Successful Pavement Management: Staying Sane while Handling both the Unplanned and the Everyday
March 28, 2018

Session Participants and Roles

Unplanned

Jared Carter
• Madera County, Deputy Public Works Director

Brian Balbas
• Contra Costa County, Public Works Director

Everyday

Paul Barradas, PE, PMP
• City of San Francisco, Project Manager

Olesya Tribukait, P.E., M.S.
• Sonoma County TPW, Deputy Director

James Signore, PhD., P.E.
• NCE, Moderator
Unexpected Impacts to Your Road Network

Didn’t exactly see that coming.....

Jared Carter, Madera County
Deputy Public Works Director

Overview

- About Madera County
- Two Projects
  - Project Impacts
  - Dealing with the Impacts
- “Lessons Learned”
Madera County

- Established in 1893 (separated from Fresno County)
- 2,153 square miles
- 154,998 population (2015)
- 170 Bridges
- 1,511 Maintained Mileage (avg. PCI = 46)
- Approx. 400 Miles of Maintenance District Roads

Fairmead Interchange (Project #1)

- $51 Million Caltrans project
- Construct new interchange
- Convert 3 miles of SR 99 from 4-lane expressway to 6-lane divided freeway
- Construct frontage roads
- Broke ground in 2006
- Completed late 2009
Fairmead Interchange (Project #1)

620,000 CY of imported borrow

Fairmead Interchange (Project #1)
Fairmead Interchange (Project #1)

approx. 44,000 truck loads
Fairmead Interchange (Project #1)

Project Impacts:

- Notice to Contractor to perform patching/maintenance

Resolution Attempts:

- Revoke encroachment permit
- Discussions with Caltrans PM on maintenance and restoration
- Meet with Caltrans District 6 Director and Assemblyman Mike Villines
Fairmead Interchange (Project #1)

**Ultimate Resolution:**
- Meeting with Caltrans State Director and Assemblyman Villines in Sacramento (2010)
- Assemblyman Villines prepared to propose legislation to address State project impacts to Local facilities
- Caltrans worked with Contractor to rehabilitate approximately 3 miles of haul route (most severely impacted)

High Speed Rail (Project #2)

- **Construction Package 1 (CP-1) & CP-1 Extension**
- **Construct HSR rail line**
  - E. American Ave. (south of Fresno) to Avenue 19 in Madera County (approx. 15 miles in Madera County)
- **11 Grade Separations of Madera County Roads**
- **Design-Build Contract with Tutor-Perini-Zachary-Parsons (TPZP)**
High Speed Rail (Project #2)
High Speed Rail (Project #2)

1,012,000 CY of imported borrow...
...72,300 truck loads...
...and counting...

High Speed Rail (Avenue 8)

222,199 CY of imported borrow.....
High Speed Rail (Avenue 11)

166,918 CY of imported borrow.....
High Speed Rail (Avenue 12)

496.609 CY of imported borrow.....
High Speed Rail (Project #2)

Initial Approach:

• Standard Encroachment Permit (Road Closures)

• Permit Conditions:
  - Traffic Control/Detour Signs
  - Maps of Haul & Detour Routes
  - Maintain Haul & Detour Routes

High Speed Rail (Project #2)

Revised Approach:

• Specialized Encroachment Permit (Road Closures)

• Revised Permit Conditions:
  - Traffic Control/Detour Signs
  - Maps of Haul & Detour Routes
  - Maintain Haul & Detour Routes
  - Haul & Detour Route Maintenance Plan and Logs
  - 3rd Party Pre/Post PCI Evaluation of Haul Routes
  - Bond for $45/SY of Haul Route (per map)
Lessons Learned

- Early communication/discussion with project sponsor/agency
- Know and understand your road network (condition, layout, traffic volumes, etc.)
- Get familiar with Vehicle Code and local codes related to hauling
- Prepare to commit adequate resources for monitoring
- Get Counsel’s input sooner rather than later

Thank You
Morgan Territory Road Slide

• Fully closed road on February 24, 2017
• Affected hundreds of residents
• Waterline broke
• Slide was moving up to 1 foot per day
• Long detour on the south section of the road
• Services impacted:
  • Emergency Response
  • Water
  • PG&E
  • AT&T
  • Garbage
  • Mail
  • Propane
  • Schools
Morgan Territory Road Detour

Morgan Territory Road Slide
Morgan Territory Road Slide

- January 10, 2017 the culvert failed and the roadway washed out.
- 9 foot CMP installed in 1930’s.
- Had completed previous repairs in 1980’s and 1990’s.
- Collector road, alternative commute route, popular bike route.

