Green Asphalt Pilot Option and Preliminary Assessment

Carmine DeBonis Jr.
Deputy County Administrator – Public Works

March 27, 2018
Today’s Topics

• Overview of Proposed Green Asphalt Pilot
• PASER Observation Assessment
• Analysis Constraints
• Preliminary Findings Summary
• Questions
Proposed Green Asphalt Pilot

- Tucson Asphalt approached Pima County about use of green asphalt overlay on failed condition roads.
  - Asserts 1” green overlay can be used in lieu of standard 2” mill and fill repair
  - Claims cost is 40% to 60% lower than conventional asphalt application
- County Administrator requested cost estimates for Sabino Town and Country and Moondance subdivisions
Proposed Green Asphalt Pilot

- Sabino Town and Country
  - $215,554 – Pima County 2” mill & fill
  - $126,721 – Tucson Asphalt 1” green overlay
- Moondance
  - $124,595 – Pima County 2” mill & fill
  - $71,689 – Tucson Asphalt 1” green overlay
- Tucson Asphalt quotes for initial application are roughly 40% less than County mill & fill estimate
- No data on performance or maintenance costs over time
# 1” Green Asphalt PASER Observations

<table>
<thead>
<tr>
<th>Location</th>
<th>Treatment</th>
<th>Date</th>
<th>Cost(^1)</th>
<th>Condition</th>
<th>PASER</th>
<th>PASER/Time(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haciendas Catalinas del Rey</td>
<td>1” GA overlay</td>
<td>2013</td>
<td>$0.84/SF</td>
<td>Significant crack reflection over ¼”</td>
<td>5 /4 on side street</td>
<td>1.10</td>
</tr>
<tr>
<td>Lambert Acres</td>
<td>1” GA overlay</td>
<td>2014</td>
<td>$0.84/SF</td>
<td>Reflecting cracking required surface seals in 2017</td>
<td>6</td>
<td>1.0</td>
</tr>
<tr>
<td>Edgebrook</td>
<td>1” GA overlay</td>
<td>9/2015</td>
<td>$0.84/SF</td>
<td>1/8” to 3/16” cracks</td>
<td>7</td>
<td>1.0</td>
</tr>
<tr>
<td>Sporting Chance Parking Lot</td>
<td>1” GA overlay</td>
<td>5/2017</td>
<td>$0.84/SF</td>
<td>Minor reflective cracks</td>
<td>8</td>
<td>2.0</td>
</tr>
<tr>
<td>Silverbell Terrace</td>
<td>1” GA overlay</td>
<td>8/2017</td>
<td>$0.84/SF</td>
<td>1/16” cracks</td>
<td>8</td>
<td>2.0</td>
</tr>
</tbody>
</table>

\(^1\) Cost per square foot

\(^2\) PASER/Time: Measures degradation from PASER 10 to current PASER divided by time in years (0.3 used for no degradation).
## 2” Overlay PASER Observations

<table>
<thead>
<tr>
<th>Location</th>
<th>Treatment</th>
<th>Date</th>
<th>Cost</th>
<th>Condition</th>
<th>PASER</th>
<th>PASER/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belair Ranch sub</td>
<td>2” PAG 2 overlay</td>
<td>2012</td>
<td>$1.18/SF</td>
<td>1/8” cracks</td>
<td>7</td>
<td>0.5</td>
</tr>
<tr>
<td>49ers sub</td>
<td>2” PAG 2 overlay</td>
<td>2013</td>
<td>$1.18/SF</td>
<td>1/16” cracks</td>
<td>8</td>
<td>0.4</td>
</tr>
<tr>
<td>Alvernon-Los Reales to Hughes</td>
<td>2” PAG 2 overlay</td>
<td>2014</td>
<td>$1.18/SF</td>
<td>Few transverse cracks</td>
<td>7</td>
<td>0.75</td>
</tr>
<tr>
<td>El Moraga-Goret to Sweetwater</td>
<td>2” PAG 2 overlay</td>
<td>2015</td>
<td>$1.18/SF</td>
<td>No visible cracking</td>
<td>8</td>
<td>0.67</td>
</tr>
<tr>
<td>Anklam</td>
<td>2” PAG 2 overlay</td>
<td>2015</td>
<td>$1.18/SF</td>
<td>1/8” transverse and 3/16” reflective cracking</td>
<td>7</td>
<td>1.0</td>
</tr>
</tbody>
</table>

