City of El Centro

2015 Pavement Management System Update

Submitted to:
City of El Centro
1275 W. Main Street
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# Table of Contents

- BACKGROUND ............................................................................................................. 1
- PURPOSE ..................................................................................................................... 2
- PAVEMENT NETWORK AND CURRENT CONDITION .................................................. 3
- CURRENT MAINTENANCE PRACTICES ....................................................................... 7
- BUDGET NEEDS ........................................................................................................... 9
- BUDGET SCENARIOS ................................................................................................. 11
  - Scenario 1: City’s Current Budget ($16.8 million) .................................................... 12
  - Scenario 2: Maintain Current Pavement Condition ($30.59 million) ......................... 13
  - Scenario 3: Increase Network PCI to 75 ($36.71 million) .......................................... 14
- SUMMARY .................................................................................................................. 15
- CONCLUSIONS .......................................................................................................... 17
List of Appendices

Appendix A: Section Condition Inventory
   Section PCI Listing: Sorted by Street Name

Appendix B: Preventive Maintenance and Rehabilitation (M&R) Decision Tree

Appendix C: Maintenance and Rehabilitation History (2005-2015)

Appendix D: Budget Needs:
   Projected PCI/Cost Summary Report
   Rehabilitation Treatment/Cost Summary Report
   Preventive Maintenance Treatment/Cost Summary Report
   Scenario 1-3:
   Cost Summary Report
   Network Condition Summary Report
   Sections Selected for Treatment Report

Appendix E: PCI Maps
List of Tables

Table 1: Pavement Network and Condition Summary .......................................................... 5
Table 2: Pavement Condition Category Breakdown by Functional Class ............................ 6
Table 3: Alternative Treatment Options .............................................................................. 7
Table 4: Results of Budget Needs ................................................................. .......................... 10
Table 5: Summary of Results for Scenario 1 ................................................................. 12
Table 6: Summary of Results for Scenario 2 ................................................................. 13
Table 7: Summary of Results for Scenario 3 ................................................................. 14

List of Figures

Figure 1: Examples of Streets with Different PCIs .......................................................... 3
Figure 2: Pavement Condition Categories ..................................................................... 4
Figure 3: Overall PCI Breakdown and by Functional Class ........................................... 6
Figure 4: Costs of Maintaining Pavements over Time .................................................. 8
Figure 5: PCI vs. Deferred Maintenance for Scenario 1 ................................................ 12
Figure 6: PCI vs. Deferred Maintenance for Scenario 2 ................................................ 13
Figure 7: PCI vs. Deferred Maintenance for Scenario 3 ................................................ 14
Figure 8: Pavement Condition Index by Scenario by Year ........................................... 15
Figure 9: Deferred Maintenance by Scenario by Year .................................................. 16
Figure 10: Asphalt Price Index (1999-2014, Caltrans) .................................................. 17
BACKGROUND

The City of El Centro has previously used the PAVER pavement management software. For the 2015 update, the City chose to convert to the StreetSaver™ Pavement Management System (PMS) to better meet the goals and objectives established by the City.

Broadly, a "... pavement management system is designed to provide objective information and useful data for analysis so that ... managers can make more consistent, cost-effective, and defensible decisions related to the preservation of a pavement network."

In other words, a PMS is designed to assist cities in answering questions such as:

- What does the City’s street network consist of? How many miles of roads are eligible for federal, state or other funds?
- What is the existing condition of the City’s maintained roads? Is this an acceptable level for the City? If not, what is an acceptable level? How much additional funding is needed to achieve an acceptable level?
- Are there roads in specific areas that are much worse than others, and if so, how much worse?
- How will the condition of the City’s maintained roads respond over time under existing funding levels?
- What maintenance and rehabilitation strategies exist to improve current road conditions? What maintenance activities or treatments have occurred in the past on any given road?
- What impact would either additional funding or a decrease in funding, have on the condition of the overall pavement network?
- What is the backlog of maintenance and rehabilitative work that should be done? What are the future maintenance and rehabilitation needs? Are there different needs for different classes of roads i.e. arterial vs. residential streets?
- Under different funding levels, what is the most cost-effective way to implement a multi-year capital improvement program? Maintenance work program?
- What are the road repair priorities, given different budgeting scenarios?