Alhambra Valley Road Washout

- January 10, 2017 the culvert failed and the roadway washed out.
- 9 foot CMP installed in 1930’s.
- Had completed previous repairs in 1980’s and 1990’s.
- Collector road, alternative commute route, popular bike route.
Alhambra Valley Road Washout

Alhambra Valley Road Washout
Alhambra Valley Road Washout

Miscellaneous Storm Damage
Lesson’s Learned from Storm Damage Response

- Communication
- Emergency Declaration
- Documentation
- Build an inclusive team
- Focus on solutions, but remain flexible
- Prepare in advance
- Follow-up and be persistent with Cal-OES
- Senate Bill 1

Morgan Territory Road
Alhambra Valley Road Bridge

Thank You

Contra Costa County Public Works Department
City of San Francisco
Successful Pavement Management

Paul Barradas, PE, PMP, Project Manager

Overview

• Background
• Asset Management
• Reporting
• Achievements and Challenges
SF Pavement Management and Mapping System

12,900+ Street Segments
942 Centerline Miles
2,140 Lane Miles

San Francisco’s Street Network

Local: 8,008
Arterial: 3,488
Collector: 1,421
SF Pavement Management and Mapping System

1990’s
• Pavement Management performed with in-house methods; paper based

2000’s
• Pavement Management converted to regional methods; PCI scoring system

Today
• Pavement Management expanded; utilized to drive decisions

Challenges
Challenges

- Keep Good Streets Good
- Right Road, Right Treatment, Right Time
- Coordination, coordination, coordination and… coordination

Best Pavement Management Practices
SF Considerations for Selecting Resurfacing Candidates

- Multi-modal routes
- Pavement Condition Index (PCI) Score
- Project Readiness and Coordination with Utility Companies and City Agencies
- Equitable Distribution Across the City
- Inquiries
- Funding Availability

Transparency of Information

http://sfpublicworks.org/services/street-resurfacing-program
With help of GO Bond & General Fund funding, annual resurfacing budget increased to $65M per year.

Allowed Public Works to raise City-wide PCI from 64 in 2011 to 69 in 2016.

During this time, the Bay Area region as whole held steady at PCI of 66.
With sustained budget of $65M per year, PW able to reach City-wide PCI of 70 in 2021.
Without sustained budget, City-wide PCI will rapidly decline and annual need will be increased.
Sonoma County’s Strategic Goal

- One of Board of Supervisor’s Strategic Priorities is to Rebuild Infrastructure.
- As on-going policy, the Sonoma County Board assigns high priority to investing in transportation infrastructure maintenance and improvements.
- Including:
  - enhancing safety for vehicles, pedestrians, and cyclists
  - patching potholes, repairing and paving roads and streets, and
  - improving quality of life for County residents in effort to achieve this strategic goal.
Our Vision and Mission

- On October 28, 2014, the Board of Supervisors adopted Long Term Road Plan.
- Plan lays out vision for Sonoma County Road infrastructure
- Initial focus to improve road network
  - most heavily traveled and,
  - most important to economic development, agriculture, recreation, and tourism.
- Long Term Road Plan aims to improve over half of the County’s road network by 2024.
What We Accomplished

From 2013 through 2017, the Board has invested over $65 million of General Fund dollars to preserve and rehabilitate almost 300 miles of roads.

