

How Nevada DOT Uses Sustainability to Achieve Smooth Roads and Save Millions

Webinar In-Place Recycling Workshop
Earth Day
April 22, 2008

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The Myth!

➤ ~~Sustainability means increased costs or lower quality~~

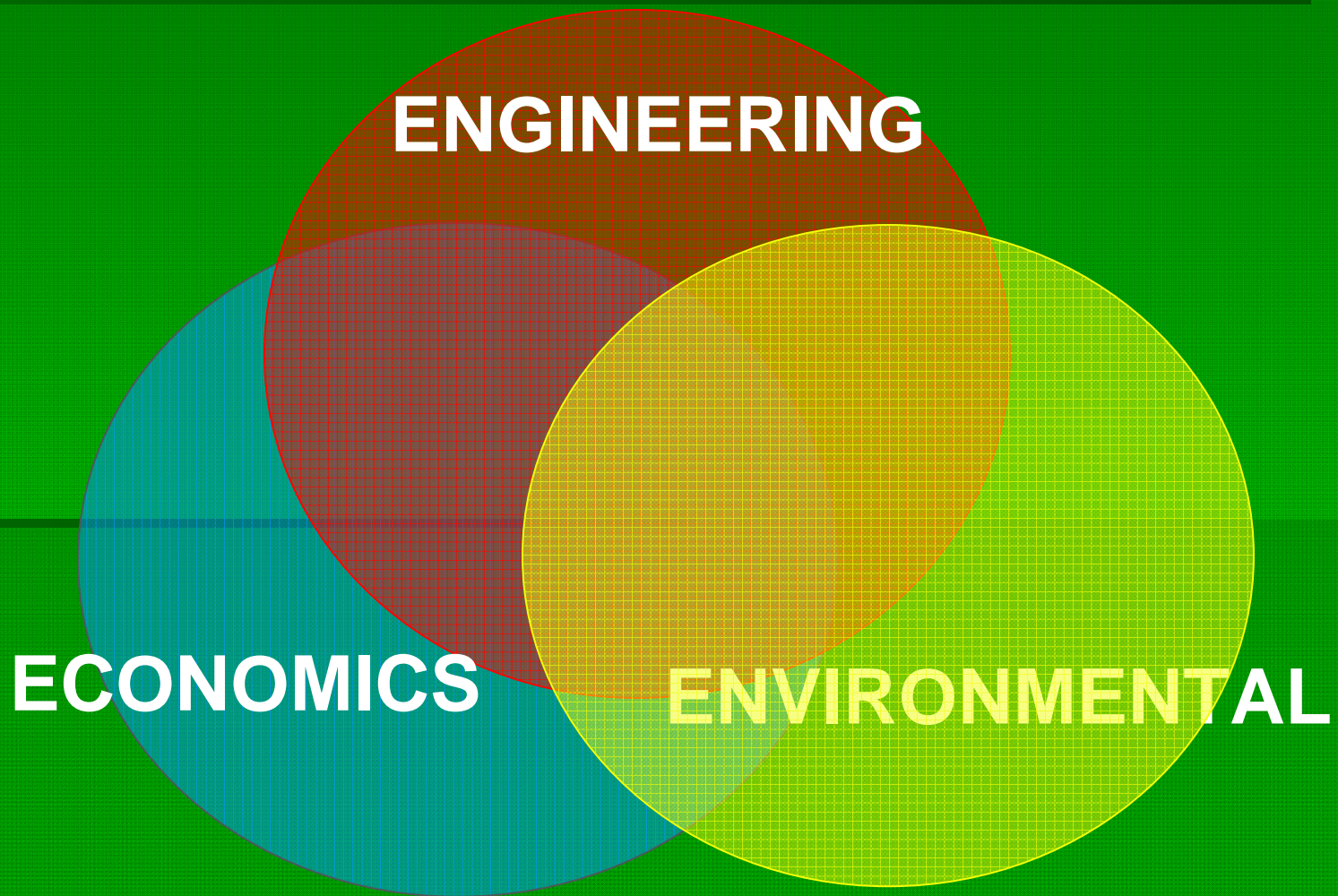


In-Place Recycling Facts

- Reduces rehab cost 30-70%
- Lasts as long or longer than conventional strategies
- Utilizes 100% in-place materials requiring minimal energy

