Sustainable Pavement Practices Help Local Agencies in California Improve Their Road Infrastructure

LA County's Path to Success

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Presentation Objectives

- What are applicable Climate Change Initiatives?
- What are the local streets and roads needs?
- Are there ways to fix our roads that minimize the impact on the environment?

California Today

DO MORE WITH LESS

"Can you maintain your system at a lower cost, treat more lane miles and reduce Green House Gas emissions?"

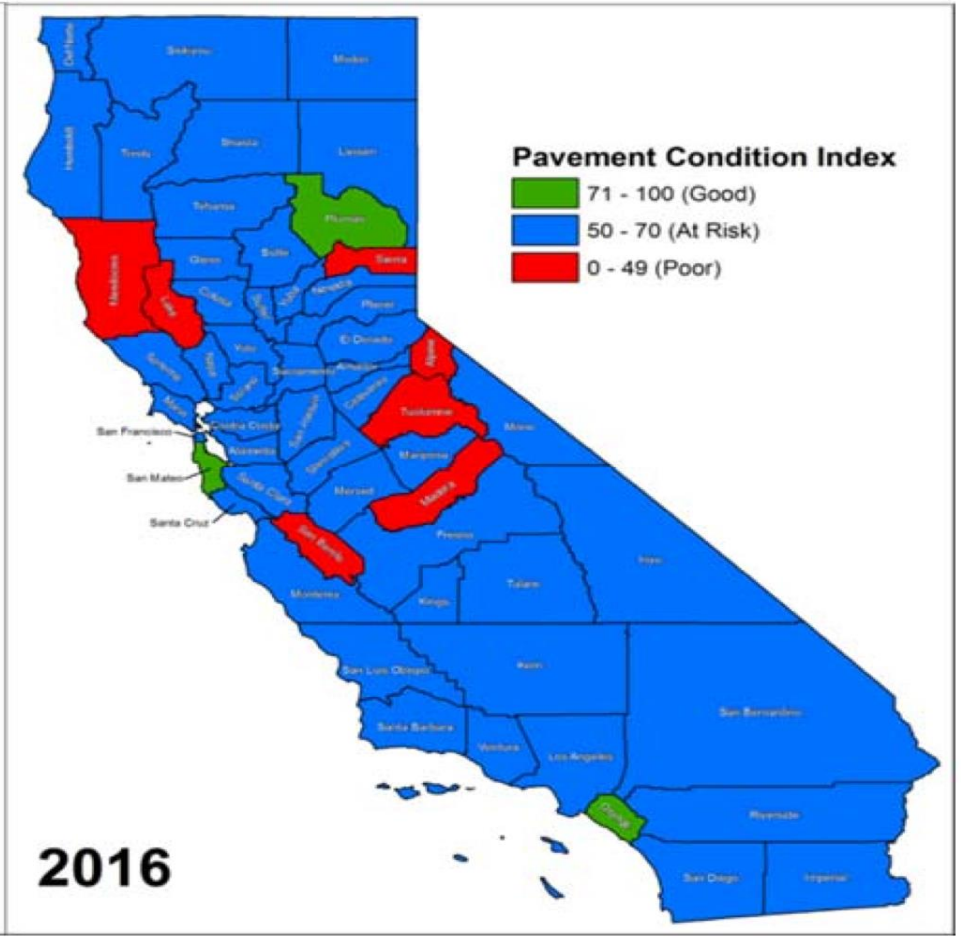
How can we achieve a balance between statewide goals and bringing our local streets and roads to a state of good repair?