Funding Allocations for the Two-Year Program

Fiscal Year 2017-2018

| Annual General Fund Contribution to Paving | $11,938,600 |
| New State Gas Tax Funding                | $1,900,000 |
| Measure L Transit Occupancy Tax           | $1,000,000 |
| Less 1st Payment for Roseland Annexation Road Improvements | ($ 662,000) |
| Carryover of Maintenance Chip Seal and Utility Projects | ($3,515,000) |
| Total Fiscal Year 17/18 for New Pavement Preservation Program | $10,661,600 |

Fiscal Year 2018-2019

| Annual General Fund Contribution to Paving | $12,125,872 |
| New State Gas Tax Funding                | $5,000,000 |
| Measure L Transit Occupancy Tax           | $1,000,000 |
| Less 2nd Payment for Roseland Annexation Road Improvements | ($ 662,000) |
| Total Fiscal Year 18/19 for New Pavement Preservation Program | $17,463,872 |

TOTAL AVAILABLE FOR NEW PROJECTS IN 2-YEAR PROGRAM $28,125,472
Network Conditions

<table>
<thead>
<tr>
<th>Network Conditions</th>
<th>Federally Eligible Roads</th>
<th>Significant Rural Road Network</th>
<th>Total Community &amp; Connector Roads</th>
<th>Community</th>
<th>Connector</th>
<th>Remaining Network</th>
<th>Total</th>
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<td>Total Miles</td>
<td>354.19</td>
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<td>Heavy</td>
<td>178.56</td>
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<td>Medium</td>
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<tr>
<td>Excellent (90-100)</td>
<td>70.08</td>
<td>19.38</td>
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<td>143.66</td>
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<td>Good (50-69)</td>
<td>64.15</td>
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<td>32.11</td>
<td>43.86</td>
<td>32.52</td>
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<td>Poor (25-49)</td>
<td>53.83</td>
<td>82.31</td>
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<td>138.49</td>
<td>98.46</td>
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<td>Very Poor (&lt;25)</td>
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<td>48.90</td>
<td>76.28</td>
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<td>Bike Plan Roads</td>
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<td>28.88</td>
<td>5.72</td>
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<td>1st District</td>
<td>56.53</td>
<td>59.28</td>
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<td>2nd District</td>
<td>73.52</td>
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<td>34.28</td>
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<td>3rd District</td>
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<td>8.00</td>
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<td>0.16</td>
<td>3.97</td>
<td>20.31</td>
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<td>4th District</td>
<td>75.24</td>
<td>54.15</td>
<td>34.08</td>
<td>72.57</td>
<td>96.07</td>
<td>332.51</td>
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<td>5th District</td>
<td>138.27</td>
<td>65.96</td>
<td>66.05</td>
<td>197.94</td>
<td>92.32</td>
<td>540.84</td>
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<tr>
<td>Total</td>
<td>354.21</td>
<td>214.09</td>
<td>195.57</td>
<td>329.67</td>
<td>287.07</td>
<td>1380.60</td>
<td></td>
</tr>
</tbody>
</table>

How do we Define Pavement Preservation?

“Pavement Preservation is a program, employing a network level, long-term strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life, improve safety, and meet motorist expectations.”

Source: FHWA Pavement Preservation Expert Task Group
What is your Pavement Preservation Strategy?

- “Worst First”
- “Good Roads First”
- Based on Sustainability
- Strategy selection process using Life Cycle Cost Analysis
Examination of Sonoma County’s Decision Trees

- **Arterial treatments are high quality**
  - But --> small fraction of network and well maintained

- **Collector treatments same or more costly than arterials**
  - At 38% of network, modifications can save significant expense
  - Address minor collectors with more ‘efficient’ treatments to save money

- **Residential/Local treatments very limited options**
  - At 58% of network, modifications can achieve significant cost savings
  - Distinguish between local rural and local urban

- **“Other” functional class** - not utilized at this time
  - Can be utilized for local rural roads for very particular treatments for specific project needs

** Courtesy NCE
### Arterial Decision Tree

<table>
<thead>
<tr>
<th>Category</th>
<th>PCI</th>
<th>Old Treatment</th>
<th>New Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Very Good</td>
<td>70-100</td>
<td>Crack Surface BWC</td>
<td>Crack Sealing BWC Microsurfacing (II / III)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restoration Thin Overlay</td>
<td>BWC or Thin Overlay</td>
</tr>
<tr>
<td>II Good Non-Load Related</td>
<td>50-70</td>
<td>BWC with repair</td>
<td>BWC with Repair RHMA-G Overlay Double Microsurfacing (II/III) with Repair</td>
</tr>
<tr>
<td>III Good Load Related</td>
<td>50-70</td>
<td>Thin AC Overlay w/ fabric</td>
<td>RHMA-G Overlay</td>
</tr>
<tr>
<td>IV Fair</td>
<td>25-50</td>
<td>Thick AC Overlay w/ fabric</td>
<td>RHMA-G OL with Repair CIR</td>
</tr>
<tr>
<td>V Poor</td>
<td>0-25</td>
<td>FDR + AC Overlay</td>
<td>FDR + AC Overlay CIR (certain cases)</td>
</tr>
</tbody>
</table>

