Public Works
LOS ANGELES COUNTY

Sustainable Pavement Approach for Los Angeles County Roads

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Speakers Biography

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- Civil Engineer
- B.S. & M.S. in Civil Engineering
- 14+ years of County’s service
- Joined Pavement Management in 2012
- Primarily responsible for overseeing the Pavement Management Team in which we collaborate with number of stakeholders internally to develop and deliver the County’s rolling Five Year Pavement Program.

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- Associate Civil Engineer
- B.S. in Civil Engineering
- 13+ years of County’s service
- Joined Pavement Management in 2010
- Responsible for managing the County’s road network, prioritizing projects and providing pavement recommendations
Presentation Highlights

- Overview of County’s Road Network
- Sustainable 3-Prong Approach
  - Pavement Management System
- Examples of Successful Sustainable Projects
- Benefits of a Sustainable Pavement Program
- Lessons Learned and Takeaways
LA COUNTY UNINCORPORATED AREA ROAD NETWORK

PCI = 66 (Fair)

7,560 Lane Miles (546 million square feet)

137 County Islands

Legend
SUPERVISORIAL DISTRICTS
DISTRICT 1
DISTRICT 2
DISTRICT 3
DISTRICT 4
DISTRICT 5
NORTH COUNTY NETWORK

- 40% of Network
- 78% Rural - 2 lanes
- Low to Moderate Traffic
- Typically No Curb & Gutter
- Extreme Temp. Fluctuations

PCI = 60 (Fair)
SOUTH COUNTY NETWORK – LA BASIN

- 60% of Network
- 91% Urban – 4 to 7 lanes
- Moderate - High traffic
- Major and Local roads

PCI = 69 (Fair)
Prior Treatment Approaches - 2008

- Worst first
- Utilizing an antiquated pavement management system
- Windshield survey
- Limited preventative maintenance work
- Hot mix pavement primarily used
Recognized a Need for Change

- California’s Global Warming Solutions legislation (AB32) established proactive steps to reduce Greenhouse Gas (GHG) to 1990 levels by 2020
- Looked for a better way to take care of our roads
- Attended conferences, talked to agencies, worked with the private sector
- County's Commitment to reduce GHG emissions
SUSTAINABLE 3-PRONG APPROACH
1) Preserve Our Pavements
   - Take care of our good roads, first
   - Extend the service life of our fair and poor roads through pavement preservation treatments

2) Use Recycled Materials
   - Reclaimed Asphalt Pavement (RAP)
   - Asphalt Rubber Hot Mix (ARHM)

3) Reutilize Existing In-Place Materials
   - Cold-In Place Recycling (CIR)
   - Cold Central Plant Recycling (CCPR)
   - Soil Stabilization (CSPB)
Pavement Management System (PMS)
Pavement Performance Prediction Curves

- Thick Pavement
- Low Traffic
- Strong Subgrade

- Thin Pavement
- High Traffic
- Weak Subgrade

Time (Years)

Pavement Condition Index (PCI)
Typical Pavement Performance Curve

National Pavement Condition Index (PCI)
National Best Management Practice = PCI 82

Preservation (Fog Seal, Slurry Seal, Chip Seal, Cape Seal): $0.05–0.80/sqft.

Resurface (Thin overlay, 2 or 3 layered system): $1–2.50/sqft.

Rehabilitation:

Reconstruction:
1. Pavement Preservation

- Preventative maintenance activities that preserve and extend the life of the road
  - True pavement preservation (PCI: 76 or above)
  - Stop-gap measure (PCI: 58-75)
- Pavement preservation treatments include cape seal, scrub seal, chip seal, slurry seal, fog seal
- Less costly than conventional paving
- Preservation treatments result in 80% less GHG emissions and energy used
- Utilize Job Order Contract (JOC) to perform work year round
## Estimated Life of Treatments*

<table>
<thead>
<tr>
<th>Treatment Strategy</th>
<th>Good Condition (PCI=80)</th>
<th>Fair Condition (PCI=60)</th>
<th>Poor Condition (PCI=40)</th>
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<tbody>
<tr>
<td>Fog Seal</td>
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<td>1 - 2</td>
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<td>Slurry Seal</td>
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<tr>
<td>Cape Seal</td>
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<tr>
<td>Thin HMA/BWC</td>
<td>10 - 15</td>
<td>7 - 9</td>
<td>3 - 5</td>
</tr>
</tbody>
</table>

* California Pavement Preservation Center
TERESA AND DELTA AVE, ET AL
SUSTAINABLE PAVEMENT PRESERVATION PROJECT
MICRO-MILLING AND CAPE SEAL
Urban Residential Streets:
Project is located in the Unincorporated County of South San Gabriel.

History: Constructed 1970s and last slurry sealed in 2000s

Length: 11.7 mi

Area: 1,9 MSF

Weighted Avg. PCI: 59 (Fair)

Predominant Distresses: Alligator, longitudinal, and transverse cracking

Treatment Strategies:
- AC Pavement Dig-outs
- Crack Seal & RAP Slurry Seal (100% RAP)
- Micro-Milling & Cape Seal (100% RAP)

Contract Cost:
- Preservation/Stop-Gap Measures: $1.4M ($0.78/sf)
Micro-Milling

- Micro-milling involves removing a thin layer of the existing pavement (typically 1/8-3/8”)
- Results in improved ride-ability of the roadway
- Improve the bond for the subsequent treatment
- Remove excess materials from gutters to improve visual appearance
- Bring a preservation treatment closer to a hot mix treatment
Before Condition

After Micro-Milling

After Scrub Seal

After RAP Slurry Seal
2: Use Recycled Materials

- Asphalt Rubber Hot Mix (ARHM)
- Reclaimed Asphalt Pavement (RAP)
“Asphalt Rubber Hot Mix uses approximately 1,000 tires per lane-mile on a 1-inch overlay”
Asphalt Rubber Hot Mix (ARHM)