Transportation Needs

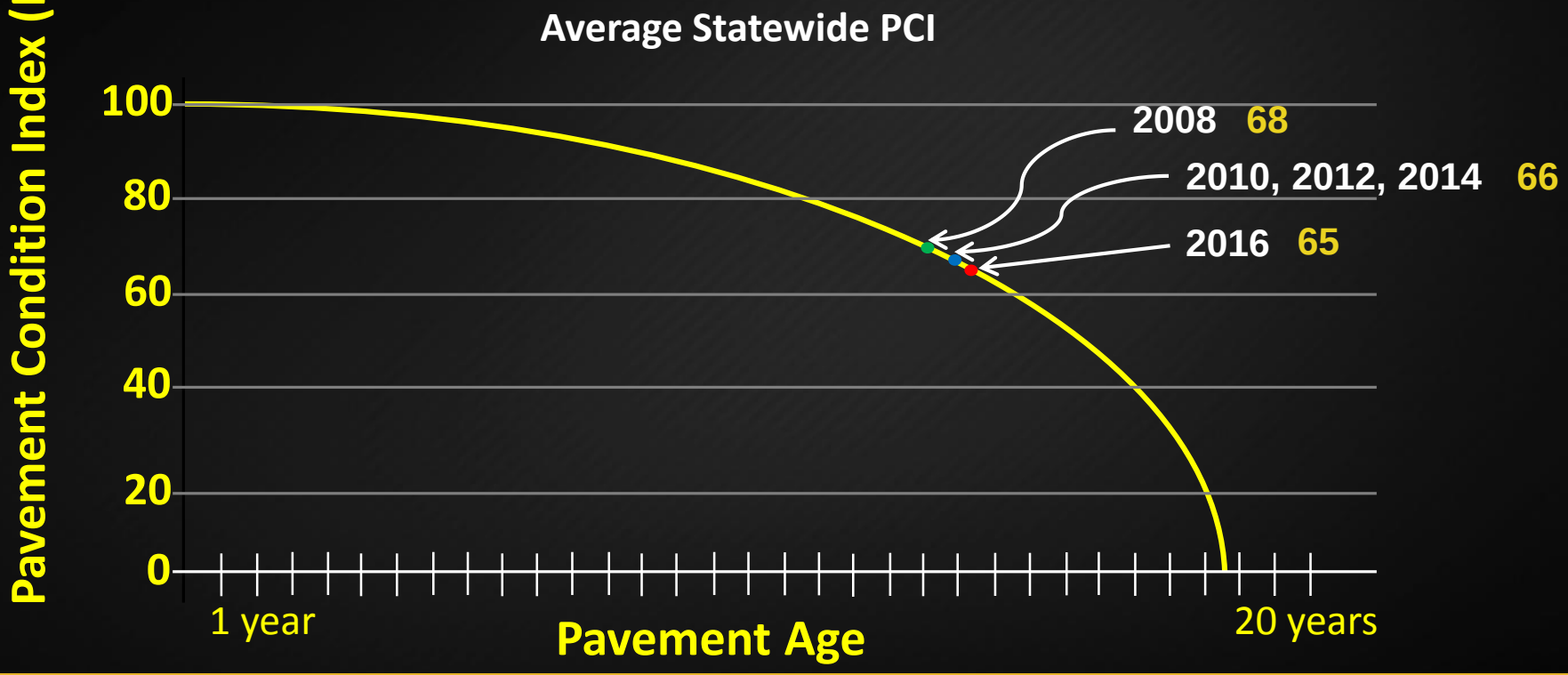
- In 2007 a statewide committee was formed to collect pavement condition data from 58 counties and 482 cities in California to estimate what the costs were to get the local streets and roads to a state of good repair.

- Assessment conducted every other year and also included costs for bridges, curb ramps, sidewalks storm drains and traffic signals.

CA Transportation Needs



Pavement Performance Curve



Pavement Condition - 10 Year Needs

Year	Statewide PCI	Ten Year Needs
2008	68	$67.6 Billion
2010	66	$70.5 Billion
2012	66	$72.3 Billion
2014	66	$72.8 Billion
2016	65	$73.6 Billion

CA Transportation Needs

- At current annual funding of $2 Billion the PCI would drop to 54 in ten years and will have increased the failed roads from 6% to 25%.

- Once local roads are in a state of good repair the annual cost to maintain them would be $2.4 billion rather than $7.3 billion annually.

Transportation Needs

- The LSR report estimated that if agencies statewide utilized sustainable treatments for 50% of their projects, approximately $1 billion could be saved.

Climate Legislation

- AB32 - established proactive steps to reduce GHG to 1990 levels by 2020 (AB32)

- The Clean Energy and Pollution Reduction Act of 2015 was introduced in California to:
  - Double energy efficiency of buildings by 2030.
  - Increase retail sales of renewable electricity to 50% by 2030.
  - Reduce petroleum use in motor vehicles by 50% by 2030 (approved legislation did not include reducing petroleum use).
  - Achieve GHG reduction of 40% of 1990 levels by 2030.