The conversion to the StreetSaver™ software will allow the City to better answer the above questions. StreetSaver™ was developed by the Metropolitan Transportation Commission (MTC), and is the most widely used PMS software in California.

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PURPOSE

The purpose of this report is to assist decision makers in utilizing the results of the StreetSaver™ PMS. Specifically, this report links the recommended repair program costs to the City’s current and projected budget alternatives to improve overall maintenance and rehabilitation strategies. This report assesses the adequacy of existing revenues to meet the maintenance needs recommended, and maximizes the return from expenditures by:

- Developing a rehabilitation and preventive maintenance program;
- Selecting streets for the most cost effective repairs; and
- Identifying long term funding strategies.

This report assists the City with identifying maintenance priorities specific to its needs. It examines the overall condition of the street network and highlights options for improving the current network level pavement condition index (PCI). These options are developed by conducting "what-if" analyses using StreetSaver™. By varying the budget amounts available for pavement maintenance and repair, one can show how different funding strategies can impact the City’s streets over the next ten years.
PAVEMENT NETWORK AND CURRENT CONDITION

The City of El Centro is responsible for the maintenance of approximately 135.5 centerline miles of streets of which 37.4 miles are arterials, 18.8 miles are collectors, and 101 miles are residential streets. Street pavements are one of the City's most valuable assets, and the replacement value is estimated to be approximately $165.27 million. Note that this does not include any improvements (e.g. widening) or other non-pavement elements such as sidewalks, storm drains, traffic signals, signs etc.

The pavement condition index, or PCI, is a measurement of pavement grade or condition and ranges from 0 to 100. A newly constructed street will have a PCI of 100, while a failed street will have a PCI of 20 or less. The pavement condition is primarily affected by the climate, traffic loads and volumes, construction materials and age. Figure 1 shows streets with different ranges of PCIs.

![Broadway St near 11th St](image1) PCI = 96
![7th St near Brighton Ave](image2) PCI = 68
![Commercial Ave near 2nd St](image3) PCI = 43
![Hope Ave near Ross Ave](image4) PCI = 6

Figure 1: Examples of Streets with Different PCIs
Figure 2 illustrates the definitions of the five pavement condition categories. The “fair” category includes roads with both non-load related (weathering and raveling) and load related (e.g. alligator cracking) distresses. Since these distresses are markedly different, the treatments assigned are also correspondingly different, and the costs associated with them. Generally, roads with load-related will require higher costs for repairs. The two categories are identified by II (non-load related) and III (load related). The StreetSaver program will assign the appropriate treatments and costs to roads identified with each category.

<table>
<thead>
<tr>
<th>Condition Category</th>
<th>Pavement Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Very Good</td>
</tr>
<tr>
<td>II/III</td>
<td>Fair (non-load)</td>
</tr>
<tr>
<td></td>
<td>Fair (load-related)</td>
</tr>
<tr>
<td>IV</td>
<td>Poor</td>
</tr>
<tr>
<td>V</td>
<td>Very Poor</td>
</tr>
</tbody>
</table>

*50 for residential streets  
**35 for residential streets

**Figure 2: Pavement Condition Categories**

The scope of work included performing walking pavement condition inspection as per ASTM D6433-11 procedures. These are performed with one-person crew (for high volume streets like expressways or major arterials, two-person crews may be needed for safety). A minimum of one sample unit per section will be inspected. Approximately one sample unit will be inspected for each 1,000 lineal feet of roadway. Any areas which are not typical of the entire section will be inspected and recorded as a special sample unit. The major advantage of this survey method is that it is highly accurate, since cracks and all other pavement distresses are measured and recorded. The inspections were completed in June 2015. Note that the inspections did not address non-pavement issues such as traffic, safety and street hazards, geometric issues, street shoulders, sidewalks, curb and gutters, drainage issues or immediate maintenance needs. There are 20 asphalt distresses and 19 concrete distresses identified in ASTM D6433, and they are:

