CENTRE FOR PAVEMENT AND TRANSPORTATION TECHNOLOGY

Evaluating the Economic Benefit of Pavement Preservation

WATERLOO ENGINEERING

engineering.uwaterloo.ca

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Outline of Presentation

- Background
- Material Characterization
- Pavement Design and Field Investigations
- Pavement Management
- Closing thoughts

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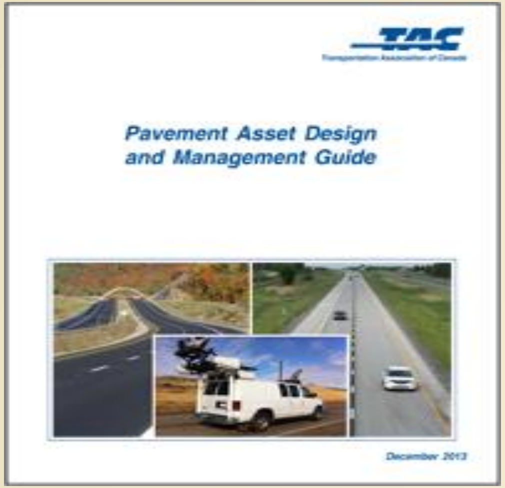
Background

1. CPATT's initiative involves an integrated program of field and laboratory research.
2. Focus on emerging and innovative technologies.
3. State-of-the-art research infrastructure.
4. Train and educate next generation.
5. Sustained partnerships.
6. Provide national and international leadership.