Feasibility of Sustainable Pavement Treatments?

- Is it feasible that if agencies incorporated sustainable approaches there would be less impacts to our environment and would it cost less than conventional methods?

- Los Angeles County – a case study

LA County Looking Forward

- In 2007 LA County started looking for a better way to take care of their roads by utilizing pavement treatments that:
  - Were less expensive
  - Impact the environment less
  - Reduce impacts to the public during construction
  - Reduce landfill deposition
  - Perform similarly to conventional pavement treatments

LA County's Prior Treatment Approaches

- Worst first
- Utilizing an antiquated pavement management system
- Limited preventative maintenance work
- Typical reconstruction methods included remove and replace
- Hot mix pavement primarily used
- These past approaches are currently being utilized by a lot of agencies right now

Sustainable approach

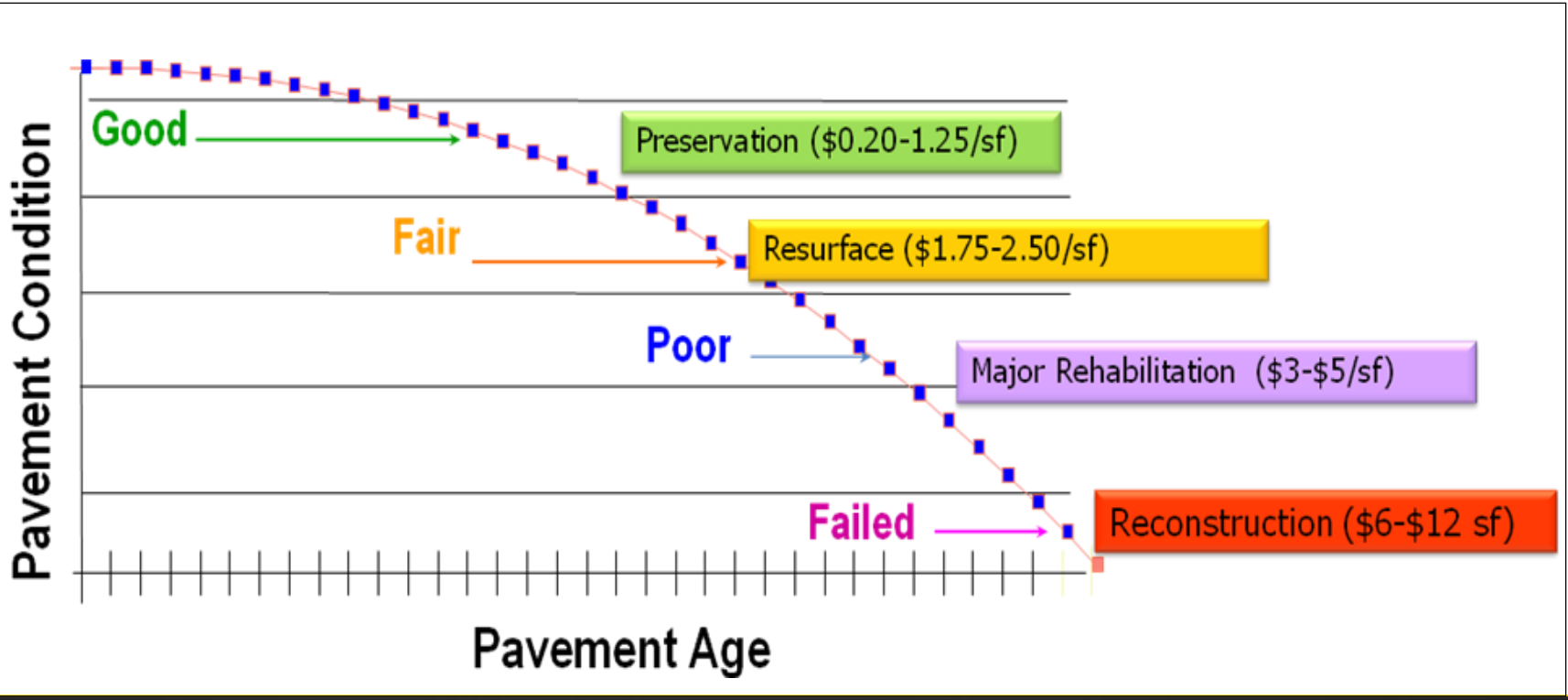
In 2008, LA County came up with their 3 pronged approach:

(1) Take care of their good roads, first

(2) Use recycled materials in treatment selections

(3) Reutilize existing materials in-place

Typical Performance Curve



1. Pavement Preservation

- 4 to 10 times less costly than conventional hot paving
- Preservation treatments result in 80% less GHG emissions and energy used
- Micro-mill surfaces to improve ride-ability of the roadway

Doublegrove Street Et Al Project

Pavement Preservation/Stop Gap Measure

- **Urban Residential Streets:**

  Project is located in the Unincorporated County near City of West Covina.

- **Length:** 27 lane miles **Area:** 2,200,000 sf

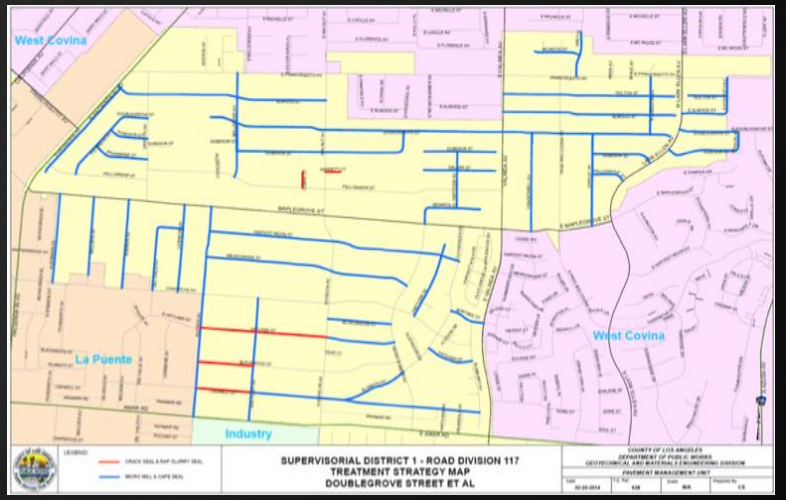
- **Treatment Strategies:**

  Pavement Preservation **PCI= 56**

- Crack Seal & RAP Slurry Seal
- Micro-Milling & Cape Seal

- **Cost Options:**

- Conventional Resurfacing: $3.1M ($1.30/sf)
- Conventional Reconstruction: $14.4M ($6.13/sf)
- Sustainable Reconstruction: $8.1M ($3.45/sf)
- Sustainable Pavement Preservation: $1.65M ($0.70/sf) – Saved $1.4 Million



Doublegrove Street Et Al Project

Pavement Preservation (Before “Good” Condition)

Doublegrove Street Et Al Project

Stop Gap Measure (Before “Fair/Poor” Condition)

Doublegrove Street Et Al Project

Stop Gap Measure (Performed Digouts)

Doublegrove Street Et Al Project

Stop Gap Measure (Micro-Milled Surface Part-1)

Doublegrove Street Et Al Project

Stop Gap Measure (Micro-Milled Surface Part-2)

Doublegrove Street Et Al Project

Stop Gap Measure (Scrub Seal)

Doublegrove Street Et Al Project

Stop Gap Measure (RAP Slurry Seal)

Doublegrove Street Et Al Project

Stop Gap Measure (Finished Cape Seal Surface)

2. Use recycled Materials in project selection

Reclaimed Asphalt Pavement (RAP)

- Pavement millings that are resized and reused for pavement treatments
- Using RAP avoids removing raw materials from the earth

Reclaimed Asphalt Pavement (RAP)

- **100 percent** RAP usage for all LA County's pavement preservation projects since 2012
- **75 percent** of materials for the base pavement utilized RAP
- **640,000 tons** of RAP used (past 4 years)

RAP SLURRY


Direction:Westerly
UTC 2011:11:22 19:27:08
W:118°01'08.05"
N:033°56'21.22"

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)

Angeles Forest Highway (Summer 2011)

12 lane miles – Cold In-Place Recycling (CIR)

- Rural Major Collector:

  Best described as mountain-rural road passing through the Angeles National Forest.
- Length: 12 lane miles Area: 785,000 sf
- Pavement Condition Index: 47
- Treatment Strategy:

  Rehabilitation:
  - 1½" of ARHM
  - 3" of CIR
- Cost Saving: $520K
  - Conventional: $1.4M ($1.73/sf)
  - Sustainable: $880K ($1.12/sf)

Angeles Forest Highway – Before

Angeles Forest Highway - During

Angeles Forest Highway - After

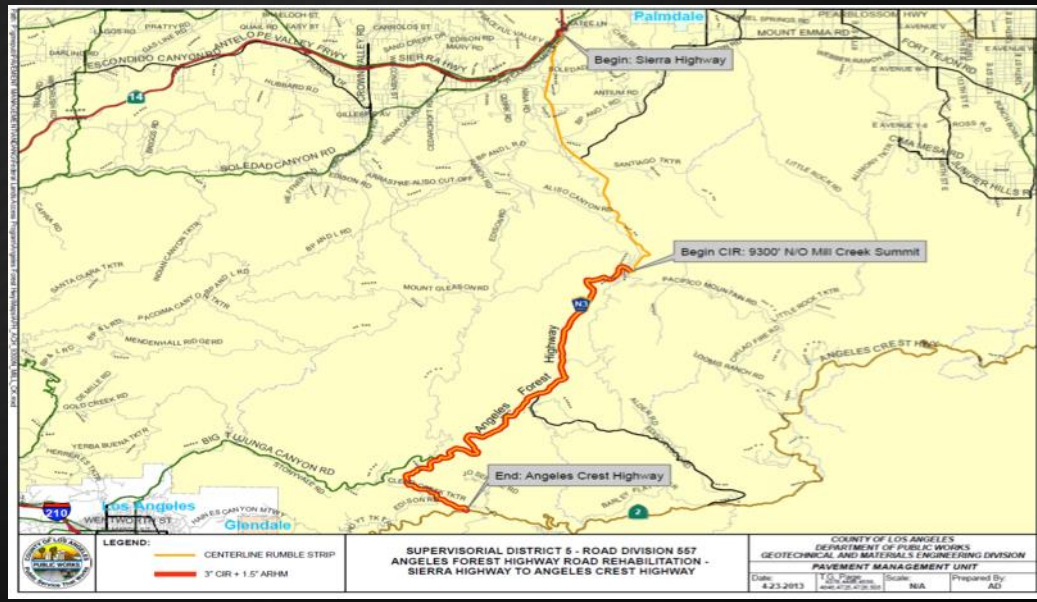
Angeles Forest Highway (Summer 2015)

33 lane miles – CIR Treatment

- Rural Major Collector:

  Best described as mountain-rural road passing through the Angeles National Forest.
- Length: 33 lane miles
- Area: 2,466,000 sf
- Pavement Condition Index: 59
- Treatment Strategy:

  Rehabilitation:
  - 1½” of ARHM
  - 3” of CIR
- Cost Saving: **$2.58M**
  - Conventional: $4.27M ($1.73/sf)
  - Sustainable: $1.69M ($0.68/sf)



Angeles Forest Highway – Before

Angeles Forest Highway - During

Angeles Forest Highway - During

Angeles Forest Highway - After

Soil Stabilization

- Engineered approach that improves the strength and stability of the in-place material