---

2 ASTM. "ASTM D6433-11." Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys
Asphalt Concrete Distresses
1. Alligator Cracking (Fatigue)
2. Bleeding/flushing
3. Block Cracking
4. Bumps & Sags
5. Corrugation
6. Depression
7. Edge Cracking
8. Joint Reflective Cracking
9. Lane/Shoulder Drop-off
10. Longitudinal & Transverse Cracking
11. Patch/Utility Cut Patch
12. Polished Aggregate
13. Potholes
14. Railroad Crossing
15. Rutting
16. Shoving
17. Slippage Cracking
18. Swell
19. Raveling
20. Weathering

PCC Distresses
21. Blowup/Buckling
22. Corner Break
23. Divided Slab
24. Durability ("D") Cracking
25. Faulting
26. Joint Seal Damage
27. Lane/Shoulder Drop-off
28. Linear Cracking
29. Patching, Large/Utility Cuts
30. Patching, Small
31. Polished Aggregate
32. Popouts
33. Pumping
34. Punchout
35. Railroad Crossing
36. Scaling, Map Cracking & Crazing
37. Shrinkage Cracks
38. Spalling, Corner
39. Spalling, Joint

The City's pavement network average weighted (by area) PCI is 70, which is in the “Very Good” condition category. However, the average PCI does not completely describe the street network as show in Tables 2 and 3. Table 2 illustrates that the collector and residential streets have an average weighted (by area) PCI that is significantly better than the arterials. This is a point of concern for the City, as arterial streets comprise approximately one third of the pavement area and carry higher traffic volumes.

Table 1: Pavement Network and Condition Summary

<table>
<thead>
<tr>
<th>Functional Class</th>
<th>Centerline Miles</th>
<th>Lane Miles</th>
<th>Pavement Area (sf)</th>
<th>Percent Area</th>
<th>Average PCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial</td>
<td>35.6</td>
<td>109.5</td>
<td>8,382,330</td>
<td>29.9%</td>
<td>67</td>
</tr>
<tr>
<td>Collector</td>
<td>28.5</td>
<td>61.6</td>
<td>5,775,259</td>
<td>20.6%</td>
<td>72</td>
</tr>
<tr>
<td>Residential</td>
<td>71.5</td>
<td>153.8</td>
<td>13,887,071</td>
<td>49.5%</td>
<td>72</td>
</tr>
<tr>
<td>Total</td>
<td>135.5</td>
<td>324.9</td>
<td>28,044,660</td>
<td>100.0%</td>
<td>70</td>
</tr>
</tbody>
</table>

Table 3 shows the distribution of pavements by functional class and condition category. A majority of the network (93.7%) is in “Very Good” and “Fair” conditions, mostly composed of residential streets. Conversely, only 3.1% is considered to be in “Very Poor” condition with another 3.3% in “Poor” condition.
Table 2: Pavement Condition Category Breakdown by Functional Class

<table>
<thead>
<tr>
<th>Condition Category</th>
<th>PCI Range</th>
<th>Arterial (%)</th>
<th>Collector (%)</th>
<th>Residential (%)</th>
<th>Total Network (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good (I)</td>
<td>65-100*</td>
<td>18.8%</td>
<td>15.8%</td>
<td>44.2%</td>
<td>78.9%</td>
</tr>
<tr>
<td>Fair (II/III)</td>
<td>40-64*</td>
<td>8.3%</td>
<td>3.9%</td>
<td>2.6%</td>
<td>14.8%</td>
</tr>
<tr>
<td>Poor (IV)</td>
<td>20-39*</td>
<td>1.2%</td>
<td>0.5%</td>
<td>1.6%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Very Poor (V)</td>
<td>0-19</td>
<td>1.5%</td>
<td>0.4%</td>
<td>1.1%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Total (%)</td>
<td></td>
<td>29.9%</td>
<td>20.6%</td>
<td>49.5%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

*PCI ranges for “Very Good”, “Fair”, and “Poor” condition categories of Residential streets are 50-100, 35-49 and 20-34 respectively.

