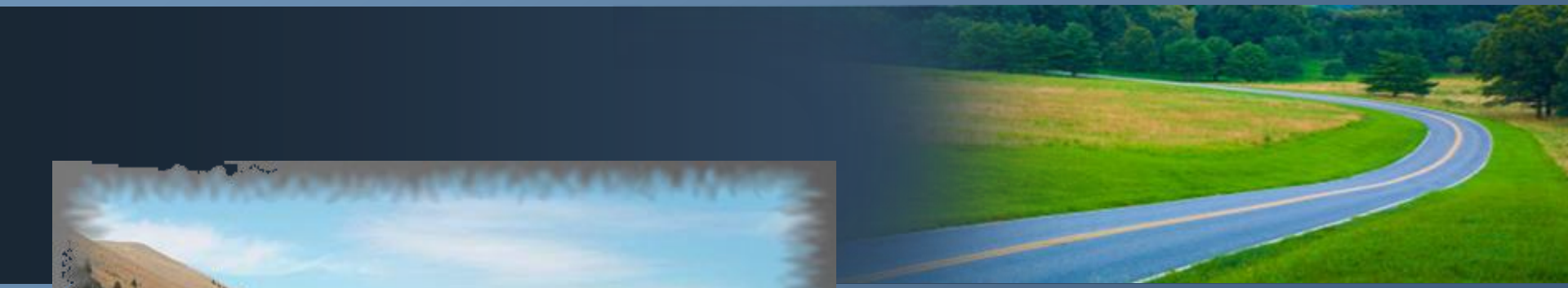
Road Science™

Division of ArrMaz Custom Chemicals



Cold In Place Recycling Project Selection

Kevin McGlumphy, P.E.

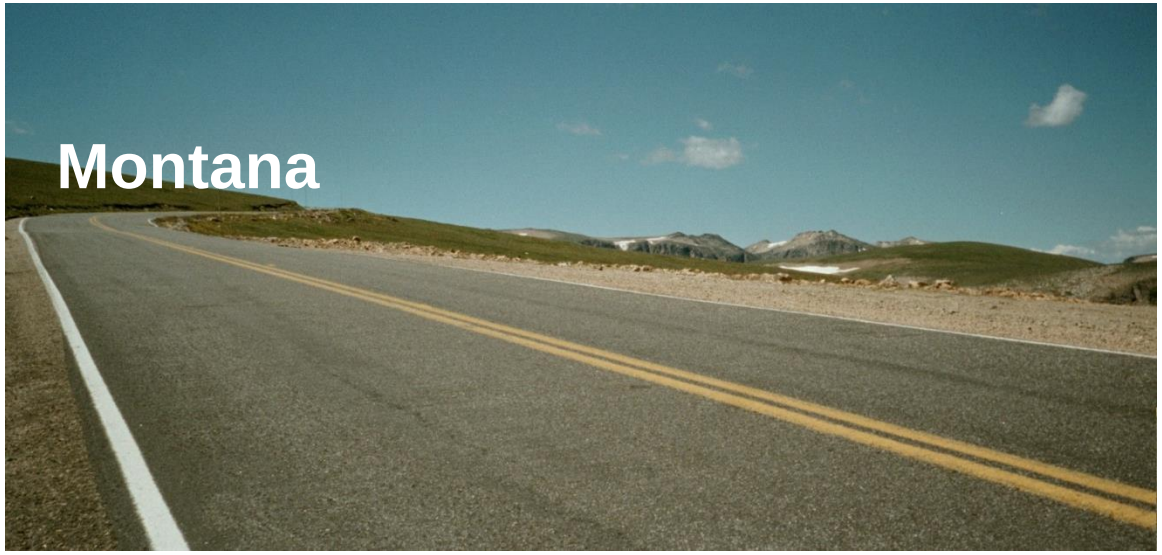
Why Select Cold In Place Recycling?

Improve serviceability of aged, deteriorated pavements

Reduce raw material costs

Level deformations & re-establish crown

Retain overhead clearances and geometric design criteria.



Road Science™
Division of ArrMaz Custom Chemicals

Why Select Cold In Place Recycling?

