polymers, the actual performance of city pavements may not be fully captured in the analysis models. For this additional reason, NCE recommends regular pavement condition surveys to ensure model accuracy and relevance.
4. **M&R Decision Tree –** NCE recommends that the City annually review and update the M&R treatment strategies and associated unit costs to reflect current construction techniques and changing costs. This will ensure that the results for the budget analyses are reliable and as accurate as possible.

Appendix A

Section Description Inventory

Section Description Inventory Report

This report lists a variety of section description information for each of the City's pavement sections. It lists the street and section identifiers, limits, number of lanes, functional class, surface type, length, width, area, Inspected PCI, and PCI date.

All of the City's pavement sections are included in the report. Two versions of the report are provided. The first is sorted alphabetically by Street Name and Section ID and the second report is sorted by descending PCI. 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	Street Name - The name of the street as indicated by street signs in the field.
Begin Location	Beginning limit of the section.
End Location	Ending limit of the section.
# of Lanes	Number of travel lanes.
Functional Class (FC)	Functional Classification: R (Residentials), RMaC (Rural Major Collector
Length (ft)	Length of the section in feet.
Width (ft)	Average width of the section in feet.
Area (sf)	Area of section in square feet.
Surface Type (ST)	Surface Type: AC = Asphalt Concrete
PCI Date	The last inspection date or rehabilitation date.
PCI	Average PCI for the section. The value is based on the last inspection.

Section Description Inventory – Sorted by Street Name

City of Ferndale - 2022 PMP Update
Section Description Inventory
Sorted by Street Name

Street ID	Section ID	Street Name	Begin Location	End Location	No. of Lanes	FC	ST	Length (ft)	Width (ft)	Area (sf)	PCI Date	PCI
F-3RDST	010	3RD STREET	A ST	SHAW AVE	2	R	AC	300	44	13,200	6/7/2022	40
F-4THST	010	4TH STREET	PIXLEY	A ST	2	R	AC	558	44	24,552	6/8/2022	45
F-5THST	010	5TH STREET	OCEAN AVE	SHAW AVE	2	R	AC	645	37	23,865	6/8/2022	19
F-5THST	020	5TH STREET	SHAW AVE	ARLINGTON AVE	2	R	AC	2,297	32	73,504	6/8/2022	74
F-5THST	030	5TH STREET	ARLINGTON AVE	VAN NESS AVE	2	R	AC	1,350	25	33,750	6/8/2022	20
F-ARLAVE	010	ARLINGTON AVE	W CITY LIMIT	5TH ST	2	R	AC	924	14	12,936	6/8/2022	18
F-ARLAVE	020	ARLINGTON AVE	5TH ST	MAIN ST	2	R	AC	1,745	35	61,075	6/8/2022	68
F-ARLAVE	030	ARLINGTON AVE	MAIN ST	E END	2	R	AC	499	35	17,465	6/7/2022	47
F-AST	010	A STREET	5TH ST	3RD ST	2	R	AC	613	36	22,068	6/8/2022	55
F-BERDST	010	BERDING STREET	FRANCIS ST	CLEVELAND ST	2	R	AC	553	27	14,931	6/7/2022	38
F-BERDST	020	BERDING STREET	CLEVELAND ST	EUGENE ST	2	R	AC	232	47	10,904	6/7/2022	54
F-BERDST	030	BERDING STREET	EUGENE ST	HERBERT ST	2	R	AC	2,233	41	91,553	6/7/2022	31
F-BLUFST	010	BLUFF STREET	CRAIG ST	E CITY LIMIT	2	RMaC	AC	2,404	20	48,080	6/7/2022	70
F-BROWST	010	BROWN STREET	MAIN ST	BERDING ST	2	R	AC	374	30	11,220	6/8/2022	61
F-BROWST	020	BROWN STREET	BERDING ST	CRAIG ST	2	R	AC	311	35	10,885	6/8/2022	40
F-CLEVST	010	CLEVELAND STREET	BERDING ST	HARRISON ST	2	R	AC	352	37	13,024	6/7/2022	41
F-CRAIST	010	CRAIG STREET	OCEAN AVE	WASHINGTON ST	2	R	AC	680	47	31,960	6/7/2022	28
F-CREACT	010	CREAM COURT	W CDS	JACOBSEN WAY	2	R	AC	609	35	21,315	6/7/2022	56
F-DEEAVE	010	DEWEY EXTENSION AVENUE	W CDS	JACOBSEN WAY	2	R	AC	508	36	18,288	6/7/2022	72
F-DEWAVE	010	DEWEY AVENUE	HERBERT ST	E CDS	2	R	AC	363	21	7,623	6/8/2022	49
F-EMERLN	010	EMERSON LANE	S CDS	WASHINGTON ST	2	R	AC	447	19	8,493	6/8/2022	57
F-EUGEST	010	EUGENE STREET	FRANCIS ST	BERDING ST	2	R	AC	383	43	16,469	6/7/2022	58
F-EUGEST	020	EUGENE STREET	BERDING ST	HARRISON ST	2	R	AC	348	31	10,788	6/7/2022	64
F-EUGEST	030	EUGENE STREET	HARRISON ST	END OF PAVEMENT	2	R	AC	362	12	4,344	6/7/2022	23
F-FERAVE	010	FERN AVENUE	N END	MAIN ST	2	R	AC	842	38	31,996	6/7/2022	48
F-FERAVE	020	FERN AVENUE	MAIN ST	BERDING ST	2	R	AC	365	33	12,045	6/7/2022	57
F-FRANST	010	FRANCIS STREET	S END	SW BRIDGE	2	R	AC	221	24	5,304	6/8/2022	54
F-FRANST	020	FRANCIS STREET	NE BRIDGE	OCEAN AVE	2	R	AC	774	48	37,152	6/8/2022	40
F-GRAAVE	010	GRANT AVENUE	SCHLEY AVE	LINCOLN AVE	2	R	AC	809	32	25,888	6/8/2022	33
F-HARAVE	010	HARRISON AVENUE	CLEVELAND ST	CLEVELAND ST	2	R	AC	234	35	8,190	6/7/2022	61
F-HERBST	010	HERBERT STREET	ROSE AVE	DEWEY AVE	2	R	AC	640	23	14,720	6/7/2022	39
F-HERBST	020	HERBERT STREET	DEWEY AVE	FERN AVE	2	R	AC	197	37	7,289	6/7/2022	69
F-HERBST	030	HERBERT STREET	FERN AVE	MAIN ST	2	R	AC	660	37	24,420	6/7/2022	82
F-HOWAST	010	HOWARD STREET	MAIN ST	E END	2	R	AC	644	46	29,624	6/8/2022	49
F-JACWAY	010	JACOBSEN WAY	S CDS	N CDS	2	R	AC	710	32	22,720	6/8/2022	73
F-LEWAVE	010	LEWIS AVENUE	MAIN ST	BERDING ST	2	R	AC	343	33	11,319	6/7/2022	37
F-LINAVE	010	LINCOLN AVENUE	CROWLEY AVE	GRANT AVE	2	R	AC	403	16	6,448	6/7/2022	61
F-LINCST	010	LINCOLN STREET	MILTON AVE	TENNYSON AVE	2	R	AC	620	42	26,040	6/7/2022	27
F-MADIST	010	MADISON STREET	ARLINGTON AVE	TENNYSON AVE	2	R	AC	399	45	17,955	6/7/2022	35

FC: Functional Classification (R: Residentials, RMaC: Rural Major Collector)
ST: Surface Type (AC: Asphalt Concrete)

City of Ferndale - 2022 PMP Update
Section Description Inventory
Sorted by Street Name

Street ID	Section ID	Street Name	Begin Location	End Location	No. of Lanes	FC	ST	Length (ft)	Width (ft)	Area (sf)	PCI Date	PCI
F-MAINST	010	MAIN STREET	OCEAN AVE	LEWIS AVE	2	RMaC	AC	1,453	44	63,932	6/8/2022	79
F-MAINST	020	MAIN STREET	LEWIS AVE	MARKET ST	2	RMaC	AC	4,349	38	165,262	6/8/2022	79
F-MCKAVE	010	MCKINLEY AVENUE	GRANT ST	DEWEY AVE	2	R	AC	1,475	36	53,100	6/7/2022	27
F-MILAVE	010	MILTON AVENUE	MAIN ST	LINCOLN ST	2	R	AC	234	47	10,998	6/7/2022	30
F-MILAVE	020	MILTON AVENUE	LINCOLN ST	E END	2	R	AC	176	35	6,160	6/7/2022	86
F-OCEAVE	010	OCEAN AVENUE	SHAW AVE	5TH ST	2	RMaC	AC	1,135	30	34,050	6/8/2022	8
F-OCEAVE	020	OCEAN AVENUE	5TH ST	MAIN ST	2	RMaC	AC	465	59	27,435	6/8/2022	43
F-OCEAVE	030	OCEAN AVENUE	MAIN ST	CRAIG ST	2	RMaC	AC	696	48	33,408	6/8/2022	97
F-PIXLEY	010	PIXLEY	4TH ST	5TH ST	2	R	AC	299	34	10,166	6/8/2022	30
F-ROSAVE	010	ROSE AVENUE	HERBERT ST	W CITY LIMIT	2	R	AC	1,970	36	70,920	6/8/2022	16
F-SCHAVE	010	SCHLEY AVENUE	ROSE AVE	GRANT AVE	2	R	AC	960	38	36,480	6/7/2022	50
F-SHAAVE	010	SHAW AVENUE	OCEAN AVE	MAIN ST	2	R	AC	2,011	32	64,352	6/7/2022	73
F-SHAAVE	020	SHAW AVENUE	MAIN ST	BERDING ST	2	R	AC	373	30	11,190	6/7/2022	30
F-SHAMCT	010	SHAMSI COURT	3RD ST	N CDS	2	R	AC	309	36	11,124	6/7/2022	67
F-SHAWLN	010	SHAW LANE	W CDS	SHAW AVE	2	R	AC	247	19	4,693	6/7/2022	47
F-TENAVE	010	TENNYSON AVENUE	MAIN ST	LINCOLN ST	2	R	AC	488	47	22,936	6/7/2022	32
F-VANAVE	010	VANSTON AVENUE	MAIN ST	W END	2	R	AC	237	41	9,717	6/7/2022	45
F-VNEAVE	010	VAN NESS AVENUE	CALIFORNIA ST	MAIN ST	2	R	AC	1,923	35	67,305	6/7/2022	36
F-WASHST	010	WASHINGTON STREET	MAIN ST	BERDING ST	2	R	AC	373	31	11,563	6/7/2022	23
F-WASHST	020	WASHINGTON STREET	BERDING ST	SCHLEY AVE	2	R	AC	1,202	31	37,262	6/7/2022	16
F-WATAVE	010	WATSON AVENUE	ROSE AVE	S CDS	2	R	AC	296	34	10,064	6/7/2022	18
F-WILDRD	010	WILDCAT ROAD	S CITY LIMIT	OCEAN AVE	2	RMaC	AC	1,530	21	32,130	6/8/2022	23