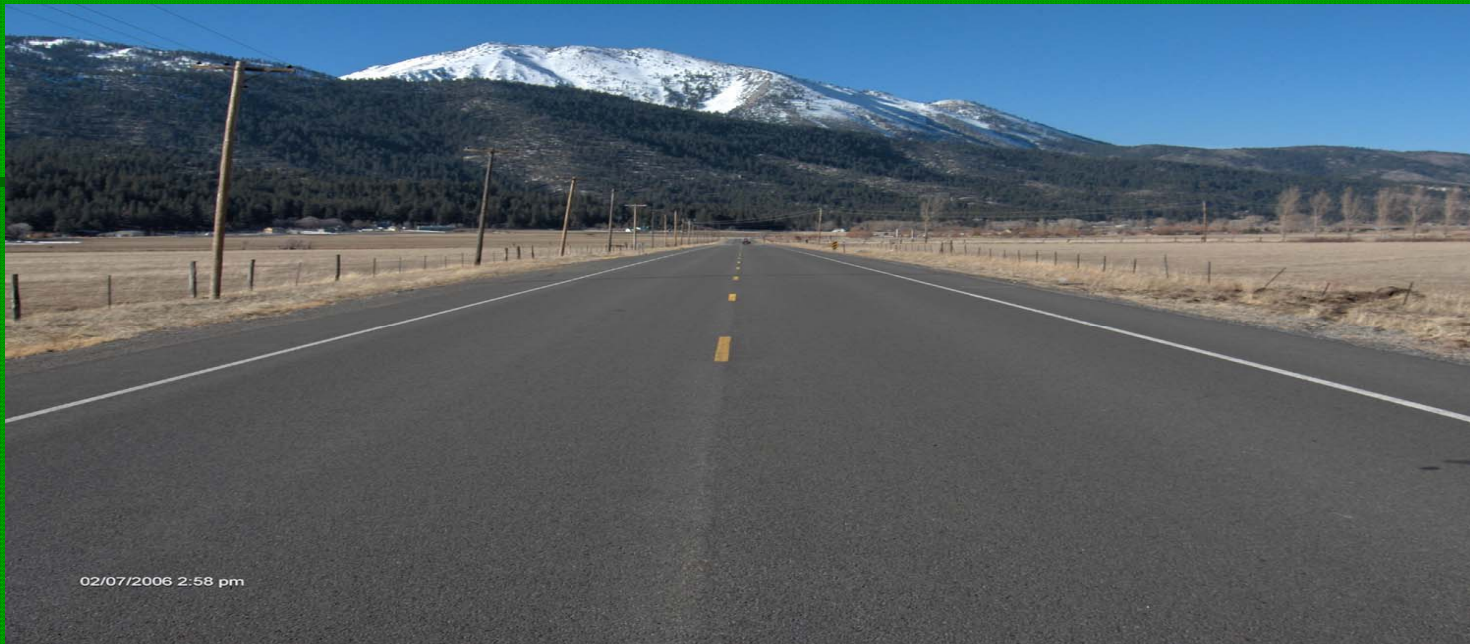


In-Place Recycling Meets the 3E Challenge

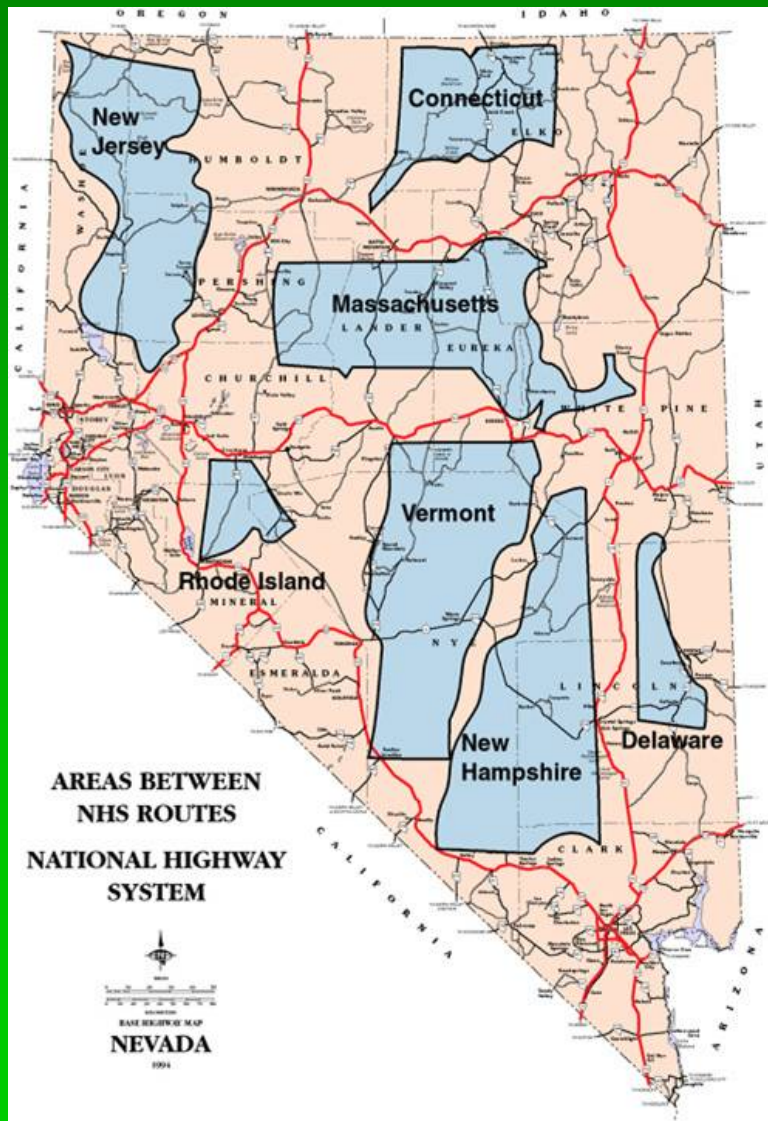


Case Study

How Nevada used a sustainable approach to reduce \$600M in project cost and significantly improve its pavement condition



NDOT Facts



- Maintains 5,300 centerline miles
- Fastest growing state
- 7th largest state
- Highest % of NHS roads in smooth category (FHWA website)
- Maintained same funding for pavement preservation from 1992-2005, while price of hotmix asphalt increased 400%

Caution: Smooth Roads Ahead!

2005 IRI Data	Good < 95	Fair 95 to 170	Poor > 170
NHS	95%	5%	0%

*from FHWA HPMS website



Cold In-Place Recycling (CIR) in Nevada

- 15% of system (over 1000 centerline miles 97-2007)
- Will meet or exceed 20-yr design life with preventive maintenance
- 1.5" – 4" Hotmix asphalt placed over medium - high traffic areas
- Double chip seal placed for low volume roads < than 1000 ADT



CIR Train

LIME
SLURRY
TANK

MILLING
MACHINE

CRUSHER

PUG MILL

EMULSION
TANK



PAVER

CIR Train Using Engineered Emulsion

MILLING MACHINE

CRUSHER