Minimize lane closure time and user delays

Public acceptance of recycling

Recycled pavement can be recycled itself

Reduce Life Cycle Costs

Road Science™
Division of ArrMaz Custom Chemicals

Where?

- **Rural Roads**

- **Interstate Highways**

- **City Streets**

Road Science™
Division of ArrMaz Custom Chemicals

Where?

Pavement conditions		CIR
Traffic	all levels	√
Ruts	< 3/8 in	√
	3/8 - 1 in	?
	>1 in	?
Crack	Fatigue	?
	Longitudinal	√
	Transverse	√
Surface	Dry	√
	Flushing	√
	Bleeding	√
	Variable	√
Raveling		√
Potholes		√

Pavement conditions	CIR
Stripping	?
Texture - Rough	√
Ride - Poor	√
Poor Drainage	no
Snow Plow Use	√
Low Skid Resistance	√
Other Criteria	
Rural	√
Urban	?
Low Life Cycle Cost	√
High User-Delay $	√

? = depends on the cause of the distress

For distress identification, consult SHRP P338

Road Science™
Division of ArrMaz Custom Chemicals

When to Recycle?

Pavement at end of design life

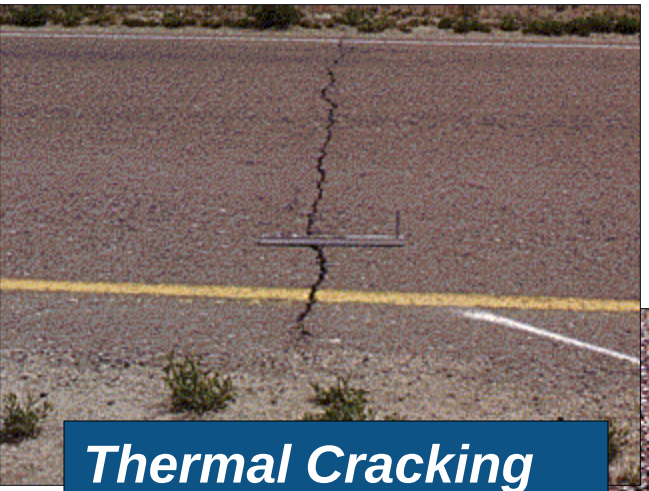
- **Fatigue (alligator) cracking**

Oxidized

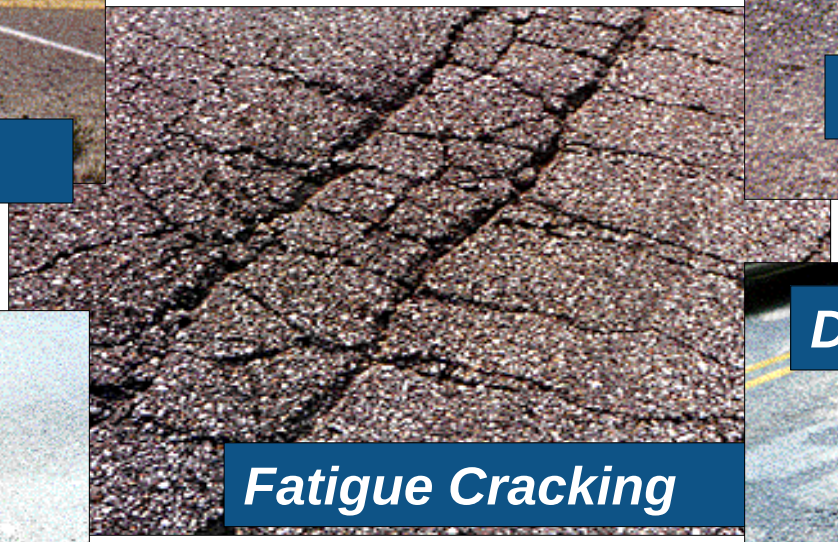
Raveling of thermal cracks - potholes

Low clearances under bridges and geometric issues.