FC: Functional Classification (R: Residentials, RMaC: Rural Major Collector)
ST: Surface Type (AC: Asphalt Concrete)

Section Description Inventory – Sorted by Descending PCI

City of Ferndale - 2022 PMP Update
Section Description Inventory
Sorted by Descending PCI

Street ID	Section ID	Street Name	Begin Location	End Location	No. of Lanes	FC	ST	Length (ft)	Width (ft)	Area (sf)	PCI Date	PCI
F-OCEAVE	030	OCEAN AVENUE	MAIN ST	CRAIG ST	2	RMaC	AC	696	48	33,408	6/8/2022	97
F-MILAVE	020	MILTON AVENUE	LINCOLN ST	E END	2	R	AC	176	35	6,160	6/7/2022	86
F-HERBST	030	HERBERT STREET	FERN AVE	MAIN ST	2	R	AC	660	37	24,420	6/7/2022	82
F-MAINST	010	MAIN STREET	OCEAN AVE	LEWIS AVE	2	RMaC	AC	1,453	44	63,932	6/8/2022	79
F-MAINST	020	MAIN STREET	LEWIS AVE	MARKET ST	2	RMaC	AC	4,349	38	165,262	6/8/2022	79
F-5THST	020	5TH STREET	SHAW AVE	ARLINGTON AVE	2	R	AC	2,297	32	73,504	6/8/2022	74
F-JACWAY	010	JACOBSEN WAY	S CDS	N CDS	2	R	AC	710	32	22,720	6/8/2022	73
F-SHAAVE	010	SHAW AVENUE	OCEAN AVE	MAIN ST	2	R	AC	2,011	32	64,352	6/7/2022	73
F-DEEAVE	010	DEWEY EXTENSION AVENUE	W CDS	JACOBSEN WAY	2	R	AC	508	36	18,288	6/7/2022	72
F-BLUFST	010	BLUFF STREET	CRAIG ST	E CITY LIMIT	2	RMaC	AC	2,404	20	48,080	6/7/2022	70
F-HERBST	020	HERBERT STREET	DEWEY AVE	FERN AVE	2	R	AC	197	37	7,289	6/7/2022	69
F-ARLAVE	020	ARLINGTON AVE	5TH ST	MAIN ST	2	R	AC	1,745	35	61,075	6/8/2022	68
F-SHAMCT	010	SHAMSI COURT	3RD ST	N CDS	2	R	AC	309	36	11,124	6/7/2022	67
F-EUGEST	020	EUGENE STREET	BERDING ST	HARRISON ST	2	R	AC	348	31	10,788	6/7/2022	64
F-BROWST	010	BROWN STREET	MAIN ST	BERDING ST	2	R	AC	374	30	11,220	6/8/2022	61
F-HARAVE	010	HARRISON AVENUE	CLEVELAND ST	CLEVELAND ST	2	R	AC	234	35	8,190	6/7/2022	61
F-LINAVE	010	LINCOLN AVENUE	CROWLEY AVE	GRANT AVE	2	R	AC	403	16	6,448	6/7/2022	61
F-EUGEST	010	EUGENE STREET	FRANCIS ST	BERDING ST	2	R	AC	383	43	16,469	6/7/2022	58
F-EMERLN	010	EMERSON LANE	S CDS	WASHINGTON ST	2	R	AC	447	19	8,493	6/8/2022	57
F-FERAVE	020	FERN AVENUE	MAIN ST	BERDING ST	2	R	AC	365	33	12,045	6/7/2022	57
F-CREACT	010	CREAM COURT	W CDS	JACOBSEN WAY	2	R	AC	609	35	21,315	6/7/2022	56
F-AST	010	A STREET	5TH ST	3RD ST	2	R	AC	613	36	22,068	6/8/2022	55
F-BERDST	020	BERDING STREET	CLEVELAND ST	EUGENE ST	2	R	AC	232	47	10,904	6/7/2022	54
F-FRANST	010	FRANCIS STREET	S END	SW BRIDGE	2	R	AC	221	24	5,304	6/8/2022	54
F-SCHAVE	010	SCHLEY AVENUE	ROSE AVE	GRANT AVE	2	R	AC	960	38	36,480	6/7/2022	50
F-DEWAVE	010	DEWEY AVENUE	HERBERT ST	E CDS	2	R	AC	363	21	7,623	6/8/2022	49
F-HOWAST	010	HOWARD STREET	MAIN ST	E END	2	R	AC	644	46	29,624	6/8/2022	49
F-FERAVE	010	FERN AVENUE	N END	MAIN ST	2	R	AC	842	38	31,996	6/7/2022	48
F-ARLAVE	030	ARLINGTON AVE	MAIN ST	E END	2	R	AC	499	35	17,465	6/7/2022	47
F-SHAWLN	010	SHAW LANE	W CDS	SHAW AVE	2	R	AC	247	19	4,693	6/7/2022	47
F-4THST	010	4TH STREET	PIXLEY	A ST	2	R	AC	558	44	24,552	6/8/2022	45
F-VANAVE	010	VANSTON AVENUE	MAIN ST	W END	2	R	AC	237	41	9,717	6/7/2022	45
F-OCEAVE	020	OCEAN AVENUE	5TH ST	MAIN ST	2	RMaC	AC	465	59	27,435	6/8/2022	43
F-CLEVST	010	CLEVELAND STREET	BERDING ST	HARRISON ST	2	R	AC	352	37	13,024	6/7/2022	41
F-3RDST	010	3RD STREET	A ST	SHAW AVE	2	R	AC	300	44	13,200	6/7/2022	40
F-BROWST	020	BROWN STREET	BERDING ST	CRAIG ST	2	R	AC	311	35	10,885	6/8/2022	40
F-FRANST	020	FRANCIS STREET	NE BRIDGE	OCEAN AVE	2	R	AC	774	48	37,152	6/8/2022	40
F-HERBST	010	HERBERT STREET	ROSE AVE	DEWEY AVE	2	R	AC	640	23	14,720	6/7/2022	39
F-BERDST	010	BERDING STREET	FRANCIS ST	CLEVELAND ST	2	R	AC	553	27	14,931	6/7/2022	38

FC: Functional Classification (R: Residentials, RMaC: Rural Major Collector)
ST: Surface Type (AC: Asphalt Concrete)

City of Ferndale - 2022 PMP Update
Section Description Inventory
Sorted by Descending PCI

Street ID	Section ID	Street Name	Begin Location	End Location	No. of Lanes	FC	ST	Length (ft)	Width (ft)	Area (sf)	PCI Date	PCI
F-LEWAVE	010	LEWIS AVENUE	MAIN ST	BERDING ST	2	R	AC	343	33	11,319	6/7/2022	37
F-VNEAVE	010	VAN NESS AVENUE	CALIFORNIA ST	MAIN ST	2	R	AC	1,923	35	67,305	6/7/2022	36
F-MADIST	010	MADISON STREET	ARLINGTON AVE	TENNYSON AVE	2	R	AC	399	45	17,955	6/7/2022	35
F-GRAAVE	010	GRANT AVENUE	SCHLEY AVE	LINCOLN AVE	2	R	AC	809	32	25,888	6/8/2022	33
F-TENAVE	010	TENNYSON AVENUE	MAIN ST	LINCOLN ST	2	R	AC	488	47	22,936	6/7/2022	32
F-BERDST	030	BERDING STREET	EUGENE ST	HERBERT ST	2	R	AC	2,233	41	91,553	6/7/2022	31
F-MILAVE	010	MILTON AVENUE	MAIN ST	LINCOLN ST	2	R	AC	234	47	10,998	6/7/2022	30
F-PIXLEY	010	PIXLEY	4TH ST	5TH ST	2	R	AC	299	34	10,166	6/8/2022	30
F-SHAAVE	020	SHAW AVENUE	MAIN ST	BERDING ST	2	R	AC	373	30	11,190	6/7/2022	30
F-CRAIST	010	CRAIG STREET	OCEAN AVE	WASHINGTON ST	2	R	AC	680	47	31,960	6/7/2022	28
F-LINCST	010	LINCOLN STREET	MILTON AVE	TENNYSON AVE	2	R	AC	620	42	26,040	6/7/2022	27
F-MCKAVE	010	MCKINLEY AVENUE	GRANT ST	DEWEY AVE	2	R	AC	1,475	36	53,100	6/7/2022	27
F-EUGEST	030	EUGENE STREET	HARRISON ST	END OF PAVEMENT	2	R	AC	362	12	4,344	6/7/2022	23
F-WASHST	010	WASHINGTON STREET	MAIN ST	BERDING ST	2	R	AC	373	31	11,563	6/7/2022	23
F-WILDRD	010	WILDCAT ROAD	S CITY LIMIT	OCEAN AVE	2	RMaC	AC	1,530	21	32,130	6/8/2022	23
F-5THST	030	5TH STREET	ARLINGTON AVE	VAN NESS AVE	2	R	AC	1,350	25	33,750	6/8/2022	20
F-5THST	010	5TH STREET	OCEAN AVE	SHAW AVE	2	R	AC	645	37	23,865	6/8/2022	19
F-ARLAVE	010	ARLINGTON AVE	W CITY LIMIT	5TH ST	2	R	AC	924	14	12,936	6/8/2022	18
F-WATAVE	010	WATSON AVENUE	ROSE AVE	S CDS	2	R	AC	296	34	10,064	6/7/2022	18
F-ROSAVE	010	ROSE AVENUE	HERBERT ST	W CITY LIMIT	2	R	AC	1,970	36	70,920	6/8/2022	16
F-WASHST	020	WASHINGTON STREET	BERDING ST	SCHLEY AVE	2	R	AC	1,202	31	37,262	6/7/2022	16
F-OCEAVE	010	OCEAN AVENUE	SHAW AVE	5TH ST	2	RMaC	AC	1,135	30	34,050	6/8/2022	8

FC: Functional Classification (R: Residentials, RMaC: Rural Major Collector)
ST: Surface Type (AC: Asphalt Concrete)

Appendix B

Maintenance and Rehabilitation Decision Tree

Maintenance and Rehabilitation (M&R) Decision Tree

This report presents the current maintenance and rehabilitation decision tree that exists in the database. The decision tree forms the basis for all of the budgetary computations included in this report. ***Changes to the decision tree will make the results in the budget reports invalid.*** All pavement treatment unit costs relevant to the road 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 – Very Good. All preventive maintenance treatment listings are assigned only to sections in Condition Category I where the PCI ≥ 70. Sections with PCI values less than 70 are assigned to treatments listed in Categories II through V.