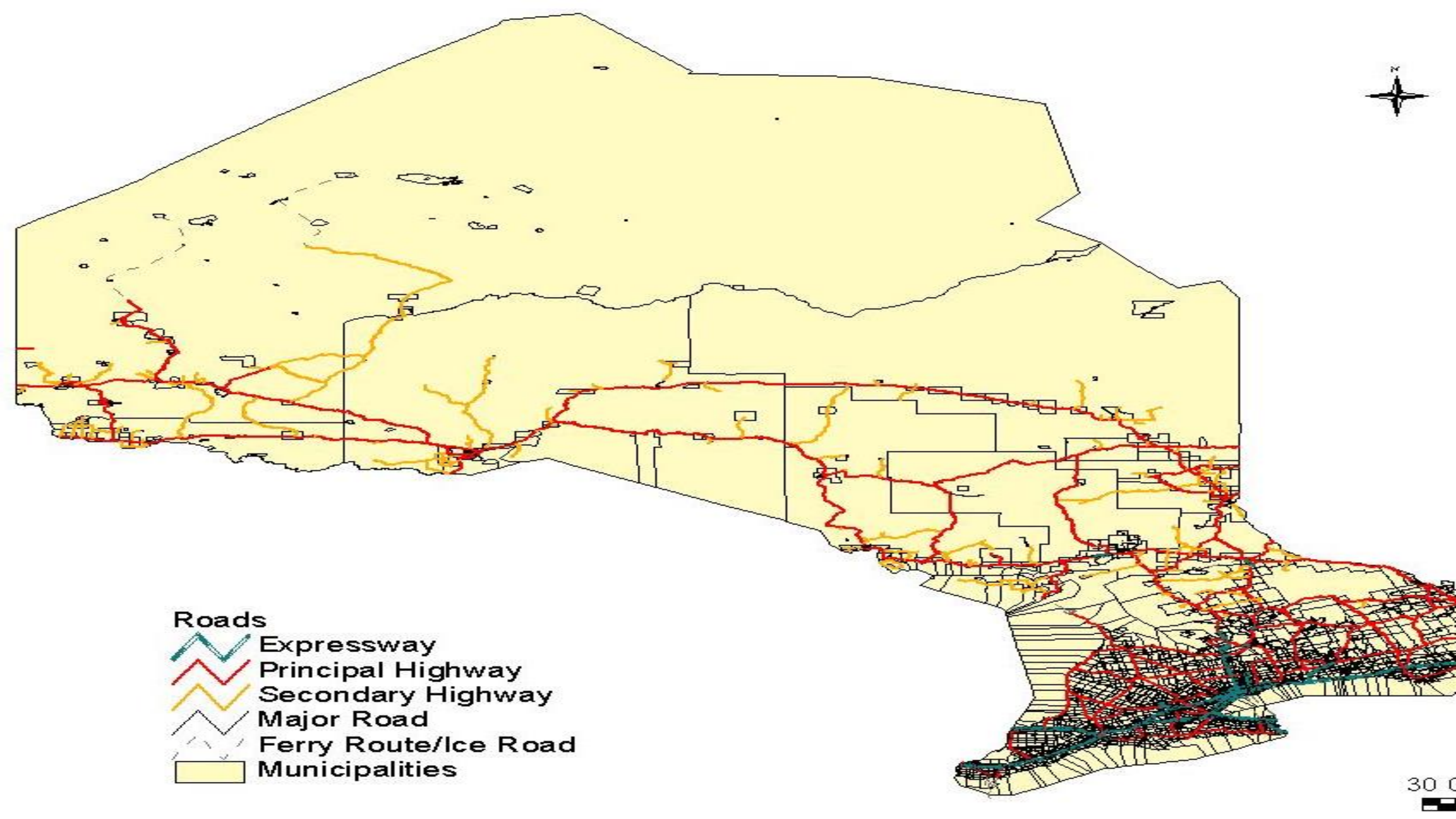
Background

- Leading the Development of the Transportation Association of Canada (TAC) design guide
- Resulted in many positive changes to Canadian standards and specifications



Background

- Examine use/cost effectiveness of Preventive Maintenance (PM)
- Compare PM to Conventional Maintenance Strategies (CMS)
- Uses the Ontario road network as a basis for examination
- Limited long term performance information of PM strategies

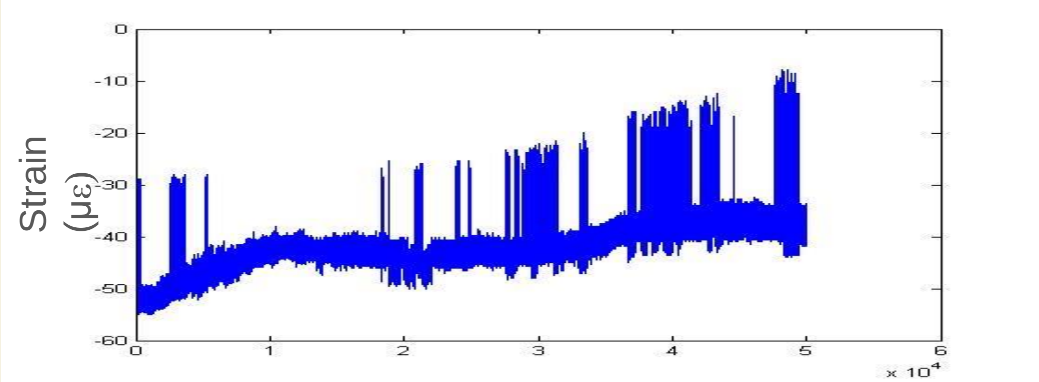


N
Roads
Expressway
Principal Highway
Secondary Highway
Major Road
Ferry Route/Ice Road
Municipalities

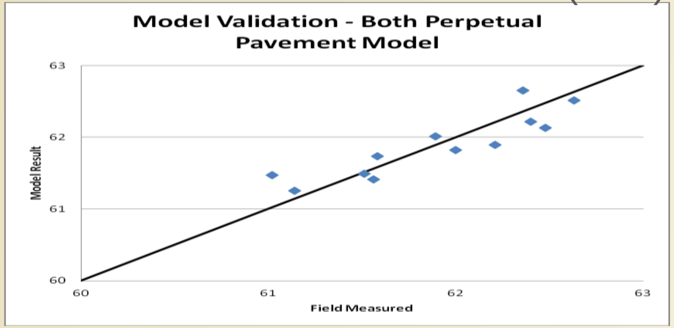
Background

- Limited data on cost effectiveness
- Primarily use CMS, based on distress surveys and worst first repair strategies
- Road Network:
- Provincial System: 25,245km
- Municipal System: 132,669km