PUG MILL

EMULSION TANK



Location: Southern CA
Subcontractor: Pavement Recycling

CIR on Nevada Roads

Medium - High Volume	Low Volume
>1000 ADT or >1M ESAL	<1000 ADT & <1M ESAL
Lime slurry, and emulsion	Engineered emulsion
1.5" to 4" Hotmix overlay and friction course	No overlay
	Double chip seal

CIR on I-80 at Pequop

(2008 Roads & Bridges Magazine Award Recipient)

Cost: \$33.7 Million

Project Length:
≈ 20 miles

Pavement Section:
3.5" CIR
4" Hotmix Overlay
 $\frac{3}{4}$ " Friction-wearing
surface



2007-2008

CIR on I-80 at Pequop



Agency: NDOT District 3
Contractor: Road & Highway Builders
Subcontractor: Valentine Surfacing
2007-2008

Project Visit

- June 3 - 5, 2008, Salt Lake City, Utah
- In-Place Recycling Workshop
- June 4th Site Visit to I-80 Pequop



I-80 Pequop



Winter 2008

Low Volume Road CIR Structural Design

< 1000 ADT & <1 M ESAL loading

- 2" - 3" CIR
- Double Chip Seal
- Engineered Emulsion
 - Better coating
 - Less resistance to thermal cracking
 - Better long-term performance
 - Faster set time
 - Construction takes place at lower temperature