In the preventive maintenance category (PCI ≥ 70), 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 5 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 a certain number of 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 (PCI less than 70). Each line is defined by a specific combination of functional classification, surface type, and condition category.

COLUMN	**DESCRIPTION**
Functional Class	Functional Classification identifying the branch
Surface	Surface Type identifying the branch number.
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.
Yrs. Between Crack Seals	First Row - number of years between successive treatment applications specified in the first row (i.e. CRACK treatment).

COLUMN	DESCRIPTION
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.

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

Decision Tree

Printed: 9/13/2022

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	DO NOTHING	$0.00	9		
			Surface Treatment	SLURRY SEAL	$5.50		7	
			Restoration Treatment	DO NOTHING	$0.00			99
		II - Good, Non-Load Related		SLURRY SEAL W/ DIGOUTS	$8.25		7	
		III - Good, Load Related		1.5" AC OVERLAY W/ DIGOUTS	$55.50			
		IV - Poor		2" AC OVERLAY W/ DIGOUTS	$66.50			
		V - Very Poor		3"AC OVERLAY W/ DIGOUTS	$91.75			
	AC/AC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	SLURRY SEAL	$5.50		7	
			Restoration Treatment	DO NOTHING	$0.00			99
		II - Good, Non-Load Related		SLURRY SEAL W/ DIGOUTS	$8.25		7	
		III - Good, Load Related		1.5" AC OVERLAY W/ DIGOUTS	$55.50			
		IV - Poor		2" AC OVERLAY W/ DIGOUTS	$66.50			
		V - Very Poor		3"AC OVERLAY W/ DIGOUTS	$91.75			
	AC/PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	4		
			Surface Treatment	SLURRY SEAL	$2.50		7	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		SLURRY SEAL W/ DIGOUTS	$4.00			
		III - Good, Load Related		SLURRY SEAL W/ DIGOUTS	$6.00			
		IV - Poor		2" AC OVERLAY W/ DIGOUTS	$40.00			
		V - Very Poor		THICK AC OVERLAY(2.5 INCHES)	$57.00			
	PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	DO NOTHING	$0.00		15	
			Restoration Treatment	DO NOTHING	$0.00			99
		II - Good, Non-Load Related		DO NOTHING	$0.00			
		III - Good, Load Related		DO NOTHING	$0.00			
		IV - Poor		THICK AC OVERLAY(2.5 INCHES)	$1.92			
		V - Very Poor		THIN AC OVERLAY(1.5 INCHES)	$7.47			

Functional Class and Surface combination not used

Selected Treatment is not a Surface Seal

Decision Tree

Printed: 9/13/2022

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	DO NOTHING	$0.00	9		
			Surface Treatment	SLURRY SEAL	$5.25		8	
			Restoration Treatment	DO NOTHING	$0.00			99
		II - Good, Non-Load Related		SLURRY SEAL W/ DIGOUTS	$7.50		8	
		III - Good, Load Related		1.5" AC OVERLAY W/ DIGOUTS	$49.00			
		IV - Poor		2" AC OVERLAY W/ DIGOUTS	$58.75			
		V - Very Poor		3"AC OVERLAY W/ DIGOUTS	$77.75			
	AC/AC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	9		
			Surface Treatment	SLURRY SEAL	$5.25		8	
			Restoration Treatment	DO NOTHING	$0.00			99
		II - Good, Non-Load Related		SLURRY SEAL W/ DIGOUTS	$7.50		8	
		III - Good, Load Related		1.5" AC OVERLAY W/ DIGOUTS	$49.00			
		IV - Poor		2" AC OVERLAY W/ DIGOUTS	$58.75			
		V - Very Poor		3"AC OVERLAY W/ DIGOUTS	$77.75			
	AC/PCC	I - Very Good	Crack Treatment	DO NOTHING	$0.00	4		
			Surface Treatment	SLURRY SEAL	$2.50		8	
			Restoration Treatment	DO NOTHING	$0.00			3
		II - Good, Non-Load Related		SLURRY SEAL W/ DIGOUTS	$4.00			
		III - Good, Load Related		SLURRY SEAL W/ DIGOUTS	$5.00			
		IV - Poor		SURFACE TREATMENT (CAPE OR SLURRY)	$10.00			
		V - Very Poor		2" AC OVERLAY W/ DIGOUTS	$40.00			

Functional Class and Surface combination not used

Selected Treatment is not a Surface Seal

Appendix C

Budget Need Analysis Results

Budget Needs Reports

The purpose of this section 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 the analysis period. The Budget Needs represents the "ideal world" funding levels, while the Budget Scenario 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 provided. An interest rate of 4% and an inflation factor of 4% were used to project the costs for the analysis period for three scenarios. An inflation rate of 8.5% was used for one scenario. 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.

Budget Needs reports included in this appendix are listed below:

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

Needs - Projected PCI/Cost Summary

This report summarizes and projects the network PCI over the ten-year analysis period, both with and without treatments applied. It also reports the associated costs, which are based on the treatment unit costs presented in the M&R decision tree.

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.

Needs - Projected PCI/Cost Summary

Interest: 4.00% Inflation: 4.00% Printed: 9/13/2022

Year	PCI Treated	PCI Untreated	PM Cost	Rehab Cost	Cost
2023	93	48	$157,903	$7,951,444	$8,109,347
2024	88	45	$0	$103,551	$103,551
2025	88	43	$0	$511,326	$511,326
2026	86	40	$0	$0	$0
2027	84	37	$0	$0	$0
2028	82	35	$0	$0	$0
2029	80	32	$0	$0	$0
2030	81	30	$113,951	$718,154	$832,105
2031	81	27	$52,355	$132,629	$184,984
2032	83	25	$816,889	$0	$816,889

% PM	PM Total Cost	Rehab Total Cost	Total Cost
10.81%	$1,141,098	$9,417,104	$10,558,202

Needs - Projected PCI/Cost Summary

Interest: 8.50% Inflation: 8.50% Printed: 9/14/2022

Year	PCI Treated	PCI Untreated	PM Cost	Rehab Cost	Cost
2023	93	48	$157,903	$7,951,444	$8,109,347
2024	88	45	$0	$108,032	$108,032
2025	88	43	$0	$556,532	$556,532
2026	86	40	$0	$0	$0
2027	84	37	$0	$0	$0
2028	82	35	$0	$0	$0
2029	80	32	$0	$0	$0
2030	81	30	$153,280	$966,034	$1,119,314
2031	81	27	$73,474	$186,126	$259,600
2032	83	25	$1,195,983	$0	$1,195,983

% PM	PM Total Cost	Rehab Total Cost	Total Cost
13.93%	$1,580,640	$9,768,168	$11,348,808

Needs - Preventive Maintenance Treatment/Cost Summary

This report summarizes each preventive maintenance treatment type, quantity of pavement affected, and total costs over the analysis 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., 2023, 2024, 2025, etc.).
Area Treated	Quantities in linear feet (Seal Cracks) or square yard (Slurry Seal).
Cost	Maintenance treatment cost.

Needs - Preventive Maintenance
Treatment/Cost Summary

Interest: 4.00% Inflation: 4.00% Printed: 9/13/2022

Treatment	Year	Area Treated		Cost
SLURRY SEAL	2023	28,863.78	sq. yd.	$157,903
	2030	15,743.89	sq. yd.	$113,951
	2031	7,109.78	sq. yd.	$52,355
	2032	109,318	sq. yd.	$816,889
	Total	161,035.44		$1,141,098
	Total Quantity	161,035.44		$1,141,098

Needs - Preventive Maintenance Treatment/Cost Summary

Interest: 8.50% Inflation: 8.50% Printed: 9/14/2022

Treatment	Year	Area Treated		Cost
SLURRY SEAL	2023	28,863.78	sq. yd.	$157,903
	2030	15,743.89	sq. yd.	$153,280
	2031	7,109.78	sq. yd.	$73,474
	2032	109,318	sq. yd.	$1,195,983
	Total	161,035.44		$1,580,640
	Total Quantity	161,035.44		$1,580,640

Needs - Rehabilitation Treatment/Cost Summary

This report summarizes each rehabilitation treatment type, quantity of pavement affected, and total costs over the analysis 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., 2023, 2024, 2025, etc.).
Area Treated	Quantities in square yard.
Cost	Rehabilitation treatment cost.