- Avoids costs and impacts of removing and replacing in-place material

Lennox Community Road Improvement Project

Cold Central Plant Recycling (CCPR) with Soil Stabilization

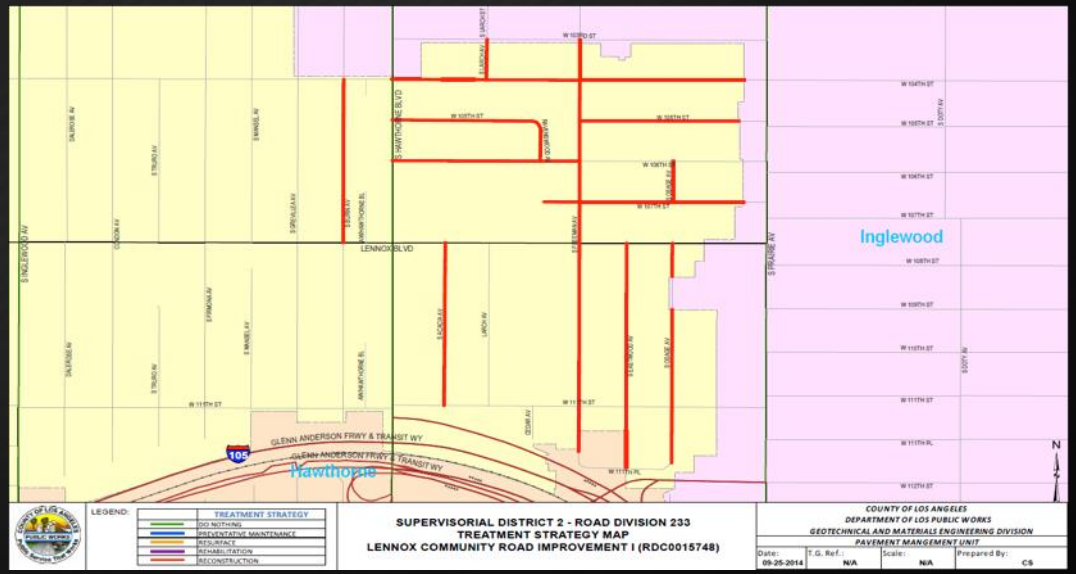
- **Urban Residential Streets:**

  Project is located near City of Inglewood.

- **Length:** 7 lane miles
- **Area:** 562,892 sf
- **Pavement Condition Index :** 63
- **Treatment Strategies:**

  Reconstruction

  - 1½” of ARHM
  - 3” of CCPRACP
  - 6” of Soil Stabilization
- **Cost Savings:** **$1.0M**
  - Conventional: $1.8 ($3.85/sf)
  - Sustainable: $764K ($1.62/sf)



Lennox Community Road Improvement Project

Cold Central Plant Recycling (CCPR) with Soil Stabilization (Before Condition)

Lennox Community Road Improvement Project

Cold Central Plant Recycling (CCPR) with Soil Stabilization (Cold Milling Operation)

Lennox Community Road Improvement Project

Cold Central Plant Recycling (CCPR) with Soil Stabilization (CSPB Operation)

Lennox Community Road Improvement Project

Cold Central Plant Recycling (CCPR) with Soil Stabilization (Recycled Asphalt Concrete Pavement)

Lennox Community Road Improvement Project

Cold Central Plant Recycling (CCPR) with Soil Stabilization (CCPR AC Pavement)

Lennox Community Road Improvement Project

Cold Central Plant Recycling (CCPR) with Soil Stabilization (CCPR Asphalt Concrete Pavement Finished Surface)

Lennox Community Road Improvement Project

Cold Central Plant Recycling (CCPR) with Soil Stabilization (ARHM Finished Surface)

Benefits of the Sustainable Approach

- Cost savings of up to 50% compared to traditional methods
- Up to 80% reduction in GHG emissions*
- Maintaining earth's natural resources
- 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

TABLE 1 - ENERGY USAGE, GREENHOUSE GAS EMISSIONS, AND COST SAVINGS FOR SUSTAINABLE PAVEMENT TREATMENTS

FY 2009/2010 THRU FY 2014/2015	COLD IN-PLACE RECYCLING	COLD CENTRAL PLANT	SUBGRADE STABILIZATION	PAVEMENT PRESERVATION	TOTAL
REDUCTION IN ENERGY CONSUMPTION	72%	38%	65%	80%	76%
REDUCTION IN GHG EMISSIONS	74%	70%	43%	89%	82%
PERCENT COST SAVINGS	45%	40%	69%	25%	32%
LANFILL REDUCTION (CY)	26,000	12,000	87,000	151,000	276,000
COST SAVINGS	$4,908,000	$1,863,000	$6,130,000	$16,470,000	$29,371,000

* Sources: Energy Usage and Greenhouse Gas Emissions of Pavement Preservation Processes for Asphalt Concrete Pavements

	FY 2009-10	FY 2010-11	FY 2011-12	FY 2012-13	FY 2013-14	FY 2014-15	TOTAL
TOTAL NUMBER OF LANE-MILES OF ARHM USED	68	13	41	142	24	76	363
TOTAL NUMBER OF TIRES RECYCLED	136,000	26,000	82,000	284,000	49,000	153,000	730,000