SR-892 Cores before CIR



SR-892 Low Volume Road Recycling

Cost: \$2 Million

Project Length:
≈ 35 miles

Pavement Section:
2" CIR
Double Chip Seal



Agency: NDOT District 3
Subcontractor: Valentine Surfacing
2005

SR-892

Well-Coated Material



2005

Full-Depth Reclamation Using Emulsion

Snow Canyon Parkway
just off Bluff Street in St. George, Utah



Contractor: Western Rock
Sub-Contractor: Coughlin Construction
2008

Cost-Effectiveness

Category	ADT & Loading	Strategy	Total Structural Numbers	Strategy Cost	Cost Reduction /mile	Increase in Structural Number
Low	<400 ADT <1M to 2M ESAL	2" mill & HMA	$(2 \times 0.42) - (2 \times 0.44 / 2)$ = 0.4	240K	\$134K	110%
		3" CIR & double Chip seal	3×0.28 = 0.84	106K		
Medium	<400 ADT < 5000 2M < ESAL < 4M	3" Mill & 3" HMA	$(3 \times 0.42) - (3 \times 0.44 / 2)$ 0.6	350K	\$80K	180%
		3" CIR & 2" HMA	$(3 \times 0.28) + (0.42 \times 2)$ = 1.68	270K		
High	<5000 ADT < 40,000 4M < ESAL < 25M	3" Mill & 6" HMA	$(6 \times 0.42) - (3 \times 0.44 / 2)$ = 1.86	650K	\$180K	50%
		3" CIR & 4" HMA	$(4 \times 0.42) + (3 \times 0.28)$ = 2.52	470K		