Needs - Rehabilitation
Treatment/Cost Summary

Interest: 4.00% Inflation: 4.00% Printed: 9/13/2022

Treatment	Year	Area Treated	Cost
1.5" AC OVERLAY W/ DIGOUTS	2023	20,085.11 sq.yd.	$1,018,899
	2024	2,032 sq.yd.	$103,551
	2025	8,167.11 sq.yd.	$432,844
	2030	7,103.56 sq.yd.	$518,803
	Total	37,387.78 sq.yd.	$2,074,097
2" AC OVERLAY W/ DIGOUTS	2023	74,878.56 sq.yd.	$4,422,751
	2031	589.33 sq.yd.	$47,385
	Total	75,467.89 sq.yd.	$4,470,136
3"AC OVERLAY W/ DIGOUTS	2023	30,098.22 sq.yd.	$2,443,088
	Total	30,098.22 sq.yd.	$2,443,088
SLURRY SEAL W/ DIGOUTS	2023	8,894 sq.yd.	$66,706
	2025	9,674.67 sq.yd.	$78,482
	2030	18,362.44 sq.yd.	$199,351
	2031	8,304.67 sq.yd.	$85,244
	Total	45,235.78 sq.yd.	$429,783

Total Cost	$9,417,104

Needs - Rehabilitation
Treatment/Cost Summary

Interest: 8.50% Inflation: 8.50% Printed: 9/14/2022

Treatment	Year	Area Treated	Cost
1.5" AC OVERLAY W/ DIGOUTS	2023	20,085.11 sq.yd.	$1,018,899
	2024	2,032 sq.yd.	$108,032
	2025	8,167.11 sq.yd.	$471,112
	2030	7,103.56 sq.yd.	$697,874
	Total	37,387.78 sq.yd.	$2,295,917
2" AC OVERLAY W/ DIGOUTS	2023	74,878.56 sq.yd.	$4,422,751
	2031	589.33 sq.yd.	$66,498
	Total	75,467.89 sq.yd.	$4,489,249
3"AC OVERLAY W/ DIGOUTS	2023	30,098.22 sq.yd.	$2,443,088
	Total	30,098.22 sq.yd.	$2,443,088
SLURRY SEAL W/ DIGOUTS	2023	8,894 sq.yd.	$66,706
	2025	9,674.67 sq.yd.	$85,420
	2030	18,362.44 sq.yd.	$268,160
	2031	8,304.67 sq.yd.	$119,628
	Total	45,235.78 sq.yd.	$539,914

Total Cost	$9,768,168

Appendix D

Budget Scenario Results

Scenario 1: Funding Level of $31K/Year (Inflation Rate = 4.0%)

Cost Summary Report
Network Condition Summary Report

Scenarios - Cost Summary

Interest: 4.00% Inflation: 4.00% Printed: 11/10/2022

Scenario: Ferndale - SC1: Funding Level of $31000/Year

Year	PM	Budget		Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2023	0%	$0	II	$0	Non-Project	$0	$0	$8,109,324	Funded	$0
			III	$0					Unmet	$42,220
			IV	$0	Project	$0				
			V	$0						
			Total	$0						
			Project	$0						
2024	77%	$18,600	II	$0	Non-Project	$18,552	$0	$8,762,622	Funded	$0
			III	$0					Unmet	$275
			IV	$0	Project	$0				
			V	$0						
			Total	$0						
			Project	$0						
2025	0%	$30,600	II	$30,505	Non-Project	$0	$0	$10,110,609	Funded	$0
			III	$0					Unmet	$2,154
			IV	$0	Project	$0				
			V	$0						
			Total	$30,505						
			Project	$0						
2026	0%	$39,000	II	$0	Non-Project	$0	$0	$10,804,238	Funded	$0
			III	$0					Unmet	$0
			IV	$38,947	Project	$0				
			V	$0						
			Total	$38,947						
			Project	$0						
2027	0%	$0	II	$0	Non-Project	$0	$0	$12,016,084	Funded	$0
			III	$0					Unmet	$3,873
			IV	$0	Project	$0				
			V	$0						
			Total	$0						
			Project	$0						
2028	0%	$65,300	II	$65,245	Non-Project	$0	$0	$12,744,955	Funded	$0
			III	$0					Unmet	$91,290
			IV	$0	Project	$0				
			V	$0						
			Total	$65,245						
			Project	$0						
2029	0%	$0	II	$0	Non-Project	$0	$0	$13,363,899	Funded	$0
			III	$0					Unmet	$334
			IV	$0	Project	$0				
			V	$0						
			Total	$0						
			Project	$0						
2030	0%	$55,400	II	$0	Non-Project	$0	$0	$13,953,648	Funded	$0
			III	$0					Unmet	$1,397
			IV	$55,389	Project	$0				
			V	$0						
			Total	$55,389						
			Project	$0						

Scenarios Criteria:

Criteria:

Year	PM	Budget	Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2031	100%	$28,000	II $0	Non-Project	$27,941	$59	$14,575,813	Funded	$0
			III $0					Unmet	$0
			IV $0	Project	$0				
			V $0						
			Total $0						
			Project $0						
2032	100%	$42,100	II $0	Non-Project	$25,390	$16,710	$15,570,691	Funded	$0
			III $0					Unmet	$4,712
			IV $0	Project	$0				
			V $0						
			Total $0						
			Project $0						

Summary

Functional Class	Rehabilitation	Prev. Maint.	Funded Stop Gap	Unmet Stop Gap
Collector	$0	$27,941	$0	$26,341
Residential/Local	$190,086	$43,942	$0	$119,914
Grand Total:	$190,086	$71,883	$0	$146,255

Scenarios Criteria:

Criteria:

Scenarios - Network Condition Summary

Interest: 4% Inflation: 4% Printed: 11/10/2022

Scenario: Ferndale - SC1: Funding Level of $31000/Year

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2023	$0	0%	2027	$0	0%	2031	$28,000	100%
2024	$18,600	77%	2028	$65,300	0%	2032	$42,100	100%
2025	$30,600	0%	2029	$0	0%			
2026	$39,000	0%	2030	$55,400	0%			

Projected Network Average PCI by Year

Year	Never Treated	With Selected Treatment	Treated Centerline Miles	Treated Lane Miles
2023	48	48	0	0
2024	45	45	0.16	0.32
2025	43	43	0.19	0.39
2026	40	40	0.04	0.08
2027	37	38	0	0
2028	35	36	0.38	0.76
2029	32	33	0	0
2030	30	31	0.08	0.15
2031	27	28	0.13	0.26
2032	25	26	0.16	0.32

Percent Network Area by Functional Class and Condition Category

Condition in base year 2023, prior to applying treatments.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	15.7%	12.5%	0.0%	28.1%
II / III	0.0%	2.9%	12.7%	0.0%	15.5%
IV	0.0%	1.6%	38.5%	0.0%	40.2%
V	0.0%	3.9%	12.2%	0.0%	16.1%
Total	0.0%	24.1%	75.9%	0.0%	100.0%

Condition in year 2023 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	15.7%	12.5%	0.0%	28.1%
II / III	0.0%	2.9%	12.7%	0.0%	15.5%
IV	0.0%	1.6%	38.5%	0.0%	40.2%
V	0.0%	3.9%	12.2%	0.0%	16.1%
Total	0.0%	24.1%	75.9%	0.0%	100.0%

Condition in year 2032 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	2.0%	2.5%	0.0%	4.5%
II / III	0.0%	13.7%	11.8%	0.0%	25.4%
IV	0.0%	2.9%	10.9%	0.0%	13.7%
V	0.0%	5.6%	50.7%	0.0%	56.3%
Total	0.0%	24.1%	75.9%	0.0%	100.0%

Scenarios Criteria: Area ID = F - Ferndale

Scenario 2: Maintain PCI (Inflation Rate = 4.0%)

Cost Summary Report
Network Condition Summary Report

Scenarios - Cost Summary

Interest: 4.00% Inflation: 4.00% Printed: 9/13/2022

Scenario: Ferndale - SC2: Maintain PCI at 49

Year	PM	Budget	Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2023	44%	$130,000	II $9,270	Non-Project	$56,908	$292	$7,979,716	Funded	$0
			III $0					Unmet	$41,843
			IV $63,430	Project	$0				
			V $0						
			Total $72,700						
			Project $0						
2024	0%	$690,000	II $0	Non-Project	$0	$0	$7,959,836	Funded	$0
			III $369,437					Unmet	$275
			IV $317,109	Project	$0				
			V $0						
			Total $686,546						
			Project $0						
2025	0%	$690,000	II $78,481	Non-Project	$0	$0	$8,624,413	Funded	$0
			III $0					Unmet	$1,148
			IV $603,322	Project	$0				
			V $0						
			Total $681,803						
			Project $0						
2026	0%	$690,000	II $0	Non-Project	$0	$0	$8,610,993	Funded	$0
			III $418,679					Unmet	$0
			IV $267,868	Project	$0				
			V $0						
			Total $686,546						
			Project $0						
2027	0%	$666,000	II $177,222	Non-Project	$0	$0	$8,654,242	Funded	$0
			III $0					Unmet	$0
			IV $488,138	Project	$0				
			V $0						
			Total $665,360						
			Project $0						
2028	0%	$650,000	II $0	Non-Project	$0	$0	$8,672,186	Funded	$0
			III $121,140					Unmet	$79,653
			IV $336,163	Project	$0				
			V $184,397						
			Total $641,699						
			Project $0						
2029	0%	$650,000	II $0	Non-Project	$0	$0	$8,406,094	Funded	$0
			III $506,366					Unmet	$0
			IV $0	Project	$0				
			V $141,403						
			Total $647,769						
			Project $0						
2030	0%	$690,000	II $0	Non-Project	$0	$0	$8,572,600	Funded	$0
			III $518,803					Unmet	$0
			IV $0	Project	$0				
			V $169,738						
			Total $688,541						
			Project $0						

Scenarios Criteria:

Criteria:

Year	PM	Budget	Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2031	13%	$580,000	II $12,687	Non-Project	$87,648	$0	$8,445,363	Funded	$0
			III $0					Unmet	$0
			IV $0	Project	$0				
			V $475,059						
			Total $487,745						
			Project $0						
2032	0%	$400,000	II $0	Non-Project	$0	$0	$8,393,167	Funded	$0
			III $0					Unmet	$0
			IV $0	Project	$0				
			V $398,078						
			Total $398,078						
			Project $0						

Summary

Functional Class	Rehabilitation	Prev. Maint.	Funded Stop Gap	Unmet Stop Gap
Collector	$1,877,515	$107,222	$0	$16,911
Residential/Local	$3,779,274	$37,334	$0	$106,008
Grand Total:	$5,656,789	$144,555	$0	$122,919

Scenarios Criteria:

Criteria:

Scenarios - Network Condition Summary

Interest: 4% Inflation: 4% Printed: 9/13/2022

Scenario: Ferndale - SC2: Maintain PCI at 49

Year	Budget	PM
2023	$130,000	44%
2024	$690,000	0%
2025	$690,000	0%
2026	$690,000	0%

Year	Budget	PM
2027	$666,000	0%
2028	$650,000	0%
2029	$650,000	0%
2030	$690,000	0%