38,000 tons of CO_2E reduced = 7,300 passenger vehicles removed from roads*

* Based on latest updated of the average fuel economy and the emissions factor for the combustion of gasoline as of August 25, 2015. The emissions factor for passenger vehicles is 4.75 metric tons/vehicle/year. (www.epa.gov)

Takeaways

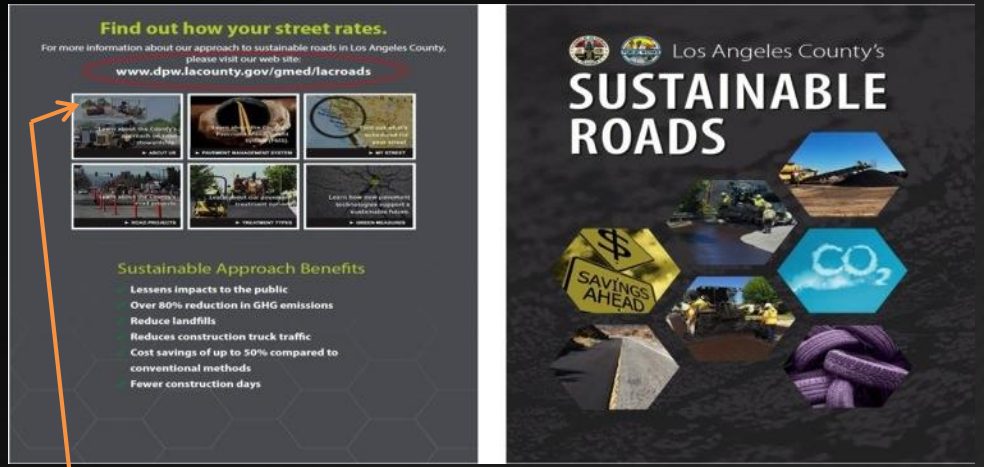
- **Pavement Preservation Projects**
  - Micro-milling
  - Use of Scrub Seal and Cape Seal on fair and poor roads as a preservation tool and stop-gap measure to extend service life
  - Utilize RAP in treatment selections
  - Utilize rubber in thin lift overlays

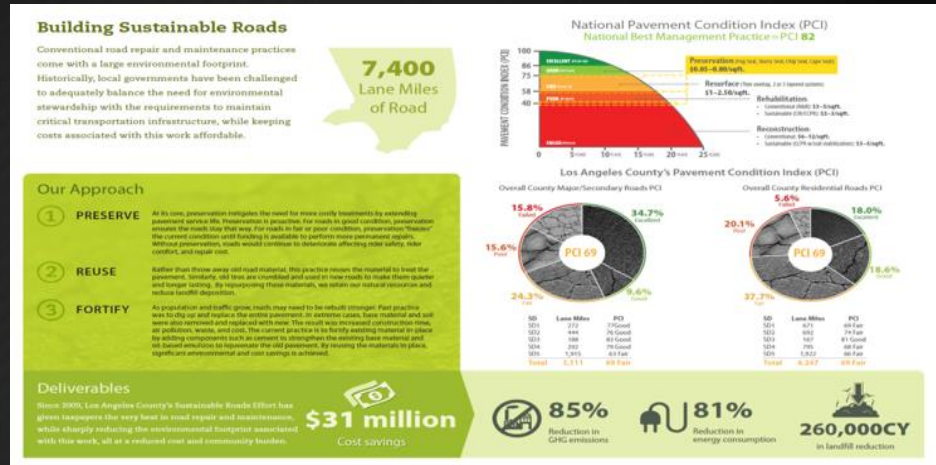
- **Rehab/Reconstruction Projects**
  - Recycle existing road materials (CIR, CCPR)
  - Reuse base/subgrade materials in-place

Takeaways continued…

- California is committed to climatic balance
- Local streets and roads are in dire need of additional funding
- Implementing sustainable pavement treatments is an opportunity to meet the environmental and fiscal goals of the state while improving the condition of our roads
- Need to create incentives for agencies to try sustainable pavement approaches

Sustainable Pavement Outreach





Los Angeles County Sustainable Pavement Website

www.dpw.lacounty.gov/gmed/lacroads

Thank you!

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