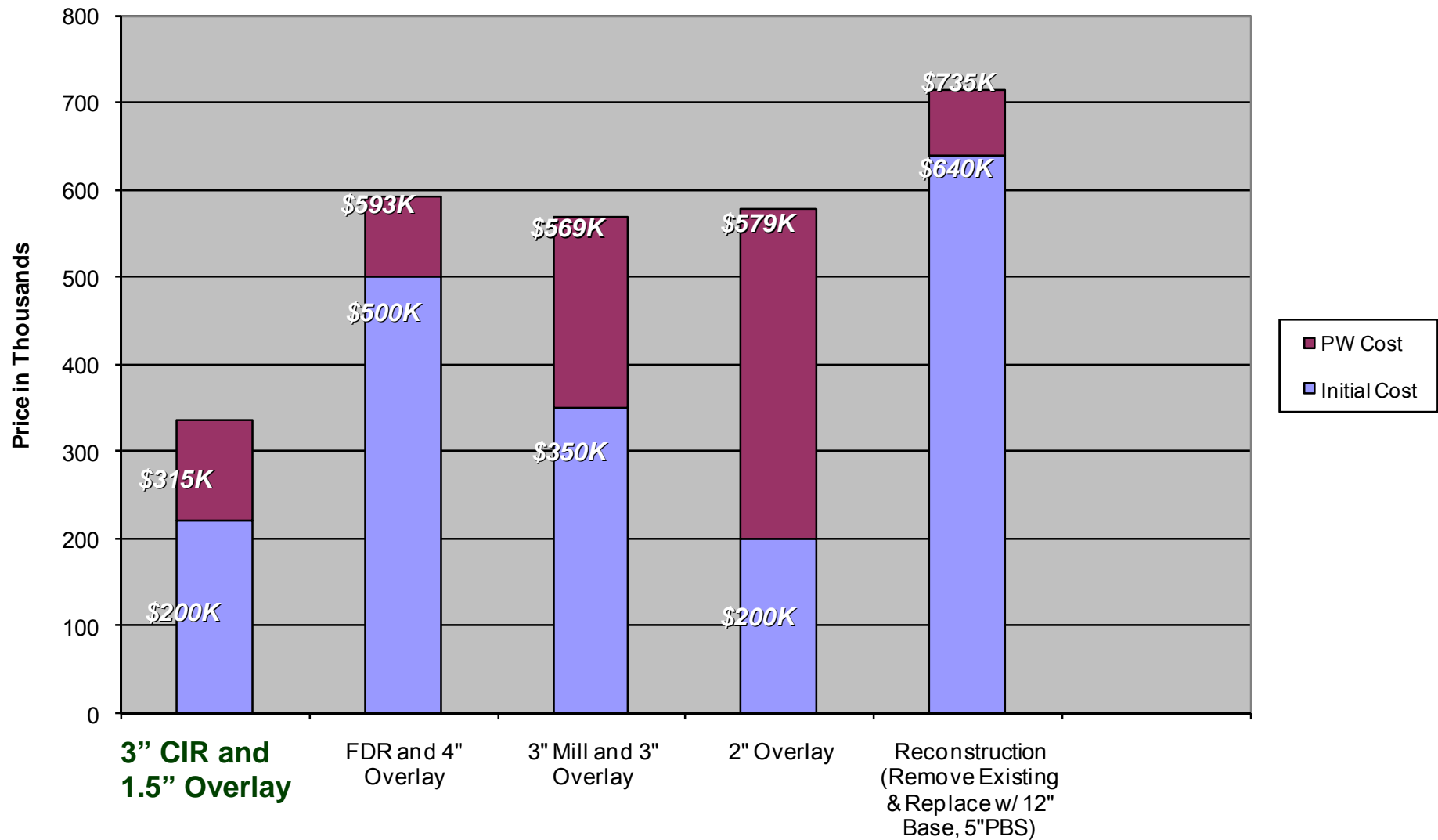
Over \$600M Saving

using CIR & full-depth
reclamation

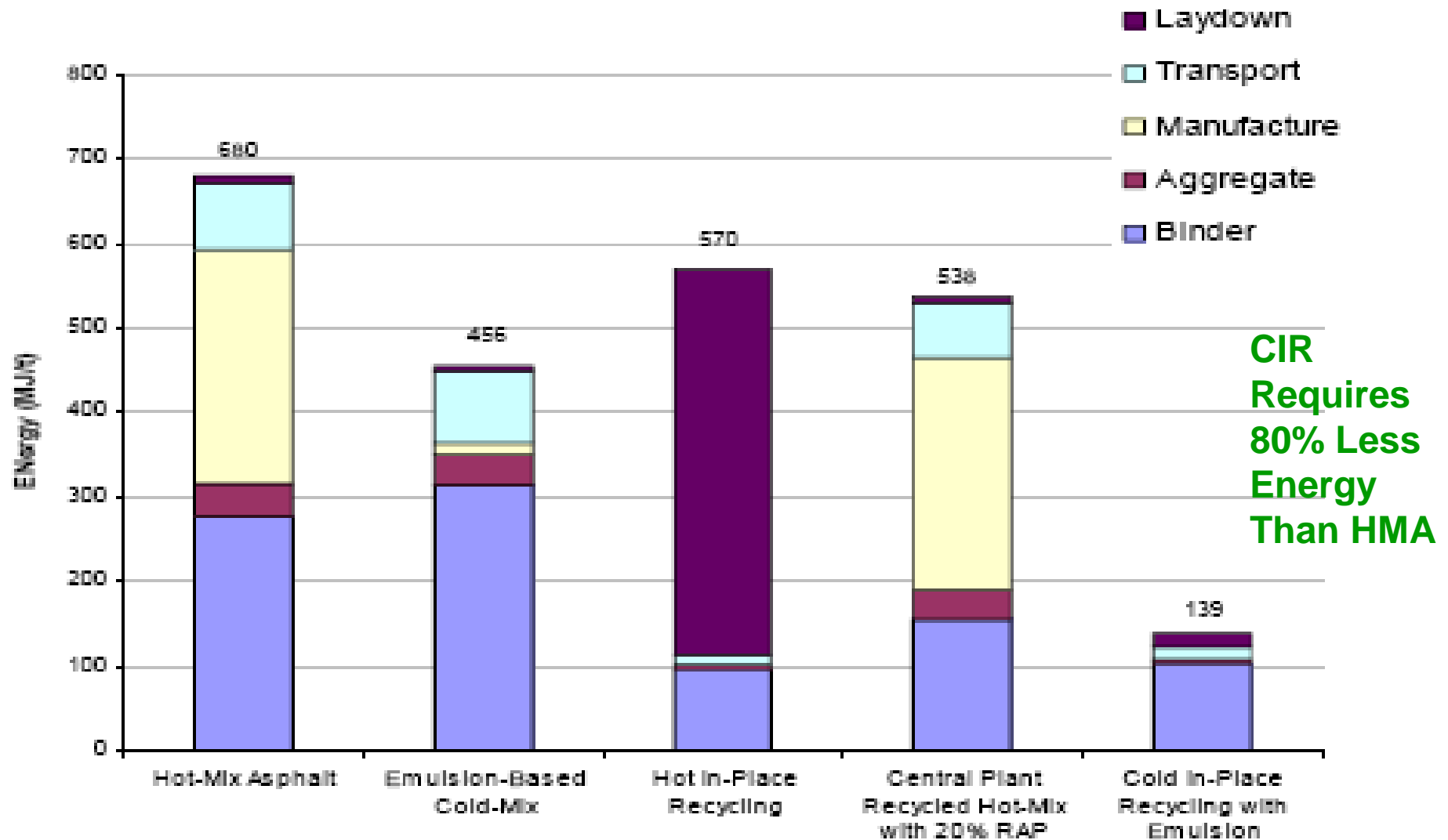


Life-cycle Cost Analysis-Present Worth (PW) for Pavement Rehabilitation