Year	Budget	PM
2031	$580,000	13%
2032	$400,000	0%

Projected Network Average PCI by Year

Year	Never Treated	With Selected Treatment	Treated Centerline Miles	Treated Lane Miles
2023	48	49	0.54	1.07
2024	45	49	0.77	1.54
2025	43	49	0.95	1.90
2026	40	49	0.55	1.10
2027	37	49	1.21	2.42
2028	35	49	0.49	0.97
2029	32	49	0.61	1.22
2030	30	49	0.38	0.76
2031	27	49	0.99	1.97
2032	25	49	0.09	0.18

Percent Network Area by Functional Class and Condition Category

Condition in base year 2023, prior to applying treatments.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	15.7%	12.5%	0.0%	28.1%
II / III	0.0%	2.9%	12.7%	0.0%	15.5%
IV	0.0%	1.6%	38.5%	0.0%	40.2%
V	0.0%	3.9%	12.2%	0.0%	16.1%
Total	0.0%	24.1%	75.9%	0.0%	100.0%

Condition in year 2023 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	15.7%	13.7%	0.0%	29.4%
II / III	0.0%	2.9%	12.0%	0.0%	14.9%
IV	0.0%	1.6%	38.0%	0.0%	39.6%
V	0.0%	3.9%	12.2%	0.0%	16.1%
Total	0.0%	24.1%	75.9%	0.0%	100.0%

Condition in year 2032 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	12.3%	32.3%	0.0%	44.7%
II / III	0.0%	9.9%	5.2%	0.0%	15.0%
V	0.0%	1.9%	38.4%	0.0%	40.3%
Total	0.0%	24.1%	75.9%	0.0%	100.0%

Scenarios Criteria: Area ID = F - Ferndale

Scenario 3: Improve PCI to 65 (Inflation Rate = 4.0%)

Cost Summary Report
Network Condition Summary Report

Scenarios - Cost Summary

Interest: 4.00% Inflation: 4.00% Printed: 9/13/2022

Scenario: Ferndale - SC3: Increase PCI to 65 in 10 Years

Year	PM	Budget		Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2023	23%	$510,000	II	$9,270	Non-Project	$56,908	$60,392	$7,662,994	Funded	$0
			III	$0					Unmet	$40,845
			IV	$380,152	Project	$0				
			V	$0						
			Total	$389,422						
			Project	$0						
2024	0%	$1,000,000	II	$0	Non-Project	$0	$0	$7,335,221	Funded	$0
			III	$514,260					Unmet	$0
			IV	$467,510	Project	$0				
			V	$0						
			Total	$981,770						
			Project	$0						
2025	0%	$1,000,000	II	$78,481	Non-Project	$0	$0	$7,679,705	Funded	$0
			III	$0					Unmet	$1,148
			IV	$736,969	Project	$0				
			V	$161,461						
			Total	$976,911						
			Project	$0						
2026	0%	$1,000,000	II	$0	Non-Project	$0	$0	$7,401,774	Funded	$0
			III	$374,039					Unmet	$0
			IV	$307,321	Project	$0				
			V	$231,910						
			Total	$913,270						
			Project	$0						
2027	0%	$1,000,000	II	$177,222	Non-Project	$0	$0	$6,975,275	Funded	$0
			III	$468,164					Unmet	$0
			IV	$125,767	Project	$0				
			V	$225,542						
			Total	$996,695						
			Project	$0						
2028	0%	$1,000,000	II	$0	Non-Project	$0	$0	$6,644,397	Funded	$0
			III	$0					Unmet	$65,362
			IV	$205,365	Project	$0				
			V	$717,997						
			Total	$923,363						
			Project	$0						
2029	0%	$1,000,000	II	$0	Non-Project	$0	$0	$6,042,607	Funded	$0
			III	$0					Unmet	$0
			IV	$0	Project	$0				
			V	$902,355						
			Total	$902,355						
			Project	$0						
2030	2%	$1,000,000	II	$0	Non-Project	$22,063	$0	$5,841,953	Funded	$0
			III	$518,803					Unmet	$0
			IV	$0	Project	$0				
			V	$442,359						
			Total	$961,162						
			Project	$0						

Scenarios Criteria:

Criteria:

Year	PM	Budget	Rehabilitation			Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2031	5%	$1,000,000	II	$12,687	Non-Project	$45,129	$4,871	$5,185,770	Funded	$0
			III	$0					Unmet	$0
			IV	$0	Project	$0				
			V	$937,297						
			Total	$949,984						
			Project	$0						
2032	8%	$1,000,000	II	$0	Non-Project	$71,902	$8,098	$4,484,327	Funded	$0
			III	$0					Unmet	$0
			IV	$0	Project	$0				
			V	$859,540						
			Total	$859,540						
			Project	$0						

Summary

Functional Class	Rehabilitation	Prev. Maint.	Funded Stop Gap	Unmet Stop Gap
Collector	$2,043,870	$130,402	$0	$9,818
Residential/Local	$6,810,601	$65,599	$0	$97,538
Grand Total:	$8,854,471	$196,002	$0	$107,356

Scenarios Criteria:

Criteria:

Scenarios - Network Condition Summary

Interest: 4% Inflation: 4% Printed: 9/13/2022

Scenario: Ferndale - SC3: Increase PCI to 65 in 10 Years

Year	Budget	PM
2023	$510,000	23%
2024	$1,000,000	0%
2025	$1,000,000	0%
2026	$1,000,000	0%

Year	Budget	PM
2027	$1,000,000	0%
2028	$1,000,000	0%
2029	$1,000,000	0%
2030	$1,000,000	2%

Year	Budget	PM
2031	$1,000,000	5%
2032	$1,000,000	8%

Projected Network Average PCI by Year

Year	Never Treated	With Selected Treatment	Treated Centerline Miles	Treated Lane Miles
2023	48	50	0.72	1.44
2024	45	52	1.04	2.07
2025	43	53	1.26	2.53
2026	40	54	0.72	1.44
2027	37	55	1.44	2.88
2028	35	57	0.57	1.14
2029	32	59	0.60	1.21
2030	30	60	0.58	1.17
2031	27	62	0.88	1.76
2032	25	65	0.78	1.56

Percent Network Area by Functional Class and Condition Category

Condition in base year 2023, prior to applying treatments.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	15.7%	12.5%	0.0%	28.1%
II / III	0.0%	2.9%	12.7%	0.0%	15.5%
IV	0.0%	1.6%	38.5%	0.0%	40.2%
V	0.0%	3.9%	12.2%	0.0%	16.1%
Total	0.0%	24.1%	75.9%	0.0%	100.0%

Condition in year 2023 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	17.3%	14.8%	0.0%	32.1%
II / III	0.0%	2.9%	12.0%	0.0%	14.9%
IV	0.0%	0.0%	36.9%	0.0%	36.9%
V	0.0%	3.9%	12.2%	0.0%	16.1%
Total	0.0%	24.1%	75.9%	0.0%	100.0%

Condition in year 2032 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	14.2%	49.0%	0.0%	63.2%
II / III	0.0%	9.9%	5.2%	0.0%	15.1%
V	0.0%	0.0%	21.7%	0.0%	21.7%
Total	0.0%	24.1%	75.9%	0.0%	100.0%

Scenarios Criteria: Area ID = F - Ferndale

Scenario 4: Funding Level of $31K/Year (Inflation Rate = 8.5%)

Cost Summary Report
Network Condition Summary Report

Scenarios - Cost Summary

Interest: 8.50% Inflation: 8.50% Printed: 11/10/2022

Scenario: Ferndale_SC4: Fund Level = $31K/yr_ inflation=8.5%

Year	PM	Budget		Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2023	0%	$0	II	$0	Non-Project	$0	$0	$8,109,324	Funded	$0
			III	$0					Unmet	$42,220
			IV	$0	Project	$0				
			V	$0						
			Total	$0						
			Project	$0						
2024	62%	$30,000	II	$10,058	Non-Project	$19,355	$0	$9,131,716	Funded	$0
			III	$0					Unmet	$287
			IV	$0	Project	$0				
			V	$0						
			Total	$10,058						
			Project	$0						
2025	0%	$22,300	II	$22,289	Non-Project	$0	$0	$11,004,495	Funded	$0
			III	$0					Unmet	$2,344
			IV	$0	Project	$0				
			V	$0						
			Total	$22,289						
			Project	$0						
2026	0%	$0	II	$0	Non-Project	$0	$0	$12,312,494	Funded	$0
			III	$0					Unmet	$0
			IV	$0	Project	$0				
			V	$0						
			Total	$0						
			Project	$0						
2027	0%	$55,000	II	$0	Non-Project	$0	$0	$14,227,693	Funded	$0
			III	$54,997					Unmet	$4,588
			IV	$0	Project	$0				
			V	$0						
			Total	$54,997						
			Project	$0						
2028	0%	$0	II	$0	Non-Project	$0	$0	$15,824,468	Funded	$0
			III	$0					Unmet	$112,844
			IV	$0	Project	$0				
			V	$0						
			Total	$0						
			Project	$0						
2029	0%	$68,700	II	$0	Non-Project	$0	$0	$17,241,606	Funded	$0
			III	$0					Unmet	$431
			IV	$68,670	Project	$0				
			V	$0						
			Total	$68,670						
			Project	$0						
2030	0%	$0	II	$0	Non-Project	$0	$0	$18,855,892	Funded	$0
			III	$0					Unmet	$3,525
			IV	$0	Project	$0				
			V	$0						
			Total	$0						
			Project	$0						

Scenarios Criteria:

Criteria:

Year	PM	Budget		Rehabilitation		Preventative Maintenance	Surplus PM	Deferred		Stop Gap
2031	0%	$72,100	II	$0	Non-Project	$0	$0	$20,515,621	Funded	$0
			III	$0					Unmet	$0
			IV	$0	Project	$0				
			V	$72,075						
			Total	$72,075						
			Project	$0						
2032	100%	$31,400	II	$0	Non-Project	$29,685	$1,715	$22,889,234	Funded	$0
			III	$0					Unmet	$7,234
			IV	$0	Project	$0				
			V	$0						
			Total	$0						
			Project	$0						

Summary

Functional Class	Rehabilitation	Prev. Maint.	Funded Stop Gap	Unmet Stop Gap
Collector	$0	$0	$0	$31,770
Residential/Local	$228,089	$49,040	$0	$141,702
Grand Total:	$228,089	$49,040	$0	$173,472