2 PASER/Time: Measures degradation from PASER 10 to current PASER divided by time in years (0.3 used for no degradation).
## 2” Mill & Fill PASER Observations

<table>
<thead>
<tr>
<th>Location</th>
<th>Treatment</th>
<th>Date</th>
<th>Cost(^1)</th>
<th>Condition</th>
<th>PASER</th>
<th>PASER/Time(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flair sub</td>
<td>2” PAG 2 mill/fill</td>
<td>2013</td>
<td>$1.40/SF</td>
<td>¼” transverse cracks</td>
<td>7</td>
<td>0.6</td>
</tr>
<tr>
<td>Tucson Mountain Village sub</td>
<td>2” PAG 2 mill/fill</td>
<td>2014</td>
<td>$1.40/SF</td>
<td>1/16” cracks</td>
<td>6</td>
<td>1.0</td>
</tr>
<tr>
<td>Kain Ruthrauff to Curtis</td>
<td>2” PAG 2 mill/fill</td>
<td>2014</td>
<td>$1.40/SF</td>
<td>1/8” longitudinal and transverse cracks</td>
<td>7</td>
<td>0.75</td>
</tr>
<tr>
<td>Silverbell Goret to Ina</td>
<td>2” PAG 2 mill/fill</td>
<td>2015</td>
<td>$1.40/SF</td>
<td>Minor transverse cracks</td>
<td>8</td>
<td>0.67</td>
</tr>
<tr>
<td>Ironwood Hills Cmo Oeste to Shannon</td>
<td>2” PAG 2 mill/fill</td>
<td>2017</td>
<td>$1.40/SF</td>
<td>No visible cracking</td>
<td>10</td>
<td>0.3</td>
</tr>
</tbody>
</table>

\(^1\) PASER/Time: Measures degradation from PASER 10 to current PASER divided by time in years (0.3 used for no degradation).
Summary of PASER Performance

• Average PASER decline for 2” mill and fill – 0.47 / year
  □ Mill and fill treated road would decline to PASER 4 (failed) in 12 years

• Average PASER decline for 2” overlay – 0.47 / year
  □ 2” overlay treated road would decline to PASER 4 (failed) in 12 years

• Average PASER decline for 1” green overlay – 1.42 / year
  □ 1” green overlay treated road would decline to PASER 4 (failed) in 4 years
Typical Pavement Condition Curve

- **Preservation** (Fog Seal):
  - $1-$2 per SY
- **Maintenance** (Chip Seal or Microsurfacing):
  - $4-$6 per SY
- **Intervention Threshold**
- **Rehabilitate** (Mill & Overlay):
  - $14 per SY
- **Reconstruct**:
  - $45 per SY

- **Condition Based Maintenance**
- **Essential Maintenance**
- **Theoretical Curve Without Maintenance**
- **Overlay**
- **Time Based Preventative Maintenance**
Analysis Limitations

• Limited data available to evaluate performance

• Small sample size
  • Only more recent green overlay examples looked at since product mix has evolved from earlier applications

• Not controlled for traffic volumes or vehicle weight

• No verification of pavement condition or sub-grade prior to green asphalt treatment application

• Comprehensive analysis alternative methods requires more time
Preliminary Performance Summary

- Mill & fill
  - Consistent with expectations for removing and replacing damaged structurally unsound pavement

- 2” standard overlay
  - Consistent with providing a semi-structural layer over existing moderately damaged but structurally sound pavement

- 1” green overlay
  - Inconsistent with fixing structurally failed pavement; likely performs well as a seal treatment to preserve surface

- Recommend waiting on DOT materials testing and evaluation project; expected results this July
Questions, Discussion, Direction

Carmine DeBonis Jr.
Deputy County Administrator
for Public Works

carmine.debonis@pima.gov