Figure 3 presents the same information as Table 2, but in a graphical format.

Figure 3: Overall PCI Breakdown and by Functional Class

Appendix A contains the PCI listing for all streets in the City. A GIS map showing current PCI on each street is shown in Appendix D.
CURRENT MAINTENANCE PRACTICES

Upon completion of the pavement condition inspections, NCE reviewed current M&R strategies with City staff. This included the recommendation and selection of appropriate treatments such as slurry seals or overlays, and the determination of unit costs.

Once appropriate M&R alternatives were defined, a treatment unit cost was determined for each alternative and these were entered into the StreetSaver™ decision tree for use in the budgetary analyses. The unit costs are based on recent bid tabs from the City, and include:

- All related construction costs such as mobilization, traffic control, digouts, paving, striping, raising monuments etc.;
- Engineering and design costs include inspections and material testing etc.

In meetings with the City Staff, a variety of treatments were discussed, such as slurry seals and overlays. Table 4 below lists some of the rehabilitation treatments utilized in the City. The treatment decision tree used for calculating budget scenarios is shown in Appendix B.

<table>
<thead>
<tr>
<th>Condition Category</th>
<th>Functional Class</th>
<th>Preferred Treatment</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good</td>
<td>Arterial and Collector</td>
<td>Crack Seal and Slurry Seal</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>Arterial and Collector</td>
<td>1.75” ARHM³ overlay with mill</td>
<td>2” AC⁴ Overlay with mill and digouts</td>
<td>System IV</td>
</tr>
<tr>
<td></td>
<td>Residential</td>
<td></td>
<td></td>
<td>System II</td>
</tr>
<tr>
<td>Poor</td>
<td>Arterial and Collector</td>
<td>¾” leveling course with 1.5” ARHM</td>
<td>System III</td>
<td>System IV</td>
</tr>
<tr>
<td></td>
<td>Residential</td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Very Poor</td>
<td>Arterial and Collector</td>
<td>4-5” ARHM overlay with 2.5” leveling course</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

³ ARHM = Asphalitic Rubberized Hot Mix
⁴ AC = Asphalitic Concrete

The City's M&R work between 2005-2015 are shown in Appendix C.
Figure 4 illustrates that pavement maintenance follows the old colloquial saying of "pay now or pay more later". Historical data has shown that it costs much less to maintain streets in good condition than to repair streets that have failed. By allowing pavements to deteriorate, streets that once cost $3.90/square yard to slurry seal may soon cost as much as $65/square yard to reconstruct. In other words, delays in repairs can result in costs increasing over 16-fold. The costs shown in Figure 4 are based on data from the City's recent bid tabs.

The pavement deterioration curve shown by the red line describes how pavements deteriorate over time. In general, arterials will be expected to have a service life of 20 years, while those for residential streets may exceed 30 years.

Figure 4: Costs of Maintaining Pavements over Time
BUDGET NEEDS

Once the pavement condition has been determined, and the appropriate maintenance treatments are assigned in the decision tree, then it is possible to calculate the funding needs for the City’s maintained streets. In other words, the StreetSaver™ program seeks to answer the question:

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

Therefore, based on the principle that it costs less to maintain streets in good condition than those in bad condition, StreetSaver™ will develop a maintenance strategy that will improve the overall condition of the streets and then maintain it at that level. The condition of each street determines the appropriate maintenance and rehabilitation treatment and cost from the decision tree.

Using this process, the entire street network was evaluated in this fashion and summed. The results indicated that the maintenance needs is approximately $45.21 million over the next ten years. An annual 3% inflation factor was assumed. If the City follows the funding strategy recommended by the program, the average PCI will increase to 82 and the deferred maintenance will be eliminated. On the other hand, if no repairs are performed, then the network PCI will fall to 49.

Of the $45.21 million, approximately $17.79 million (about 39.34%) is planned for preventive maintenance, while the rest is allocated for more costly rehabilitation and reconstruction treatments. Again, preventive maintenance includes treatments such as slurry seals and crack seals, while rehabilitation includes overlays and reconstruction.