Bemanian, Sohila. State-of-the-Practice on CIR and FDR Projects by Nevada Dot, Nov. 21, 2005



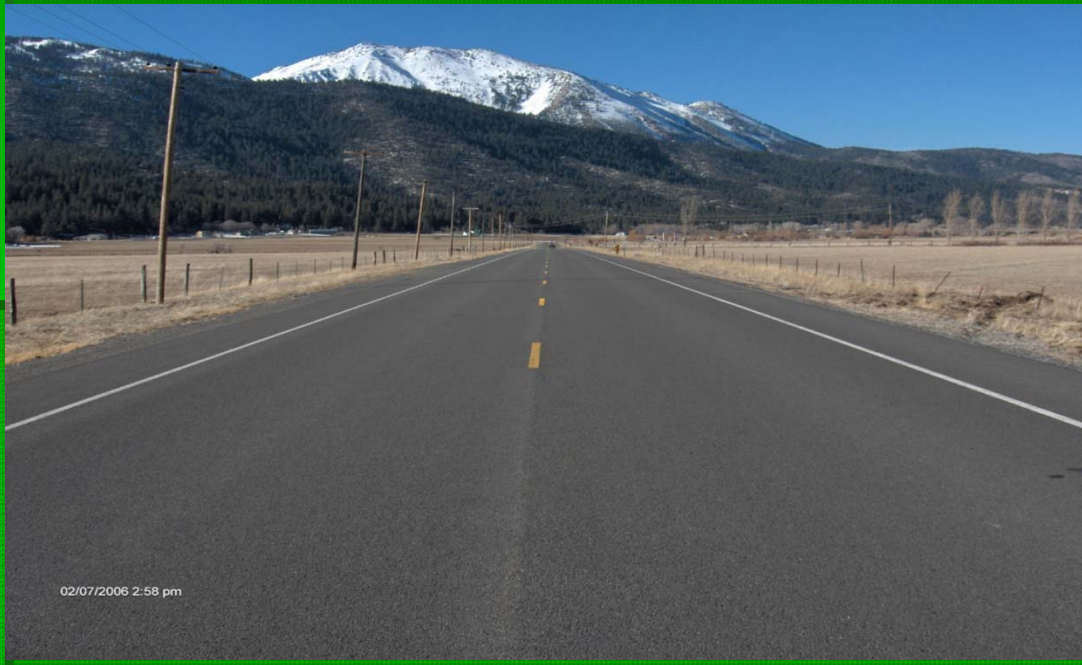
Energy Use Per Tonne Of Material Laid Down