Scenarios Criteria:

Scenarios - Network Condition Summary

Interest: 8.5% Inflation: 8.5% Printed: 11/10/2022

Scenario: Ferndale_SC4: Fund Level = $31K/yr_ inflation=8.5%

Year	Budget	PM
2023	$0	0%
2024	$30,000	62%
2025	$22,300	0%
2026	$0	0%

Year	Budget	PM
2027	$55,000	0%
2028	$0	0%
2029	$68,700	0%
2030	$0	0%

Year	Budget	PM
2031	$72,100	0%
2032	$31,400	100%

Projected Network Average PCI by Year

Year	Never Treated	With Selected Treatment	Treated Centerline Miles	Treated Lane Miles
2023	48	48	0	0
2024	45	46	0.22	0.43
2025	43	43	0.13	0.27
2026	40	40	0	0
2027	37	38	0.04	0.07
2028	35	35	0	0
2029	32	33	0.08	0.15
2030	30	30	0	0
2031	27	28	0.07	0.14
2032	25	26	0.12	0.25

Percent Network Area by Functional Class and Condition Category

Condition in base year 2023, prior to applying treatments.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	15.7%	12.5%	0.0%	28.1%
II / III	0.0%	2.9%	12.7%	0.0%	15.5%
IV	0.0%	1.6%	38.5%	0.0%	40.2%
V	0.0%	3.9%	12.2%	0.0%	16.1%
Total	0.0%	24.1%	75.9%	0.0%	100.0%

Condition in year 2023 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	15.7%	12.5%	0.0%	28.1%
II / III	0.0%	2.9%	12.7%	0.0%	15.5%
IV	0.0%	1.6%	38.5%	0.0%	40.2%
V	0.0%	3.9%	12.2%	0.0%	16.1%
Total	0.0%	24.1%	75.9%	0.0%	100.0%

Condition in year 2032 after schedulable treatments applied.

Condition	Arterial	Collector	Res/Loc	Other	Total
I	0.0%	2.0%	2.9%	0.0%	4.9%
II / III	0.0%	13.7%	11.3%	0.0%	25.0%
IV	0.0%	2.9%	11.2%	0.0%	14.1%
V	0.0%	5.6%	50.5%	0.0%	56.1%
Total	0.0%	24.1%	75.9%	0.0%	100.0%

Scenarios Criteria: Area ID = F - Ferndale

Appendix E

Pavement Condition Maps

Current Network Condition - 2022

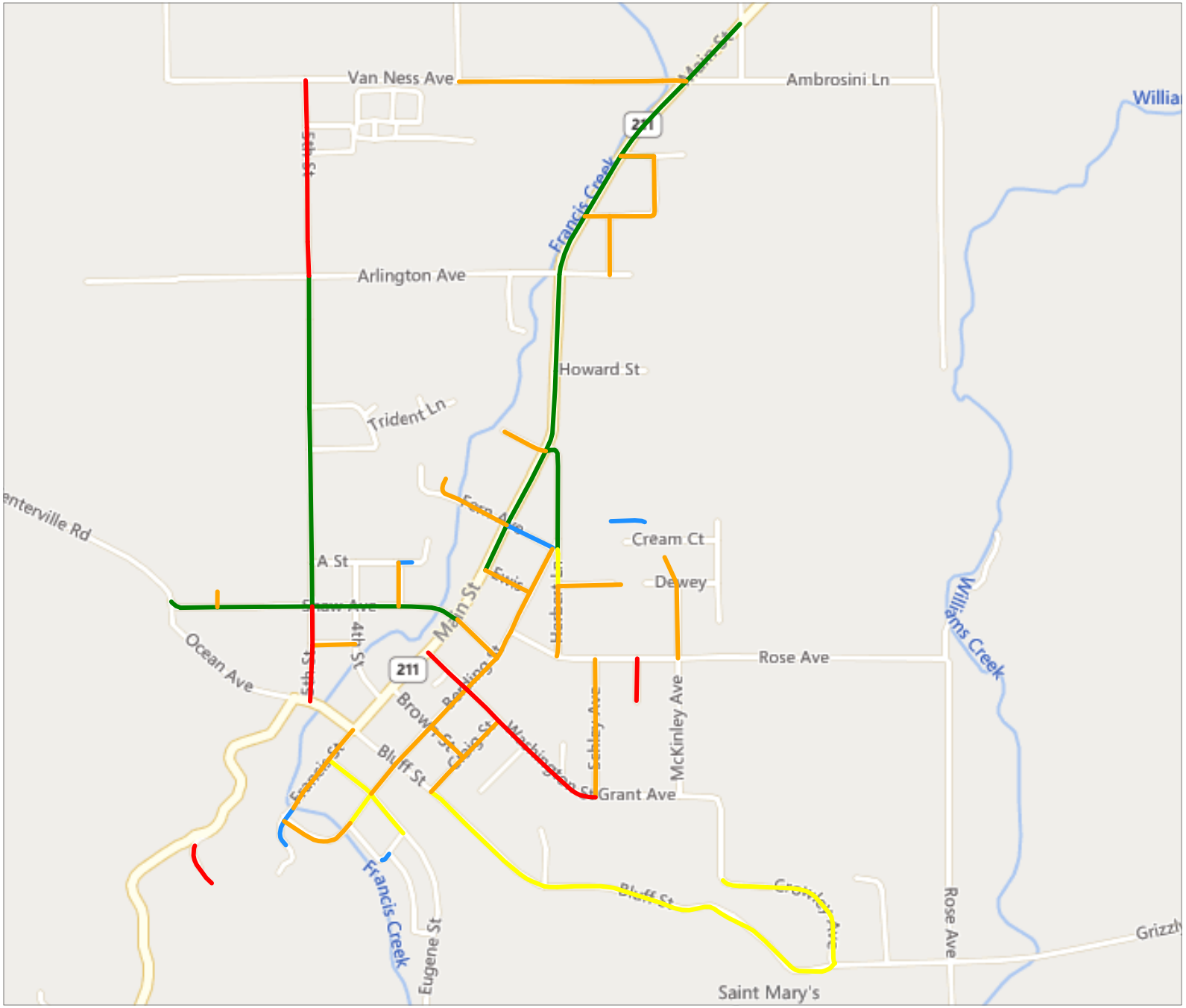
HCAOG

Current PCI Condition

Printed: 9/13/2022

Feature Legend

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



Scenario 1: Funding Level of $31K/Year (Inflation Rate = 4.0%)

Projected Street Network Condition - 2032

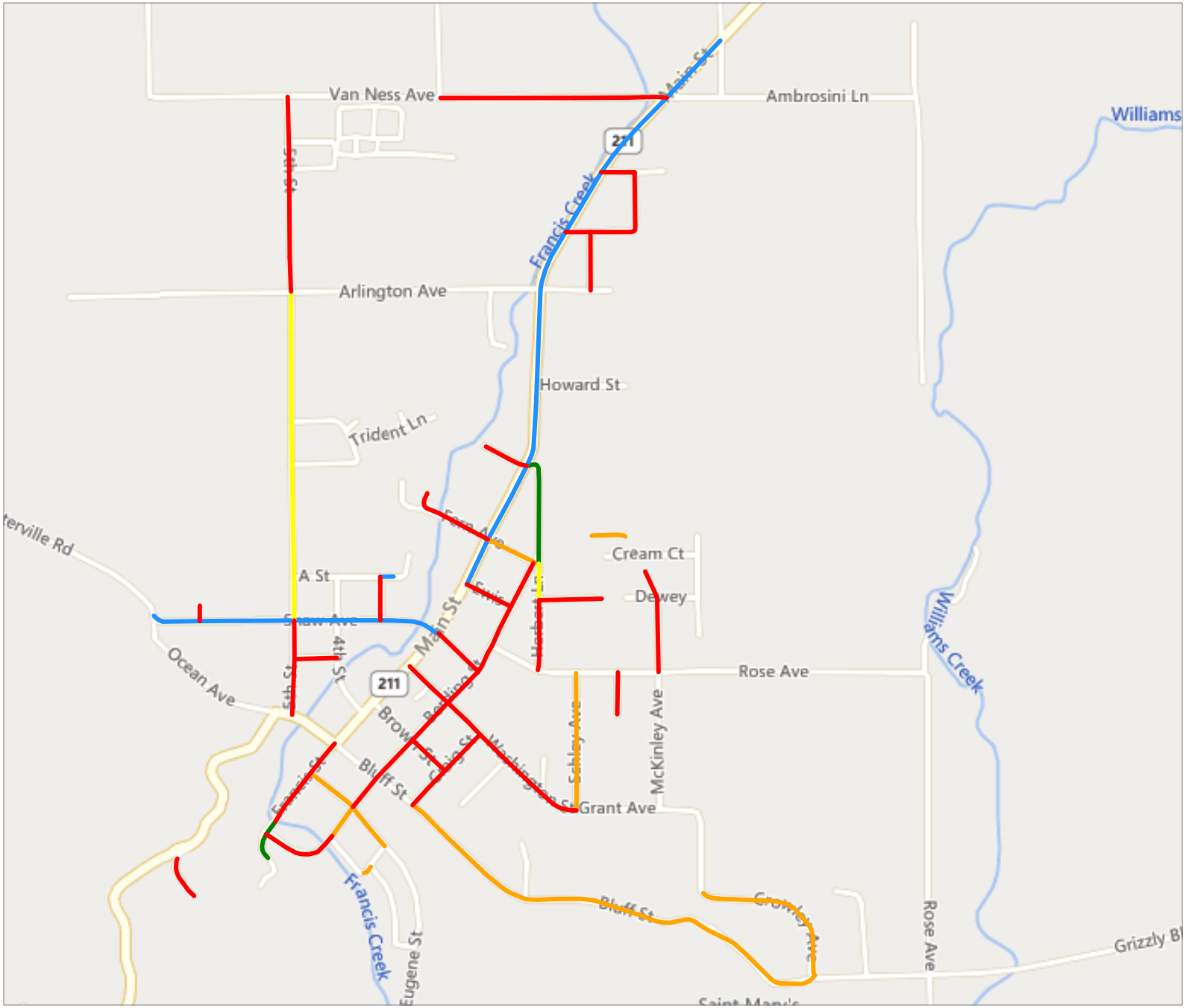
HCAOG

Scenario PCI Condition

Ferndale - SC1: Funding Level of $31000/Year - 2032 Project Period - Printed: 11/10/2022