Note that in this analysis, the total funding needed is “front-loaded” i.e., it is less expensive to repair the streets in the first year than in subsequent years due to the effects of both inflation and deferring maintenance. Therefore, the majority of the funding is allocated within the first year of the analysis period. The first year’s need of $14.55 million reflects the City’s current unfunded backlog.

The results of the budget needs analysis are summarized in Table 5.
### Table 4: Results of Budget Needs

<table>
<thead>
<tr>
<th>Year</th>
<th>16/17</th>
<th>17/18</th>
<th>18/19</th>
<th>19/20</th>
<th>20/21</th>
<th>21/22</th>
<th>22/23</th>
<th>23/24</th>
<th>24/25</th>
<th>25/26</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preventive Maintenance ($ Million)</td>
<td>2.40</td>
<td>1.03</td>
<td>1.38</td>
<td>0.62</td>
<td>0.17</td>
<td>0.13</td>
<td>1.56</td>
<td>4.90</td>
<td>2.85</td>
<td>2.75</td>
<td>17.79</td>
</tr>
<tr>
<td>Rehabilitation ($ Million)</td>
<td>12.15</td>
<td>5.70</td>
<td>3.24</td>
<td>2.10</td>
<td>2.21</td>
<td>1.51</td>
<td>0.40</td>
<td>0.00</td>
<td>0.11</td>
<td>0.00</td>
<td>27.43</td>
</tr>
<tr>
<td>Total Budget ($ Million)</td>
<td>14.55</td>
<td>6.73</td>
<td>4.63</td>
<td>2.72</td>
<td>2.38</td>
<td>1.64</td>
<td>1.96</td>
<td>4.90</td>
<td>2.96</td>
<td>2.75</td>
<td>45.22</td>
</tr>
<tr>
<td>Untreated PCI</td>
<td>70</td>
<td>67</td>
<td>65</td>
<td>63</td>
<td>61</td>
<td>59</td>
<td>56</td>
<td>54</td>
<td>52</td>
<td>49</td>
<td>N/A</td>
</tr>
<tr>
<td>Treated PCI</td>
<td>80</td>
<td>81</td>
<td>82</td>
<td>82</td>
<td>81</td>
<td>81</td>
<td>81</td>
<td>82</td>
<td>82</td>
<td>82</td>
<td>N/A</td>
</tr>
</tbody>
</table>
BUDGET SCENARIOS

Having determined the maintenance needs of the City’s street network, the next step in developing a cost-effective maintenance and rehabilitation strategy is to conduct several “what-if” analyses. Although the front loading process is preferable, it comes with a very large commitment of funds in the first several years. Most agencies do not have that kind of funding available hence a more realistic approach is needed. Using the StreetSaver™ budget scenario module, various budget scenarios are performed to determine the funding required to achieve an acceptable pavement condition level.

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

The following budget scenarios were performed as part of this report:

**Scenario 1: City’s Current Budget ($16.8 Million)** – This scenario shows the impact of the City’s current annual budget of $1.5 million with a projected increase of 2.5% per year. The network PCI will decrease from 70 to 62 by fiscal year (FY) 2025/26, dropping the network pavement condition from “Very Good” to “Fair” condition. The deferred maintenance will increase threefold from $14.55 million to $47.06 million. Furthermore, 19% of the streets will be in the “Poor” and “Very Poor” condition categories compared to 6.4% in 2015.

**Scenario 2: Maintain Current Pavement Condition ($30.59 million)** – An annual budget of $2.75 million with a 2.5% increase each year will maintain the network PCI at 70 to 71 over the next ten years. The deferred maintenance will be approximately $25 million. Additionally, 9.1% of streets will be in the “Poor” or “Very Poor” condition category by FY 2025/26.

**Scenario 3: Increase Network PCI to 75 ($36.71 million)** – Increasing the annual budget to $3.3 million with a 2.5% increase per year will raise the network PCI from 70 to 75 by FY 2025/26. The deferred maintenance will slightly increase to $16.52 million and 5.4% of streets will be in the “Poor” and “Very Poor” condition.