### Collector Decision Tree

<table>
<thead>
<tr>
<th>Category</th>
<th>PCI</th>
<th>Current Treatment</th>
<th>Recommended Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Very Good</td>
<td>70-100</td>
<td>Crack Surface BWC</td>
<td>Crack Sealing BWC Microsurfacing (II / III)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restoration Thin Overlay</td>
<td>BWC or Thin AC Overlay or RHMA-G</td>
</tr>
<tr>
<td>II Good Non-Load Related</td>
<td>50-70</td>
<td>BWC with repair</td>
<td>Microsurfacing (II) Double Microsurfacing (II/III) (both with Repairs)</td>
</tr>
<tr>
<td>III Good Load Related</td>
<td>50-70</td>
<td>Thin AC Overlay w/ fabric</td>
<td>Thin RHMA-G Overlay w/ Repairs</td>
</tr>
<tr>
<td>IV Fair</td>
<td>25-50</td>
<td>Thick AC Overlay w/ fabric</td>
<td>RHMA-G OL with Repairs CIR</td>
</tr>
<tr>
<td>V Poor</td>
<td>0-25</td>
<td>FDR + AC Overlay</td>
<td>FDR + AC or RHMA-G Overlay CIR (certain cases)</td>
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</table>
### Local – Urban Decision Tree

<table>
<thead>
<tr>
<th>Category</th>
<th>PCI</th>
<th>Old Treatment</th>
<th>New Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good</td>
<td>70-100</td>
<td>Crack Do Nothing</td>
<td>Crack Seal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surface Do Nothing</td>
<td>Slurry (II)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restoration Do Nothing</td>
<td>Do Nothing</td>
</tr>
<tr>
<td>Good</td>
<td>50-70</td>
<td>Chip Seal + Grader Patch</td>
<td>Microsurfacing (II)</td>
</tr>
<tr>
<td>Non-Load Related</td>
<td></td>
<td></td>
<td>Cape Seal (non cul-de-sacs)</td>
</tr>
<tr>
<td>Good</td>
<td>50-70</td>
<td>CIR + BWC</td>
<td>Cape Seal w/ Repair (non cul-de-sacs)</td>
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<tr>
<td>Load Related</td>
<td></td>
<td></td>
<td>BWC + Repair</td>
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<tr>
<td>Fair</td>
<td>25-50</td>
<td>Thick AC Overlay w/ Fabric</td>
<td>Thin/Thick RHMA-G OL w/ Repair (Mill depending)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Double Chip Seal w/ Microsurfacing and Repair (non cul-de-sacs)</td>
</tr>
<tr>
<td>Poor</td>
<td>0-25</td>
<td>CIR + BWC</td>
<td>Mill and RHMA-G OL Surface Reconstruct Double Chip Seal w/ Microsurfacing and Repair (non cul-de-sacs)</td>
</tr>
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</table>