Feature Legend

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



Scenario 2: Maintain PCI (Inflation Rate = 4.0%)

Projected Street Network Condition - 2032

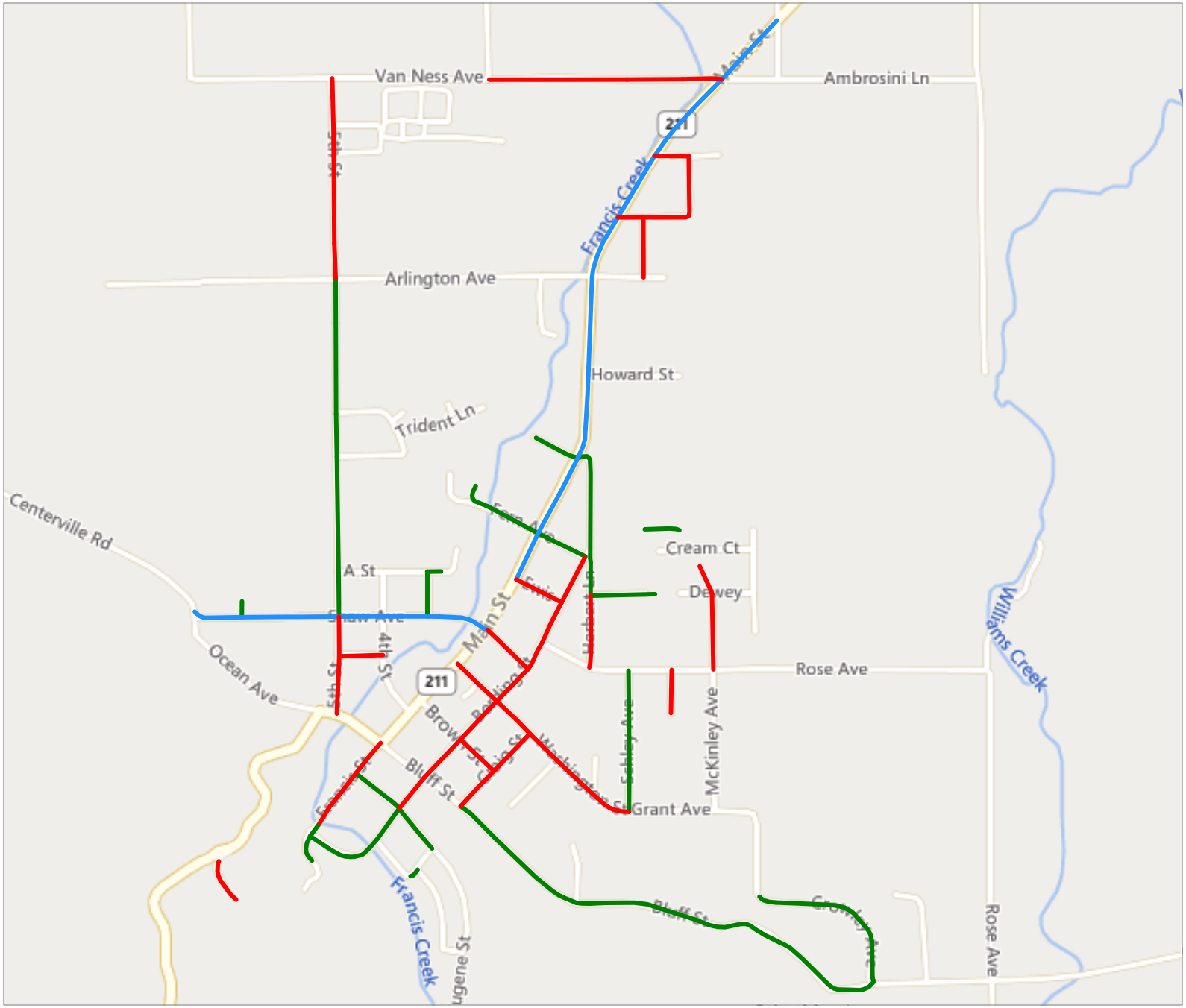
HCAOG

Scenario PCI Condition

Ferndale - SC2: Maintain PCI at 49 - 2032 Project Period - Printed: 9/13/2022

Feature Legend

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



Scenario 3: Improve PCI to 65 (Inflation Rate = 4.0%)

Projected Street Network Condition - 2032

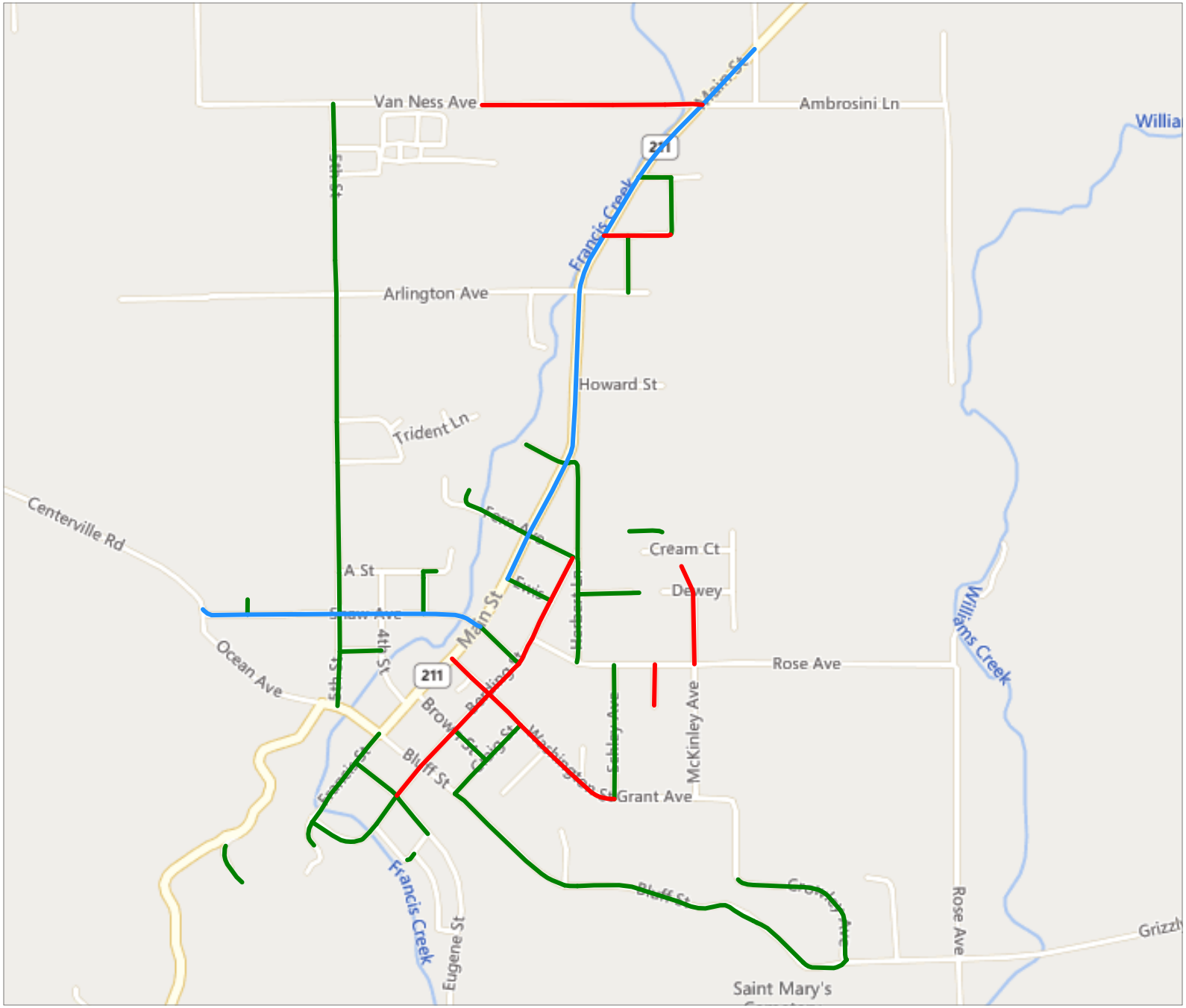
HCAOG

Scenario PCI Condition

Ferndale - SC3: Increase PCI to 65 in 10 Years - 2032 Project Period - Printed: 9/13/2022

Feature Legend

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



Scenario 4: Funding Level of $31K/Year (Inflation Rate = 8.5%)