Each budget scenario incorporates a 3% inflation rate.

**Note:** Deferred maintenance consists of pavement maintenance that is needed but cannot be performed due to lack of funding. It is often referred to as “unfunded backlog.” More detailed results of the budget needs and scenarios, as well as, candidate street sections selected for treatments can be found in Appendix D.
Scenario 1: City’s Current Budget ($16.8 million)

This scenario shows the impact of the City’s annual budget of $1.5 million with a projected increase of 2.5% per year. At the end of the analysis period in FY 2025/26, the deferred maintenance will increase from $14.55 million to $47.06 million. Furthermore, the network PCI will drop from 70 to 62 and 19% of the streets will be in the “Poor” or “Very Poor” condition categories compared to 6.4% in 2015.

Table 5: Summary of Results for Scenario 1

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Before Work</th>
<th>16/17</th>
<th>17/18</th>
<th>18/19</th>
<th>19/20</th>
<th>20/21</th>
<th>21/22</th>
<th>22/23</th>
<th>23/24</th>
<th>24/25</th>
<th>25/26</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget ($M)</td>
<td>N/A</td>
<td>1.50</td>
<td>1.54</td>
<td>1.58</td>
<td>1.62</td>
<td>1.66</td>
<td>1.70</td>
<td>1.74</td>
<td>1.78</td>
<td>1.83</td>
<td>1.87</td>
<td>16.80</td>
</tr>
<tr>
<td>Preventive Maintenance ($M)</td>
<td>N/A</td>
<td>0.23</td>
<td>0.23</td>
<td>0.24</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
<td>0.26</td>
<td>0.27</td>
<td>0.19</td>
<td>0.20</td>
<td>2.36</td>
</tr>
<tr>
<td>Rehabilitation ($M)</td>
<td>N/A</td>
<td>1.27</td>
<td>1.31</td>
<td>1.34</td>
<td>1.37</td>
<td>1.41</td>
<td>1.44</td>
<td>1.48</td>
<td>1.51</td>
<td>1.64</td>
<td>1.67</td>
<td>14.44</td>
</tr>
<tr>
<td>Deferred Maintenance ($M)</td>
<td>14.55</td>
<td>18.33</td>
<td>22.43</td>
<td>25.62</td>
<td>27.09</td>
<td>29.18</td>
<td>31.34</td>
<td>35.67</td>
<td>39.35</td>
<td>42.40</td>
<td>47.06</td>
<td>N/A</td>
</tr>
<tr>
<td>PCI Treated</td>
<td>70</td>
<td>71</td>
<td>70</td>
<td>69</td>
<td>67</td>
<td>66</td>
<td>66</td>
<td>65</td>
<td>64</td>
<td>63</td>
<td>62</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Figure 5: PCI vs. Deferred Maintenance for Scenario 1
Scenario 2: Maintain Current Pavement Condition ($30.59 million)

With an annual budget of $2.75 million and an annual increase of 2.5%, the City will be able maintain the network PCI at 70 to 71 while the deferred maintenance will increase to $25.65 million. Approximately 9.1% of streets will be in the "Poor" or "Very Poor" condition category by FY 2025/26.