### Local – Rural Decision Tree

<table>
<thead>
<tr>
<th>Category</th>
<th>PCI</th>
<th>Old Treatment</th>
<th>New Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good</td>
<td>70-100</td>
<td>Crack Do Nothing</td>
<td>Crack Seal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surface Do Nothing</td>
<td>Slurry (II)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restoration Do Nothing</td>
<td>Do Nothing</td>
</tr>
<tr>
<td>Good</td>
<td>50-70</td>
<td>Chip Seal + Grader Patch</td>
<td>Microsurfacing (II) and Grader Patch</td>
</tr>
<tr>
<td>Non-Load Related</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>50-70</td>
<td>CIR + BWC</td>
<td>Chip Seal Double Chip Seal AR Chip Seal Cape Seal (All w/ Repairs)</td>
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<tr>
<td>Load Related</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>25-50</td>
<td>Thick AC Overlay w/ Fabric</td>
<td>Crusher Course and Chip Seal Double Chip Crusher Course and Cape Seal CIR + Chip Seal Cape Seal / BWC RHMA-G OL + Repairs</td>
</tr>
<tr>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Poor</td>
<td>0-25</td>
<td>FDR + AC Overlay</td>
<td>Crusher Course and Double Chip / Cape Seal FDR + Chip Seal Cape Seal / RHMA-G OL Mill and RHMA-G OL + Repairs</td>
</tr>
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</table>
Decision Trees – Lessons Learned

- Review and optimize current practices.
- Let the design process be in sync with the Decision Trees.
- Changes in Decision Trees could lead to substantial cost savings.
## What We are Planning in 2018-2019

<table>
<thead>
<tr>
<th>Location</th>
<th>Traffic Volume</th>
<th>Pavement Condition</th>
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<tbody>
<tr>
<td>Federally Eligible Roads</td>
<td>26.95</td>
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<tr>
<td>Significantly Road Eligible Network</td>
<td>20.77</td>
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<tr>
<td>Significant Community Network</td>
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<td>Community Connector Network</td>
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<td>Remaining Network</td>
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<td>Total</td>
<td>81.84</td>
<td>0.33</td>
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### Traffic Volume
- **Heavy (4,000+)**: 13.88
- **Medium (200-4,000)**: 12.76
- **Light (<200)**: 0.31

### Pavement Condition
- **Excellent (90-100)**: 0.33
- **Very Good (70-89)**: 13.48
- **Good (50-69)**: 6.94
- **Poor (25-49)**: 4.62
- **Very Poor (<25)**: 1.58

### Bike Plan Roads
- 24.81

### Transit Roads
- 4.87

### Supervisorial Districts
- **1st District**: 6.13
- **2nd District**: 0.00
- **3rd District**: 2.92
- **4th District**: 7.29
- **5th District**: 11.53

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<th>Medium</th>
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<td>6.13</td>
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<td>2.92</td>
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<td>1.70</td>
<td>1.70</td>
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<td>3rd</td>
<td>7.29</td>
<td>0.00</td>
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<td>4th</td>
<td>11.53</td>
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<td>6.08</td>
<td>0.00</td>
<td>1.70</td>
<td>7.86</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Miles</th>
<th>81.84</th>
<th>0.33</th>
</tr>
</thead>
</table>

Breakdown of 2018 - 2019
## 2018 – 2019 Program Summary

### Storm Damage Overlays

<table>
<thead>
<tr>
<th>Funding</th>
<th>Total Miles</th>
<th>Treatments</th>
<th>Number of Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>$8 Million</td>
<td>24.9 Miles</td>
<td>24.9 miles = Asphalt Concrete Overlay</td>
<td>15</td>
</tr>
</tbody>
</table>

### 2018-2019 Recommended Pavement Preservation

<table>
<thead>
<tr>
<th>Funding</th>
<th>Total Miles</th>
<th>Treatments</th>
<th>Number of Roads</th>
</tr>
</thead>
</table>
| $20 Million| 56.9 Miles  | 13.54 miles = Asphalt Concrete Overlay  
1.44 miles = Bonded Wearing Course  
22.34 miles = Chip Seal  
7.46 miles = Full-Depth Reclamation  
0.72 miles = Remove and Replace  
11.41 miles = Slurry Seal          | 47              |

## Seven Year Total

- From Summer 2013 through Summer 2019 Board will dedicate over $91 million of General Fund dollars to roads.
- The total investment over this time, including Federal and State funds, is $112.1 million.
- This investment will preserve and rehabilitate 384 miles of roads.
Other Considerations

• Program Term
• Grouping projects and contracts
• Preparing and budgeting for “unplanned”
• Monitoring post-construction condition, timing preventive maintenance and rehabilitation treatments, and conducting economic analysis of alternatives
• Innovation/research to improve all of the above
• Coordination with utilities and neighboring local agencies
• Public Outreach

THANK YOU!
Questions?