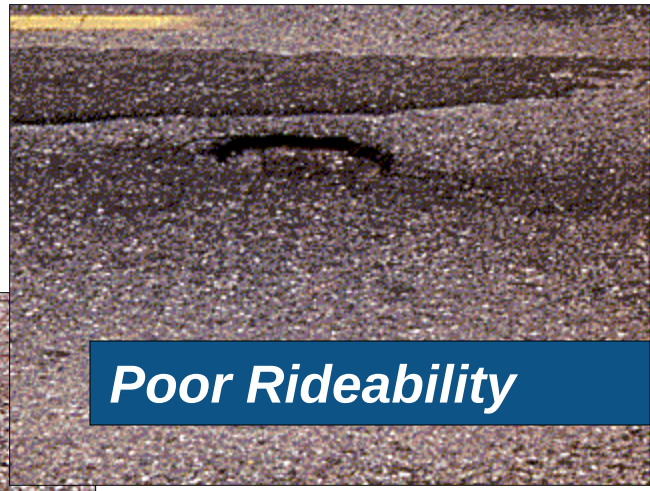
Pavement Distresses



Thermal Cracking



Fatigue Cracking



Poor Rideability

Patched

Dry, Raveled

Road Science™
Division of ArrMaz Custom Chemicals

Solution –CIR

Distressed Pavements Not for ReFlex Emulsion CIR

Avoid base problems!

Road Science™
Division of ArrMaz Custom Chemicals

Engineered System

Defined sampling procedure

- Millings sampled from Job Site
  - Mill to the depth of proposed recycle
  - Ensure that millings are of expected gradation.
- Coring
  - Select a sample pattern that will generate representative materials.

Goal is to collect enough materials for design, to determine the thickness and recycling depth and to test subgade as needed.

Road Science™
Division of ArrMaz Custom Chemicals

Coring Considerations

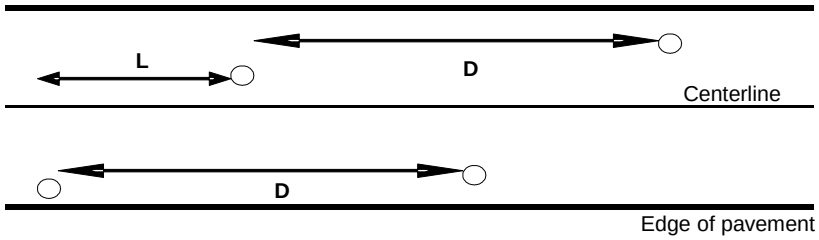


Diagram 1a – Staggered Sampling

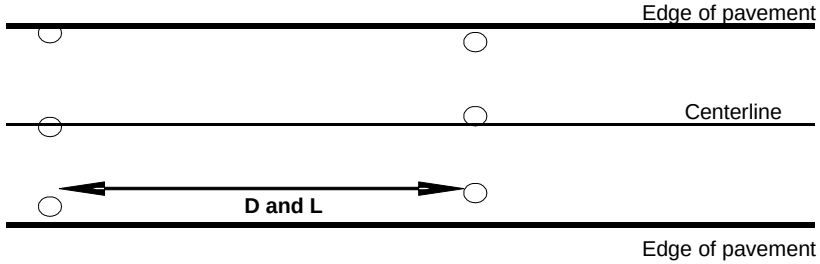


Diagram 1b – Crossroad Sampling

Highways or Airports

D - 1 mile maximum
L – 0.5 mile maximum
At least 15% of the cores should be in the shoulder if the shoulder is getting recycled.
At least 25% of the cores should be on or within 3 feet of centerline.