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Before Work</th>
<th>16/17</th>
<th>17/18</th>
<th>18/19</th>
<th>19/20</th>
<th>20/21</th>
<th>21/22</th>
<th>22/23</th>
<th>23/24</th>
<th>24/25</th>
<th>25/26</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget (SM)</td>
<td>N/A</td>
<td>2.75</td>
<td>2.82</td>
<td>2.89</td>
<td>2.96</td>
<td>3.02</td>
<td>3.09</td>
<td>3.16</td>
<td>3.23</td>
<td>3.30</td>
<td>3.37</td>
<td>30.59</td>
</tr>
<tr>
<td>Preventive Maintenance (SM)</td>
<td>N/A</td>
<td>0.41</td>
<td>0.43</td>
<td>0.44</td>
<td>0.44</td>
<td>0.46</td>
<td>0.47</td>
<td>0.49</td>
<td>0.50</td>
<td>0.50</td>
<td>0.51</td>
<td>4.64</td>
</tr>
<tr>
<td>Rehabilitation (SM)</td>
<td>N/A</td>
<td>2.34</td>
<td>2.39</td>
<td>2.45</td>
<td>2.51</td>
<td>2.56</td>
<td>2.63</td>
<td>2.67</td>
<td>2.73</td>
<td>2.80</td>
<td>2.86</td>
<td>25.95</td>
</tr>
<tr>
<td>PCI Treated</td>
<td>70</td>
<td>72</td>
<td>71</td>
<td>71</td>
<td>71</td>
<td>71</td>
<td>71</td>
<td>71</td>
<td>71</td>
<td>71</td>
<td>71</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Scenario 3: Increase Network PCI to 75 ($36.71 million)

In order to raise the network PCI to 75 by the end of FY 2025/26, the City will need to increase the budget to $3.3 million per year with an 2.5% annual increase. The deferred maintenance will increase to $16.52 million and 5.4% of streets will be in the “Poor” or “Very Poor” condition category by FY 2025/26 compared to 6.4% in 2015.

### Table 7: Summary of Results for Scenario 3

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Before Work</th>
<th>16/17</th>
<th>17/18</th>
<th>18/19</th>
<th>19/20</th>
<th>20/21</th>
<th>21/22</th>
<th>22/23</th>
<th>23/24</th>
<th>24/25</th>
<th>25/26</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budget ($M)</td>
<td>N/A</td>
<td>3.30</td>
<td>3.38</td>
<td>3.46</td>
<td>3.55</td>
<td>3.63</td>
<td>3.71</td>
<td>3.79</td>
<td>3.88</td>
<td>3.96</td>
<td>4.04</td>
<td>36.71</td>
</tr>
<tr>
<td>Preventive Maintenance ($M)</td>
<td>N/A</td>
<td>0.50</td>
<td>0.51</td>
<td>0.54</td>
<td>0.53</td>
<td>0.55</td>
<td>0.57</td>
<td>0.57</td>
<td>0.58</td>
<td>0.60</td>
<td>0.61</td>
<td>5.57</td>
</tr>
<tr>
<td>Rehabilitation ($M)</td>
<td>N/A</td>
<td>2.80</td>
<td>2.87</td>
<td>2.93</td>
<td>3.01</td>
<td>3.07</td>
<td>3.14</td>
<td>3.22</td>
<td>3.30</td>
<td>3.35</td>
<td>3.43</td>
<td>31.14</td>
</tr>
<tr>
<td>Deferred Maintenance ($M)</td>
<td>14.55</td>
<td>16.53</td>
<td>18.73</td>
<td>19.92</td>
<td>19.10</td>
<td>18.85</td>
<td>17.87</td>
<td>18.31</td>
<td>18.22</td>
<td>17.63</td>
<td>16.52</td>
<td>N/A</td>
</tr>
<tr>
<td>PCI Treated</td>
<td>70</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>73</td>
<td>73</td>
<td>74</td>
<td>74</td>
<td>74</td>
<td>75</td>
<td>N/A</td>
</tr>
</tbody>
</table>
SUMMARY

Figure 8 illustrates the change in PCI over time for the three different budget scenarios. Scenario 1 shows that the City's current budget ($16.8 million) will drop the PCI to 62 by FY 2025/26. A total budget of $30.59 million over ten years (Scenario 2) will maintain the network PCI at 70 to 71 and budget of $36.71 million will increase the PCI to 75 by the end of the analysis period.

Maps showing the City's current and projected PCI for each budget scenario can be found in Appendix E.
From Figure 9, all the budget scenarios show an increase in deferred maintenance. The City’s current budget of $16.8 million over ten years (Scenario 1) will increase the current deferred maintenance three times within ten years, from $14.55 million to $47.06 million. By spending $30.59 million over this period (Scenario 2), the deferred maintenance will increase to approximately $25 million. And lastly, a total budget of $36.71 million (Scenario 3) will increase the deferred maintenance to $16.52 million by FY 25/26.