- Used since early 1990’s
- Diverts scrap tires from landfills
- Lasts 40-60% longer
- Requires no or little maintenance
- Effective against reflective cracking
- Reduces noise
- Stays dark longer
Reclaimed Asphalt Pavement (RAP)

- Pavement millings that are resized and reused for pavement treatments
- Using RAP avoids removing raw materials from the earth
100 percent RAP usage for all County’s pavement preservation projects since 2012

75 percent of materials for the base pavement utilized RAP

136,000 tons of RAP used (past 5 years)
3: Utilize In-place Materials

- Objective is to reuse the existing asphalt using techniques such as Cold In Place Recycling (CIR) & Cold Central Plant Recycling (CCPR)

- Add strengthening materials to the existing material below the pavement (cement, lime, emulsion)
Rehabilitation/Reconstruction Strategy

- Utilize cement stabilized pulverized base
  - 70% cost savings over removing and replacing base
  - 90% reduction in greenhouse gas (GHG) and energy savings
  - Significant landfill reduction
  - Shorten construction duration
- Utilize cold in-place and cold central plant recycled AC techniques
  - 20%-30% cost savings over removing and replacing with hot mix AC
  - 70% reduction in GHG and energy savings
  - Utilizing 100% RAP
- Develop a sustainable JOC to incorporate sustainable treatments (e.g. CIR, CCPR, CSPB)
EL SEGUNDO BOULEVARD
SUSTAINABLE PAVEMENT REHABILITATION PROJECT

COLD IN-PLACE RECYCLING (CIR)
El Segundo Blvd
Project Overview

- **Urban Major Arterial:** Located in Unincorporated area near City of Compton
- **Structural Section:** 5-8½” AC on 9-19” CAB
- **Length:** 1.5 centerline mi (4-6 lanes)
- **Area:** 558k sf
- **Weighted Avg. PCI:** 41 (Poor)
- **Treatment Strategy:**
  - 1.5” of ARHM
  - 3” of CIR AC (100% RAP)
- **Cost Savings:** $300K
  - Sustainable Method: $983k($1.8/sf)
  - Traditional Method: $1.28M ($2.3/sf)
El Segundo Blvd
Before, During, and After

Before Condition

Pre-milling

CIR Operation
El Segundo Blvd
Before, During, and After

Paving CIRACP

Rolling

Final Surface
SUSANA ROAD
SUSTAINABLE PAVEMENT RECONSTRUCTION PROJECT
COLD CENTRAL PLANT RECYCLING (CCPR)
& CEMENT STABILIZED PULVERIZED BASE (CSPB)
Susana Road
Project Overview

- **Location:** Unincorporated County Area near City of Long Beach
- **Structural Section:** 2-9” AC on 8-22” CAB w/ pavement fabric below surface course
- **Average Weighted PCI:** 40 (Failed)
- **Area:** 744k sq. ft.
- **Length:** 1.9 centerline miles (4 lanes)
- **Treatment Strategy:**
  - 2” Polymer Modified AC (15% RAP)
  - 3” CCPR AC (100% RAP)
  - 10” to 12” CSPB (100% Recycled Material)
- **Cost Savings:** $3.2M
  - Sustainable method: $3.2M ($4.2/sf)
  - Traditional method: $6.4M ($8.6/sf)
Susana Road
Additional Design Features

- **Complete Street Features:**
  - Concrete work Repair (e.g. ramps, sidewalks, curb and gutters, etc.)
  - Installation of stormwater bioretention filtration basins
  - Installation of LID tree wells
  - Incorporation of a Class II Bike Lane per 2011 Bikeway Mater Plan
Susana Road
Before, During & After

Before Condition

Cold Milling Operation

CCPR Process

CSPB Process
Susana Road
Before, During & After

CCPR AC Over CSPB
Polymer Modified AC Paving
Finished Surface
Infiltration Basin
BENEFITS OF A SUSTAINABLE PAVEMENT PROGRAM
Benefits of the Sustainable Approach

- Cost savings of up to 50% compared to traditional methods
- Up to 80% reduction in energy use and GHG emissions*
- Maintaining earth’s natural resources
- Reduction in landfill deposition
- Reduction in construction truck traffic
- Less construction working days
- Reduced construction impacts to the public

* Based upon a study completed by the National Center for Pavement Preservation
Sustainable Treatments - Benefits

Deliverables
Since 2009, Los Angeles County’s Sustainable Roads Effort has given taxpayers the very best in road repair and maintenance, while sharply reducing the environmental footprint associated with this work, all at a reduced cost and community burden.

45% Cost savings

84% Reduction in GHG emissions
80% Reduction in energy consumption
543,000 CY in landfill reduction
LESSONS LEARNED AND TAKEAWAYS
Lessons Learned

- Weather/Temperature has a significant impact on performance of preservation treatments
- Public education important for project success
- Impacts of trash trucks on cul-de-sacs
- Mixing treatment selections not advisable
- Importance of proper inspection
- Impacts of Macadam on treatment selections
- Be careful of yielding subgrade
Takeaways

- **Pavement Preservation Projects**
  - Perform full width micro-milling
  - Use of cape seal as “stop-gap” measures for “Fair/Poor” roads to preserve and extend service life
  - Utilize reclaimed aggregate (RAP) in treatment selections

- **Resurfacing Project**
  - Use Rubberized Hot Mix (ARHM)

- **Rehab/Reconstruction Projects**
  - Recycle existing pavement materials (CIR, CCPR)
  - Reutilize existing base/subgrade materials in-place (CSPB)
Any Questions?