Cold In-place Recycling (CIR)

It’s Easy to be Green

Experience from California’s Climate Initiatives Innovation Program

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Cold In-Place Recycling is:

• A socially responsible, eco-friendly method of safeguarding the earth’s resources; legacy aggregates, oil & substantially reduces greenhouse emissions.

• It achieves dramatic cost savings over traditional construction methods; increased motorist satisfaction due to improved pavement condition & reduced construction delays.
Today’s “Tax Payer Friendly Topic”

- Project Description and Purpose
- Video, Climate Initiatives Innovation Project
- Engineered Approach, Mix Design
- Construction Process and Equipment
- Green House Gas Reductions
- Cost Savings
- Energy and Material Savings
Project Description and Purpose

- $31M Metropolitan Transportation Commission funded program
- Designed to provide bay area agencies with new ideas to improve air quality and can be replicated on a larger scale in the Bay Area
- Submittals centered on carpool, electric vehicles, bus projects, parking strategies
- Napa/Sonoma Project- only pavement rehabilitation project approved
Sustainable Maintenance Practices
Cold In Place Recycling

• Grant was for $2M for the CIR Demo Project

• Estimated Cost Saving was 35% less than conventional rehabilitation methods

• Estimated GHG CO₂ emissions savings from project was 2.2 M lbs
Video From the Bay Area MTC’s 2010 Climate Initiatives Innovative Grant Program

Sonoma County & City of Napa Partnership for Sustainable Community Networks
When to Utilize Asphalt Recycling

• Anywhere mill and fill is considered

• Adequate existing pavement thickness
  2-4 inches asphalt thickness
  stable base or leave 1” of existing pavement over native soils.

• When cracking distress is not sub-grade or base related
When to Utilize Asphalt Recycling

- Where surface maintenance is no longer effective
- Where safety is a concern
- When life cycle costs dictate
- When you need to stretch your budget
Engineered Approach, Mix Design

On all Recycling Projects

• Prior to bidding the project.
  – Check existing pavement for adequate thickness
  – Check for stable subgrade
  – Check for fabric and pavement type.

• Part of the contract is to core pavement to obtain samples for mix design using a systematic engineered system.

• Optimizes the percentage and type of engineered recycling agent unless agency specifies asphalt foam. For asphalt foam the optimum percent asphalt is determined in a mix design

• Determine the need for, percentage of and type of recycling additive at the mix design.
Cold In-place Recycling (CIR)

Distressed Pavement = New Pavement Using A Train of Equipment that:

- Mills deteriorated pavement into reclaimed asphalt pavement (RAP)
- Crushes RAP to gradation
- Mixes with recycling agent
- Re-Paves recycled mix
- Compacts to specified density
- Readies for surface treatment
- Small carbon footprint
Cold In-place Recycling (CIR) Preservation or Minor Rehabilitation

Recycle AC to:
- Stable Base
- Within 1” of less Supportive Material
Recycling Plant Meets and Exceeds Caltrans Caltrans CT 109 Calibration Requirements
Recycled Asphalt Mix
Pick Up and Installation

Recycled Asphalt Surface
10-12 Ton Double Steel Drum
Minimum one, must have working water spray system
25-Ton Pneumatic Roller

Minimum one, must have working water spray system
Testing and Quality Assurance

100% Recycled Asphalt
Fog Seal and Sand Blotter
Quick Opening to Traffic

- Rolling is completed
- Some cure time, fast return to traffic
- After fog-seal and sand blotter are applied
Before and After Pictures Recent CIR Projects
New Recycled Surface
Green House Gas Reduction

• The reuse of legacy aggregates and asphalt binders minimizes the need for new materials.

• 80% reduction in greenhouse gas emissions due to reduced equipment energy
  – No mining
  – Eliminated hauling & disposal
  – Improved traffic congestion management

• The GHG emissions savings potential if all candidate streets in the SF Bay Area Region were paved using CIR instead of traditional hot mix asphalt (HMA) is 1.6 billion pounds of CO₂.
Approximately 130,704 lbs of Green House Gas emissions, which is equivalent to taking 11 cars off the road for one year.
Recycling In-Place Saves Material Resources, Money and Energy

- Re-using existing asset’s instead of replacing or discarding
- Reduces import-export from 83 truckloads (mill and fill) to two
- Fewer emissions, less traffic, small carbon footprint
- Structural value and long life: resists reflective and thermal cracking

Recycling is “Green”
Energy Use Per Tonne Of Material Laid Down

Source: The Environmental Road of the Future, Life Cycle Analysis by Chappat, M. and Julian Bilal. Colas Group, 2003, p.34

Ministry of Transportation
Ministère des Transports
Project Cost Savings

• Cold In-place Recycling (CIR) cost $7.35 per square yard.
• The engineer’s estimate of the traditional Hot Mix Asphalt (HMA) alternative was $21.05 per square yard.

Project Cost Savings using CIR was approximately $118,000 per lane mile over traditional HMA approach
Unit “Energy and Cost Savings” for a 500,000 Square Feet Project

- 8,750 tons of asphalt reworked.
- 850 fewer trucks used utilizing CIR, compared to a mill and fill operation.
- 1,650 fewer barrels of oil used.
- 80% less carbon emissions compared to mill and fill operation.
- Over $260,000 savings
- 30% shorter project schedule.
Summary - Benefits of Recycling

• Improved Pavement and Structural Section Properties
• Mitigates Reflective Cracking
• Shorter Construction Periods with Reduction in User Delays
Summary - Benefits of Recycling

• 20 Plus Years Extension of Pavement Life

• Cost Savings Over Traditional Rehabilitation Methods

• Sustainable Development “.... Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”
  – Reduced the consumption of natural resources
  – Reduced energy consumption
  – Reduced construction truck traffic
  – Reduced greenhouse gas emissions, pollution
Resources

National Center for Pavement Preservation Website

http://www.pavementpreservation.org/conferences/recyclingoutreach/2011-meeting/

http://www.pavementpreservation.org/conferences/recyclingoutreach/2012-meeting/

Videos, Presentations for Elected Officials, Public Works Directors & staff engineers, Sample Specifications