Projected Street Network Condition - 2032

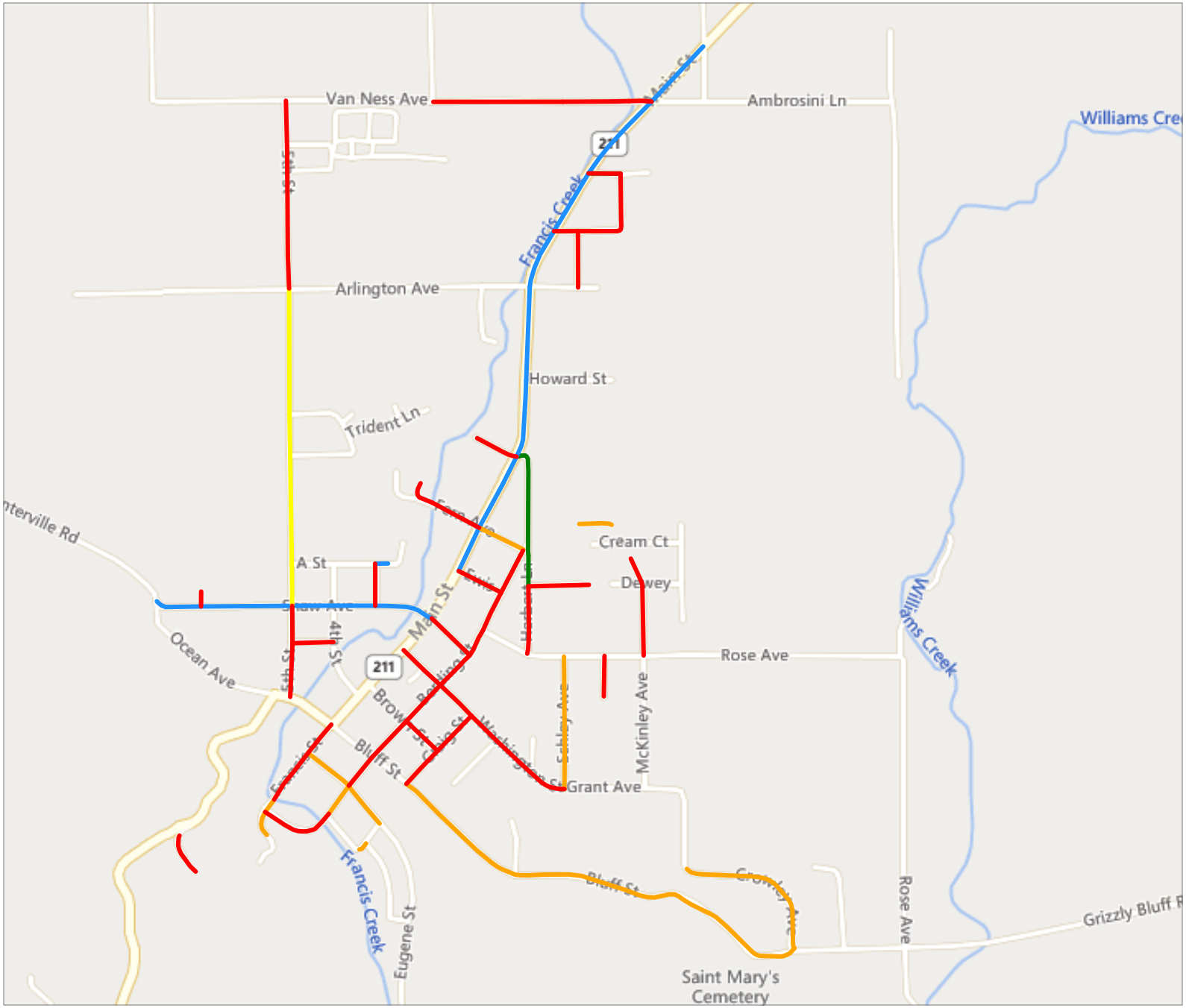
HCAOG

Scenario PCI Condition

Ferndale_SC4: Fund Level = $31K/yr_ inflation=8.5% - 2032 Project Period - Printed: 11/10/2022

Feature Legend

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



Appendix F

Sections Selected for Treatment – Scenario 1

Scenarios - Sections Selected for Treatment

Interest: 4.00% **Inflation: 4.00%** Printed: 11/10/2022

Scenario: Ferndale - SC1: Funding Level of $31000/Year

Year	Budget	PM	Year	Budget	PM	Year	Budget	PM
2023	$0	0%	**2027**	$0	0%	**2031**	$28,000	100%
2024	$18,600	77%	**2028**	$65,300	0%	**2032**	$42,100	100%
2025	$30,600	0%	**2029**	$0	0%			
2026	$39,000	0%	**2030**	$55,400	0%			

Year: 2024

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
HERBERT STREET	FERN AVE	MAIN ST	F-HERBST	030	660	37	24,420	R	AC	F - Ferndale	81	80	87	$14,815	16,309	SLURRY SEAL
MILTON AVENUE	LINCOLN ST	E END	F-MILAVE	020	176	35	6,160	R	AC	F - Ferndale	85	83	90	$3,737	14,006	SLURRY SEAL
													Treatment Total	$18,552		
									Year 2024 Area Total	**30,580**			**Year 2024 Total**	**$18,552**		

Year: 2025

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
JACOBSEN WAY	S CDS	N CDS	F-JACWAY	010	710	32	22,720	R	AC	F - Ferndale	72	69	78	$20,478	11,758	SLURRY SEAL W/ DIGOUTS
SHAMSI COURT	3RD ST	N CDS	F-SHAMCT	010	309	36	11,124	R	AC	F - Ferndale	66	62	73	$10,026	11,369	SLURRY SEAL W/ DIGOUTS
													Treatment Total	$30,505		
									Year 2025 Area Total	**33,844**			**Year 2025 Total**	**$30,505**		

Year: 2026

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
FRANCIS STREET	S END	SW BRIDGE	F-FRANST	010	221	24	5,304	R	AC	F - Ferndale	53	46	100	$38,947	5,787	2" AC OVERLAY W/ DIGOUTS
													Treatment Total	$38,947		
									Year 2026 Area Total	**5,304**			**Year 2026 Total**	**$38,947**		

Scenarios - Sections Selected for Treatment

Interest: 4.00% **Inflation: 4.00%** Printed: 11/10/2022

Scenario: Ferndale - SC1: Funding Level of $31000/Year

Year: 2028

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
SHAW AVENUE	OCEAN AVE	MAIN ST	F-SHAAVE	010	2,011	32	64,352	R	AC	F - Ferndale	72	63	73	$65,245	10,160	SLURRY SEAL W/ DIGOUTS
													Treatment Total	$65,245		
				Year 2028 Area Total			**64,352**						**Year 2028 Total**	**$65,245**		

Year: 2030

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
LINCOLN AVENUE	CROWLEY AVE	GRANT AVE	F-LINAVE	010	403	16	6,448	R	AC	F - Ferndale	60	45	100	$55,389	4,984	2" AC OVERLAY W/ DIGOUTS
													Treatment Total	$55,389		
				Year 2030 Area Total			**6,448**						**Year 2030 Total**	**$55,389**		

Year: 2031

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
OCEAN AVENUE	MAIN ST	CRAIG ST	F-OCEAVE	030	696	48	33,408	RMaC	AC	F - Ferndale	96	79	87	$27,941	14,590	SLURRY SEAL
													Treatment Total	$27,941		
				Year 2031 Area Total			**33,408**						**Year 2031 Total**	**$27,941**		

Year: 2032

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
HERBERT STREET	FERN AVE	MAIN ST	F-HERBST	030	660	37	24,420	R	AC	F - Ferndale	81	75	83	$20,275	12,754	SLURRY SEAL
MILTON AVENUE	LINCOLN ST	E END	F-MILAVE	020	176	35	6,160	R	AC	F - Ferndale	85	77	85	$5,114	12,455	SLURRY SEAL
													Treatment Total	$25,390		
				Year 2032 Area Total			**30,580**						**Year 2032 Total**	**$25,390**		
				Grand Total Section Area:			**204,516**						**Grand Total**	**$261,967**		

** - Treatment from Project Selection

Scenarios Criteria: Area ID = F - Ferndale

Scenarios - Sections Selected for Treatment

Interest: 8.50% Inflation: 8.50% Printed: 11/10/2022

Scenario: Ferndale_SC4: Fund Level = $31K/yr_ inflation=8.5%

Year	Budget	PM
2023	$0	0%
2024	$30,000	62%
2025	$22,300	0%
2026	$0	0%

Year	Budget	PM
2027	$55,000	0%
2028	$0	0%
2029	$68,700	0%
2030	$0	0%

Year	Budget	PM
2031	$72,100	0%
2032	$31,400	100%

Year: 2024

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
SHAMSI COURT	3RD ST	N CDS	F-SHAMCT	010	309	36	11,124	R	AC	F - Ferndale	66	64	74	$10,058	7,793	SLURRY SEAL W/ DIGOUTS
											Treatment Total			$10,058		
HERBERT STREET	FERN AVE	MAIN ST	F-HERBST	030	660	37	24,420	R	AC	F - Ferndale	81	80	87	$15,456	9,708	SLURRY SEAL
MILTON AVENUE	LINCOLN ST	E END	F-MILAVE	020	176	35	6,160	R	AC	F - Ferndale	85	83	90	$3,899	8,205	SLURRY SEAL
											Treatment Total			$19,355		
							Year 2024 Area Total		41,704		Year 2024 Total			$29,413		

Year: 2025

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
JACOBSEN WAY	S CDS	N CDS	F-JACWAY	010	710	32	22,720	R	AC	F - Ferndale	72	69	78	$22,289	7,138	SLURRY SEAL W/ DIGOUTS
											Treatment Total			$22,289		
							Year 2025 Area Total		22,720		Year 2025 Total			$22,289		

Year: 2027

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
HERBERT STREET	DEWEY AVE	FERN AVE	F-HERBST	020	197	37	7,289	R	AC	F - Ferndale	68	61	100	$54,997	2,784	1.5" AC OVERLAY W/ DIGOUTS
											Treatment Total			$54,997		
							Year 2027 Area Total		7,289		Year 2027 Total			$54,997		

** - Treatment from Project Selection

Scenarios Criteria: Area ID = F - Ferndale

Scenarios - Sections Selected for Treatment

Interest: 8.50% Inflation: 8.50% Printed: 11/10/2022

Scenario: Ferndale_SC4: Fund Level = $31K/yr_ inflation=8.5%

Year: 2029

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
LINCOLN AVENUE	CROWLEY AVE	GRANT AVE	F-LINAVE	010	403	16	6,448	R	AC	F - Ferndale	60	47	100	$68,670	2,288	2" AC OVERLAY W/ DIGOUTS
													Treatment Total	$68,670		
							Year 2029 Area Total		6,448				Year 2029 Total	$68,670		

Year: 2031

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
EUGENE STREET	HARRISON ST	END OF PAVEMENT	F-EUGEST	030	362	12	4,344	R	AC	F - Ferndale	22	0	100	$72,075	1,573	3"AC OVERLAY W/ DIGOUTS
													Treatment Total	$72,075		
							Year 2031 Area Total		4,344				Year 2031 Total	$72,075		

Year: 2032

Road Name	Begin Location	End Location	Street ID	Section ID	Length	Width	Area	FC	Surface Type	Area ID	Current PCI	Treatment PCI Before	Treatment PCI After	Cost	Rating	Treatment
HERBERT STREET	FERN AVE	MAIN ST	F-HERBST	030	660	37	24,420	R	AC	F - Ferndale	81	75	83	$29,685	5,555	SLURRY SEAL
													Treatment Total	$29,685		
							Year 2032 Area Total		24,420				Year 2032 Total	$29,685		
							Grand Total Section Area:		106,925				Grand Total	$277,128		

** - Treatment from Project Selection

Scenarios Criteria: Area ID = F - Ferndale