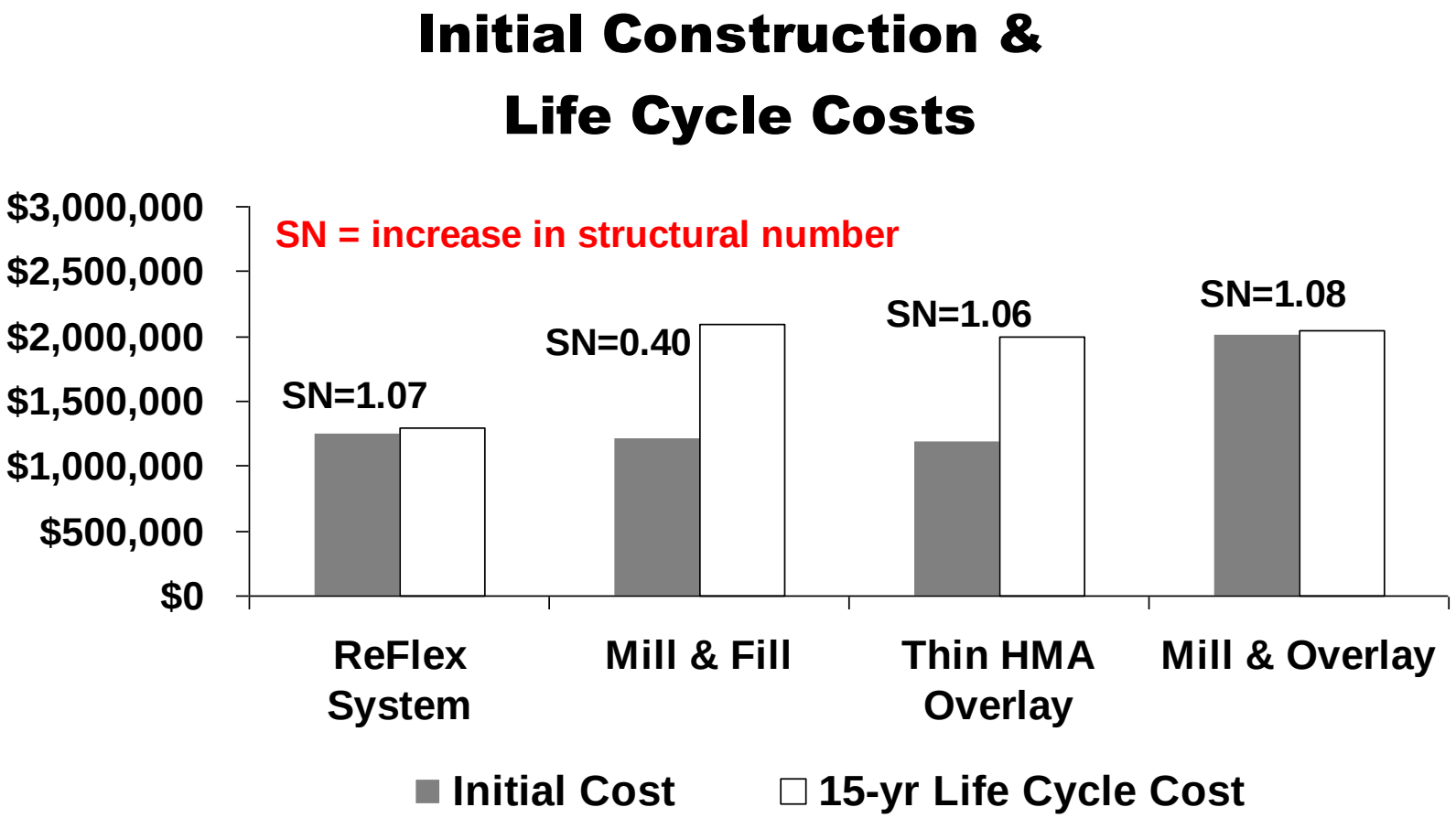
Arterial and Industrial Streets

D - 2,000 feet maximum
L – 1,000 feet maximum
At least 25% of the cores should be in the shoulder if it is getting recycled or within 3-feet of gutter.
At least 25% of the cores should be on or within 3-feet of centerline.

Residential Sites

Streets less than 250 feet long one core
Streets 250 to 500 feet long two cores. One within 3-feet of gutter the other within 3-feet of centerline.
Streets over 500 feet long three cores. One within 3-feet of gutter, one within 3-feet of centerline the other between the two.