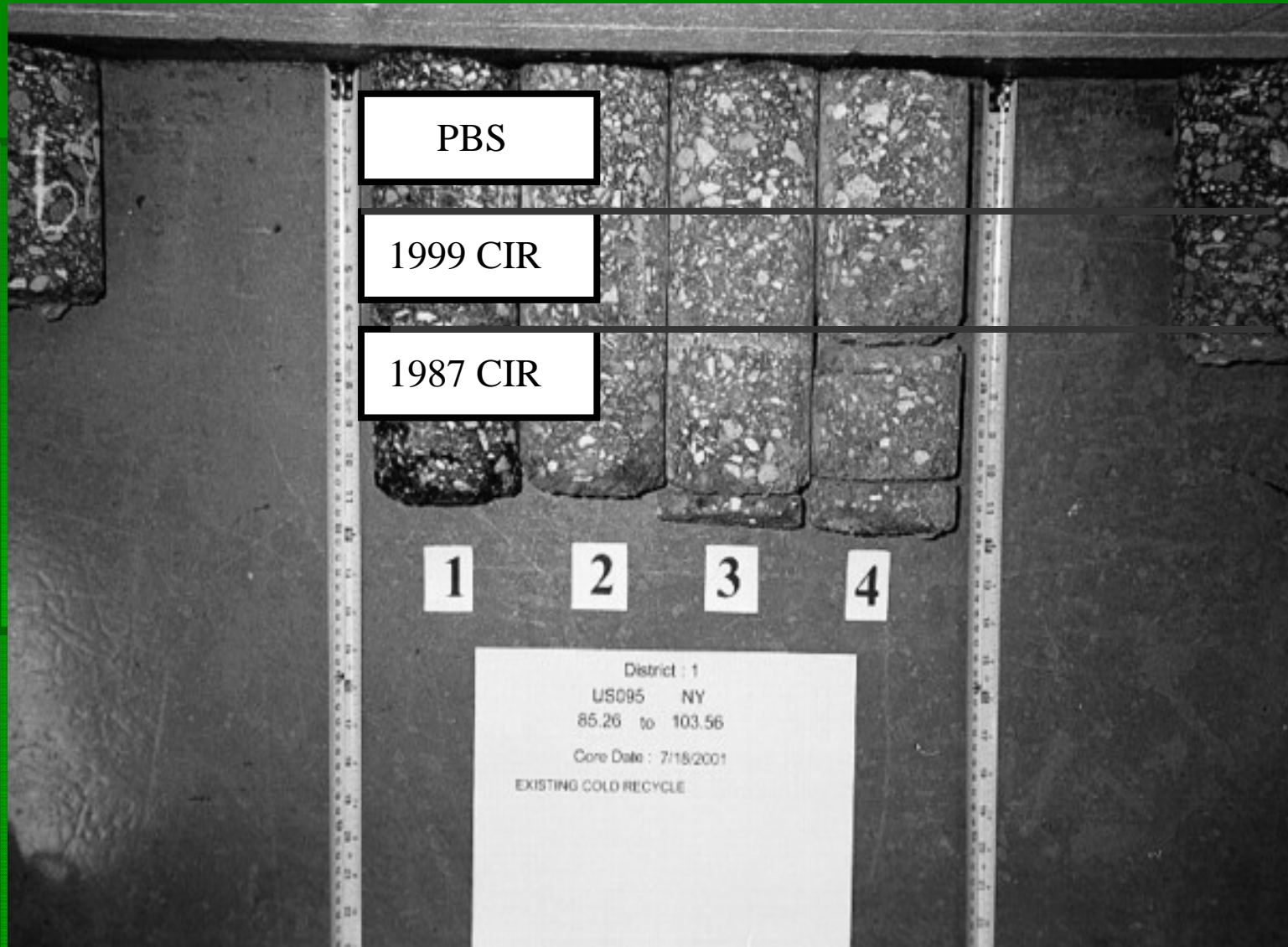
Source: *The Environmental Road of the Future, Life Cycle Analysis* by Chappat, M. and Julian Bilal. Colas Group, 2003, p.34

CIR Performance

Based on NDOT experience, CIR can last 20+ years with timely preventive maintenance



Long -Term Performance



McCarran Blvd., Reno, NV

CIR Process and Asphalt Paving Operation



Agency: RTC Washoe County
Contractor: Granite Construction
Subcontractor: Arizona Pavement Profiling
2002

McCarran Blvd. 6-Year Performance Reconstructed Section



April 2008

McCarran Blvd.