![Graph showing deferred maintenance by scenario by year](image)

- **Scenario 1:** City’s Current Budget ($16.80 million)
- **Scenario 2:** Maintain Current Pavement Condition ($30.59 million)
- **Scenario 3:** Increase Network PCI to 75 ($36.71 million)

**Figure 9: Deferred Maintenance by Scenario by Year**
CONCLUSIONS

The City of El Centro has a substantial investment in its street network, which is valued at approximately $165.27 million. Overall, the streets are currently in “Very Good” condition with an average PCI of 70. However, the arterial network has an overall PCI of 67, which is lower than the network average. This is atypical, since most cities are able to obtain federal or state funding to maintain their higher volume facilities.

Pavement Funding

The City currently has an annual paving budget of $1.5 million with a projected increase of 2.5% per year. However, the analysis indicates that this budget is not sufficient to maintain the current pavement condition and the network PCI will deteriorates to 62 over the next ten years.

It should be noted that a significant unknown is the future cost of rehabilitation; with the recent volatility in oil prices, we would recommend that the City carefully monitor future construction costs and be ready to adapt to large increases if necessary. The graph below illustrates the changes in the Asphalt Price Index (source: Caltrans) since 1999. As can be seen in Figure 10, asphalt prices have been extremely volatile since 2007.

![Asphalt Price Index Graph](image)
In light of the substantial financial commitment that is required to maintain and/or improve street conditions and the increase in construction costs, it is relevant to discuss the various possible financing alternatives to help fund pavement rehabilitation and preventive maintenance for the City. The following alternatives are some of the possible ways that the City may wish to consider.

- Truck Route Permit Fee – Leverages a surcharge fee on trucks for use of City streets to help recoup the costs of heavy wheel loads imposed by truck traffic.
- Residential Waste Collection Fee – Surcharge is leveraged on waste companies to account for damage to pavement incurred by heavy waste collection trucks.
- Development fees – Fees assessed to new developments to account for increased traffic associated with new residential and commercial tenants.
- Utility Cut Impact Fee – Fee is leveraged against utility to provide compensation for reduced pavement life due to utility cuts and patches.
- Devote more revenues to street maintenance.
- Citywide Assessment Districts.

**Pavement Maintenance Strategies**

The City's pavement maintenance strategies include seals, and overlays. Since a large percentage of pavements are in "Very Good" condition, it is important to preserve them. Crack sealing, one of the least expensive treatments, can keep moisture out of pavements and prevent the underlying aggregate base from premature failures. Life-extending surface seals, such as slurry seals, are also cost-effective for pavements currently in good condition.

Therefore, NCE recommends that the City continue the efforts in the current preventive maintenance program for collector and residential streets as outlined in the decision tree, while at the same time rehabilitating streets that are in a lower condition.

**Re-inspection Strategies**

In order to monitor future pavement performance and ongoing maintenance needs, it is recommended that arterial and collector streets in the network are re-inspected every two years and residential streets every four to five years.

**Maintenance and Rehabilitation Decision Tree**

The maintenance and rehabilitation decision tree and the associated unit costs should be reviewed and updated annually to reflect new construction techniques/repairs and changing costs so that the budget analysis results can be reliable and accurate.

**Next Steps**

To summarize, NCE recommends that the City considers the following steps:

- At a minimum, maintain the network PCI at 70. Decreasing the PCI further will increase the future or deferred maintenance and cost;
- Review and update the maintenance and rehabilitation decision tree and associated unit costs annually to reflect new construction techniques/repairs and costs so that the budget analysis results can be reliable and accurate;
- Continue to fund the preventive maintenance strategies as aggressively as possible;
- Consider alternative maintenance treatments as technology changes occur;
• Monitor future pavement performance and on-going maintenance needs. It is recommended that arterial and collector streets in the network are re-inspected every two years and residential streets every four to five years.