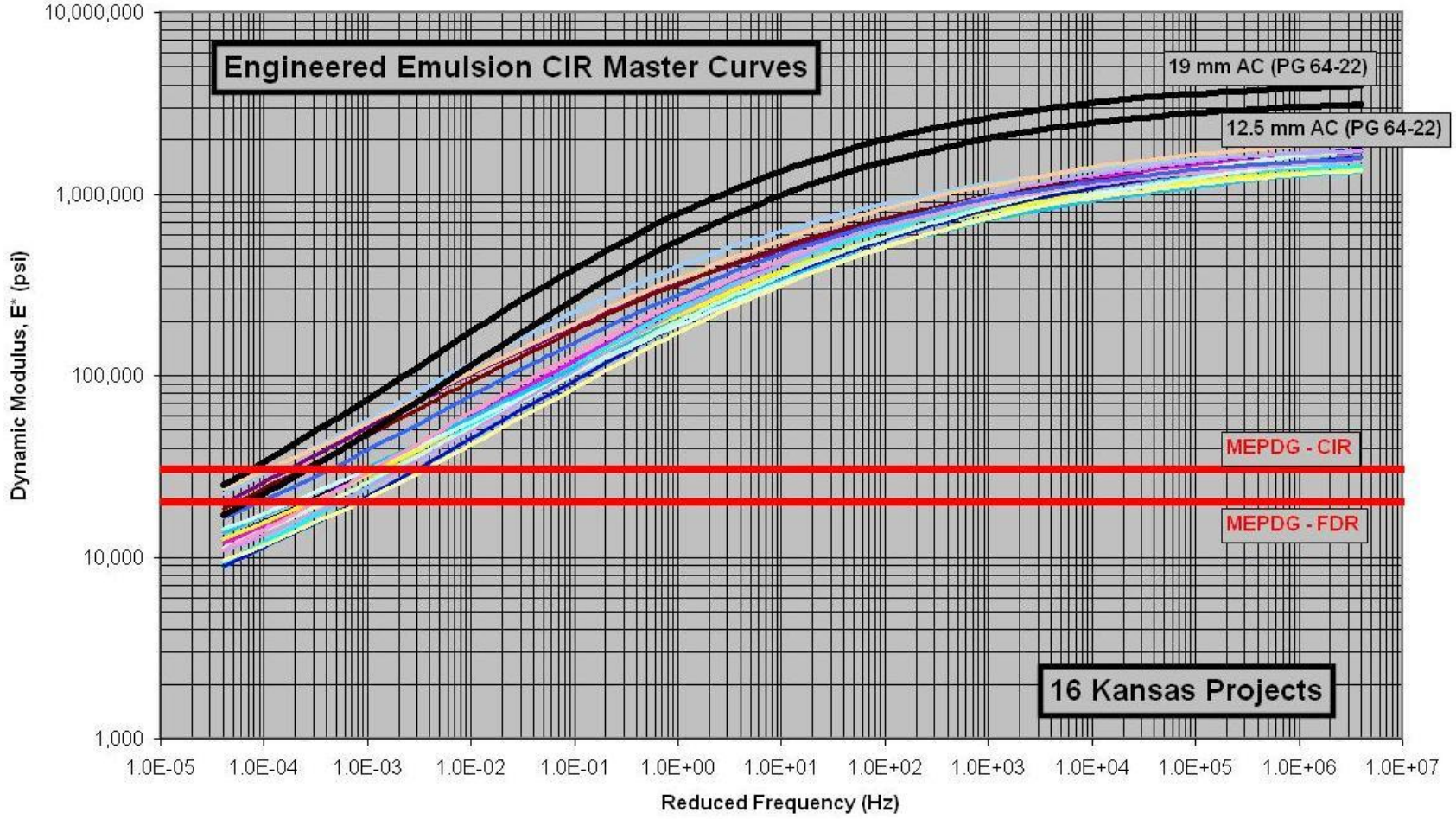
Washington Road, Tazewell County, IL



5.5 mi project, 15 year LCC analysis, 7% interest rate, 3% inflation, 4% discount rate Data from Tazewell County

Road Science™
Division of ArrMaz Custom Chemicals

MEPDG Curves for Reflex (Kansas Projects)



Road Science™
Division of ArrMaz Custom Chemicals

Project Selection

How do I select my project appropriately?

- Take into consideration Location and Geometric Constraints
- Take into consideration Design Life and Traffic Data
- Perform Distress Analysis.
- Look at Funding availability
- Consider Environmental and green paving aspects
- Study the impact of user delays and traffic control on the project
- Do you homework on Site Assessment
- Perform Life Cycle Cost Analysis using the findings from above

Cash In On the Savings!

Road Science™
Division of ArrMaz Custom Chemicals

Thank you.

Questions?

Road Science™
Division of ArrMaz Custom Chemicals