6-Year Performance
CIR and 2" Overlay Section



CIR = Long-Lasting, Cost-Effective, Sustainable Solution

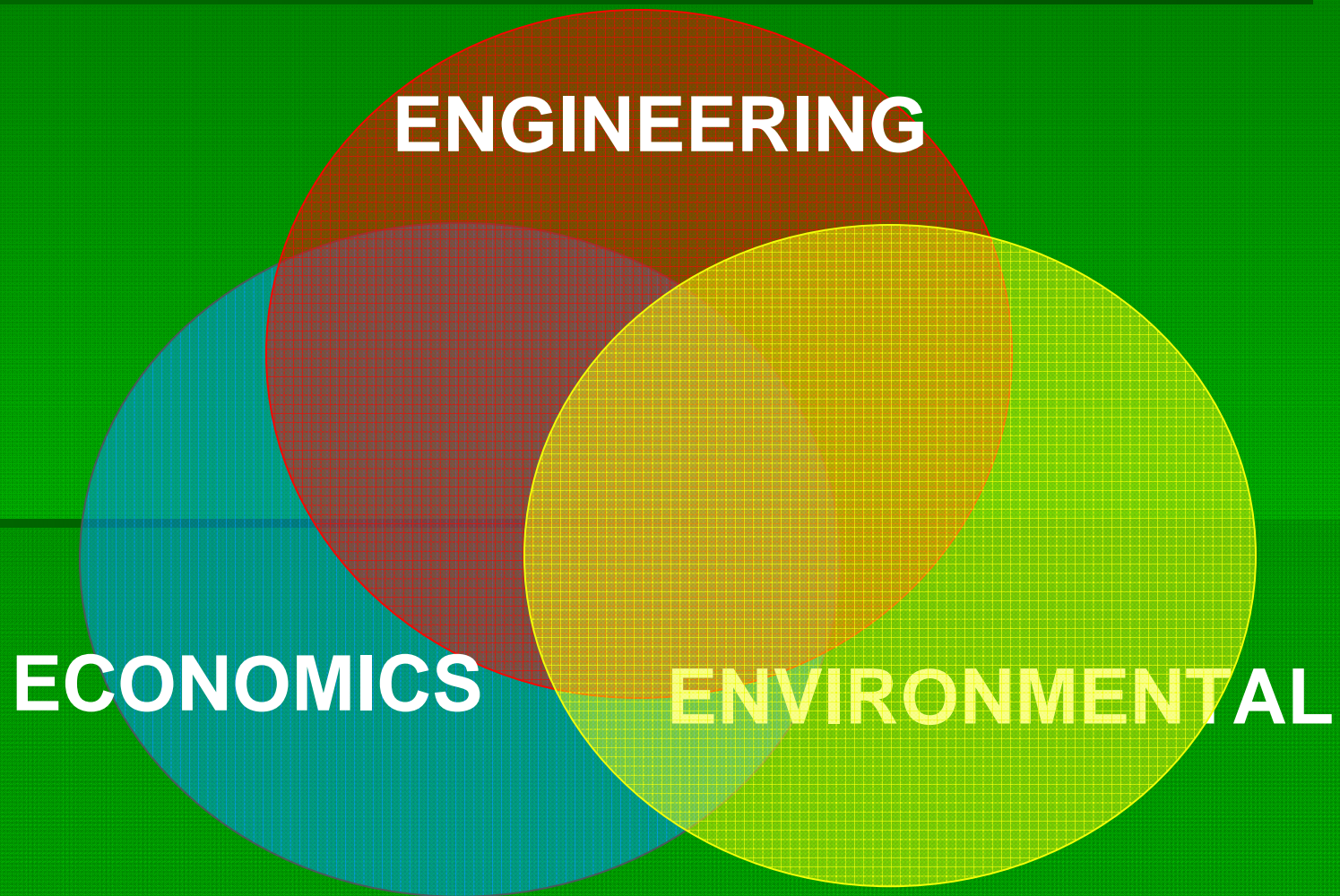


Time, Oct. 1, 2007



Newsweek, April 16, 2007

In-Place Recycling Meets the 3E Challenge



*Let's Create a
Sustainable Future
with In-Place Recycling!*

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