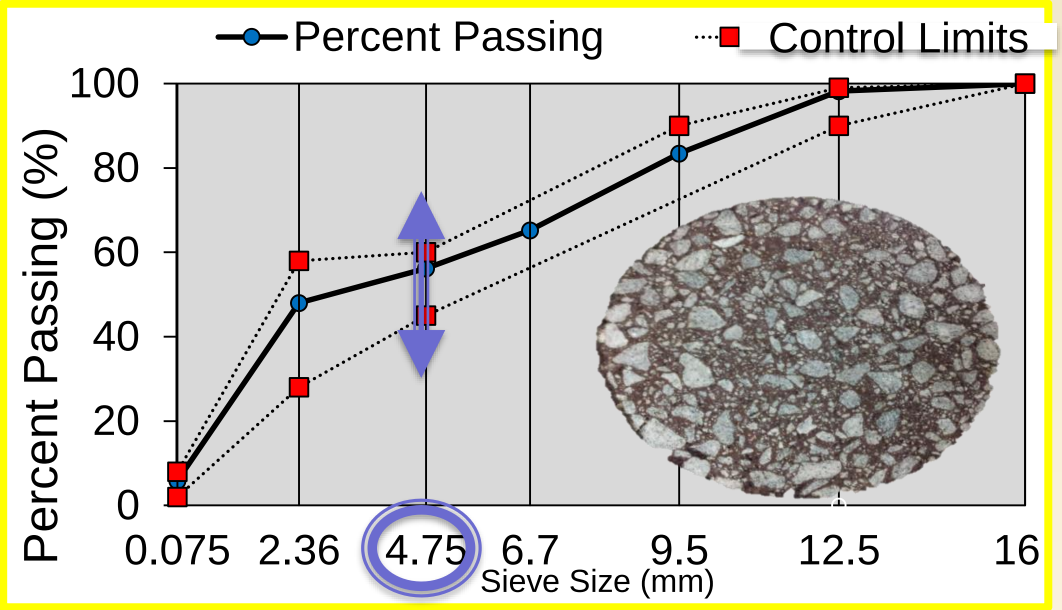
Long-Life Pavement Designs:



Time (Sec.)



Colored Asphalt



Tailoring the amount of ***FINE*** *and* ***COARSE*** *aggregate*

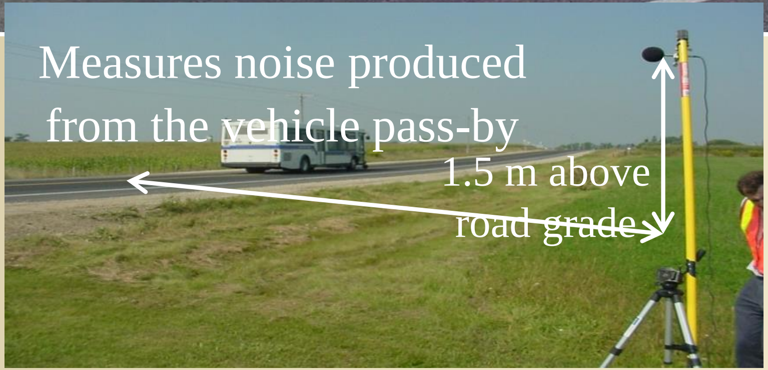
Colored Asphalt

Application of RAS into HMA:

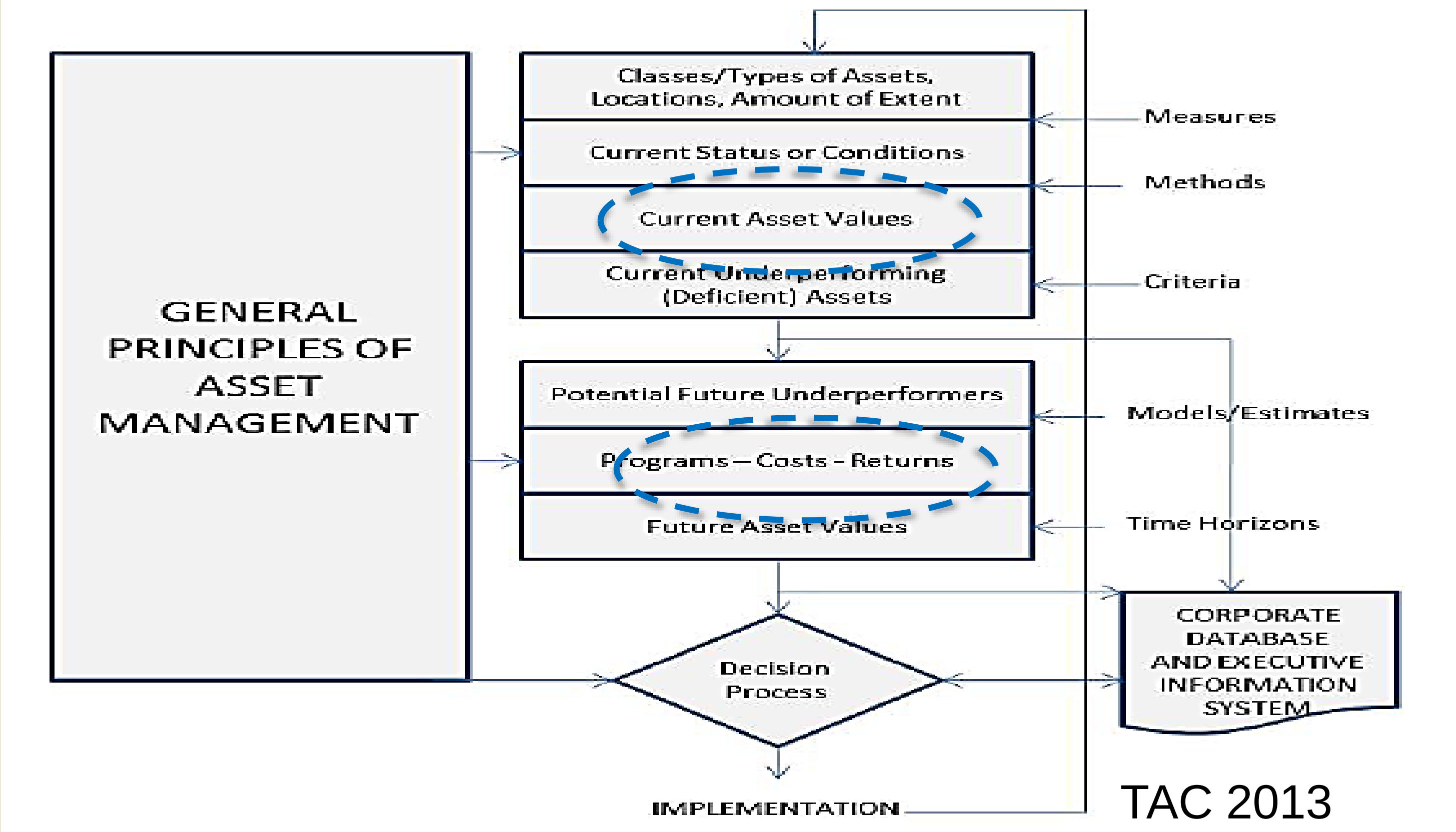
2009

2010

Surface Texture and Noise:



Asset Valuation:



TAC 2013

Experimental Design

- Road classifications
- Pavement surface type (flexible)
- Traffic level (low, medium, high)
- Performance index (PCI, RCI, DMI)
- Pavement structure (layers, thickness)

Experimental Design

- Geometry extent (one lane km)
- Environmental conditions (Northern or Southern Ontario)
- Subgrade conditions (weak, medium, or strong)
- Timing of PM strategy

Experimental Design

- Provincial (Collector, Minor Arterial, Principal Arterial, Freeway)
- Municipal (Local, Collector, Arterial)
- Northern or Southern
- Urban or Rural
- TOTAL 20 Functional Categories

Experimental Design

- Road classifications
- Pavement surface type (flexible)
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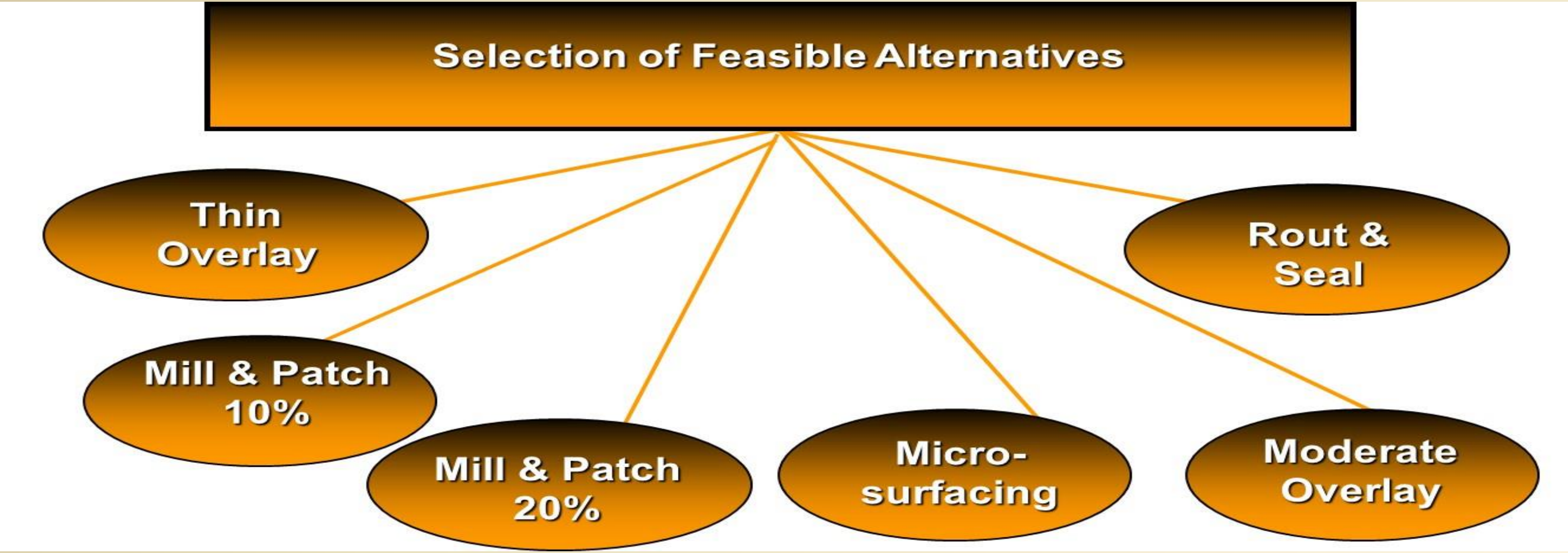
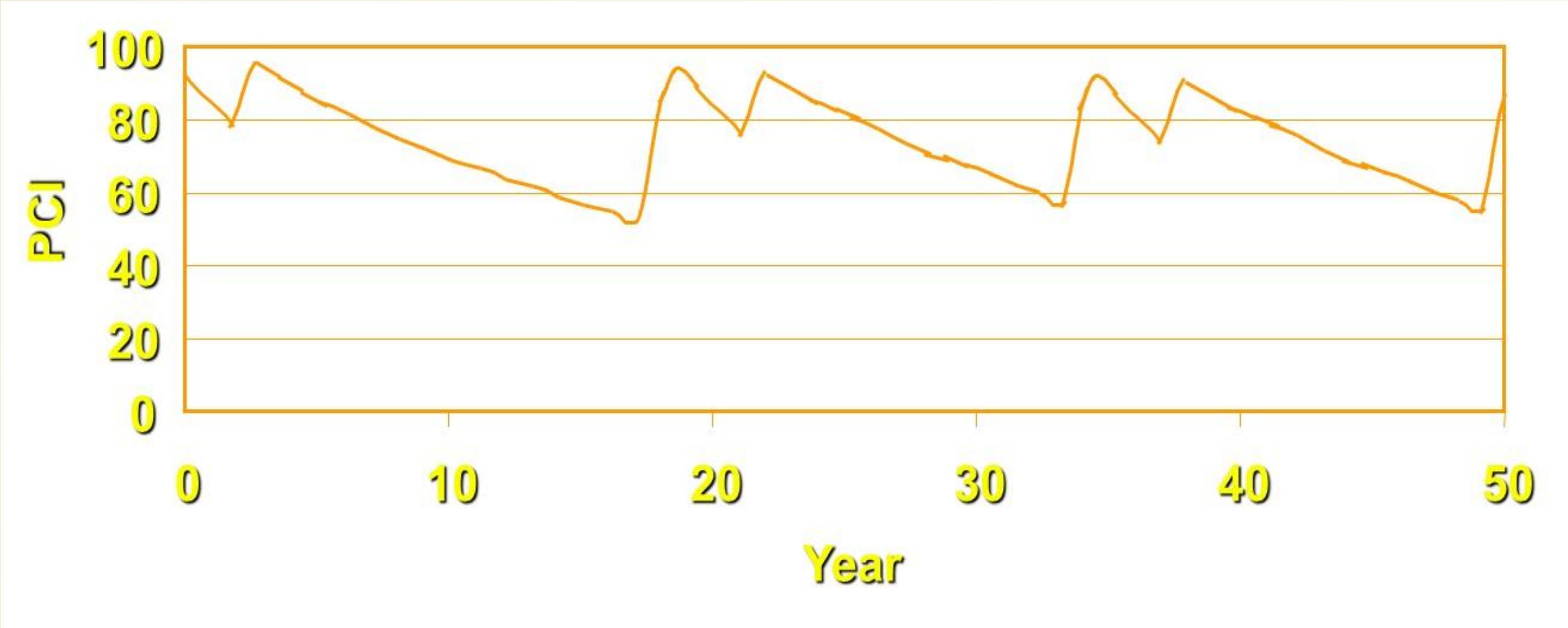
Experimental Design

Experimental Design



Experimental Design



Experimental Design

Verification

- Does treatment appear to be appropriate for given design scenario?
- Would plan be consistent with fiscal policy?
- Is treatment available?
- Initial Construction Costs
- Maintenance Costs
- Rehabilitation Costs
- Salvage Value
- Discount Rate
- Analysis Period

Results

- Majority of road classes: Hot Mix Patching 10% and Hot Mix patching 20% was most cost effective
- Higher the traffic level, overlays were more effective
- Seals were most effective on lower traffic volumes

Results

- Some cases where PM only provided slight improvements
- Also indicated that all 15 types of treatments are viable options given road type/environment
- Environmental conditions had an impact on the choice of treatment

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Closing Thoughts

- Experimental Design in Engineering Research Important
- Framework presented which uses a near optimization for evaluating effectiveness
- Uses several key design parameters to evaluate PM treatments
- Challenge – is to determine the most appropriate time to apply the treatment
- Develop long term data that provides service lives for maintenance treatments


Thank you
Questions?