NOVA SCOTIA
Transportation and Infrastructure Renewal

Cold In Place Recycling in Nova Scotia

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2008 Capital Program - Overview

2008 NSTIR Budget

- Capital construction projects:
  - Spent $138 Million in 2008 on capital repaving projects
  - Paved/treated approximately 800 Kilometres
  - 15% of budget went to pavement preservation projects (chip / micro / asphalt overlay)

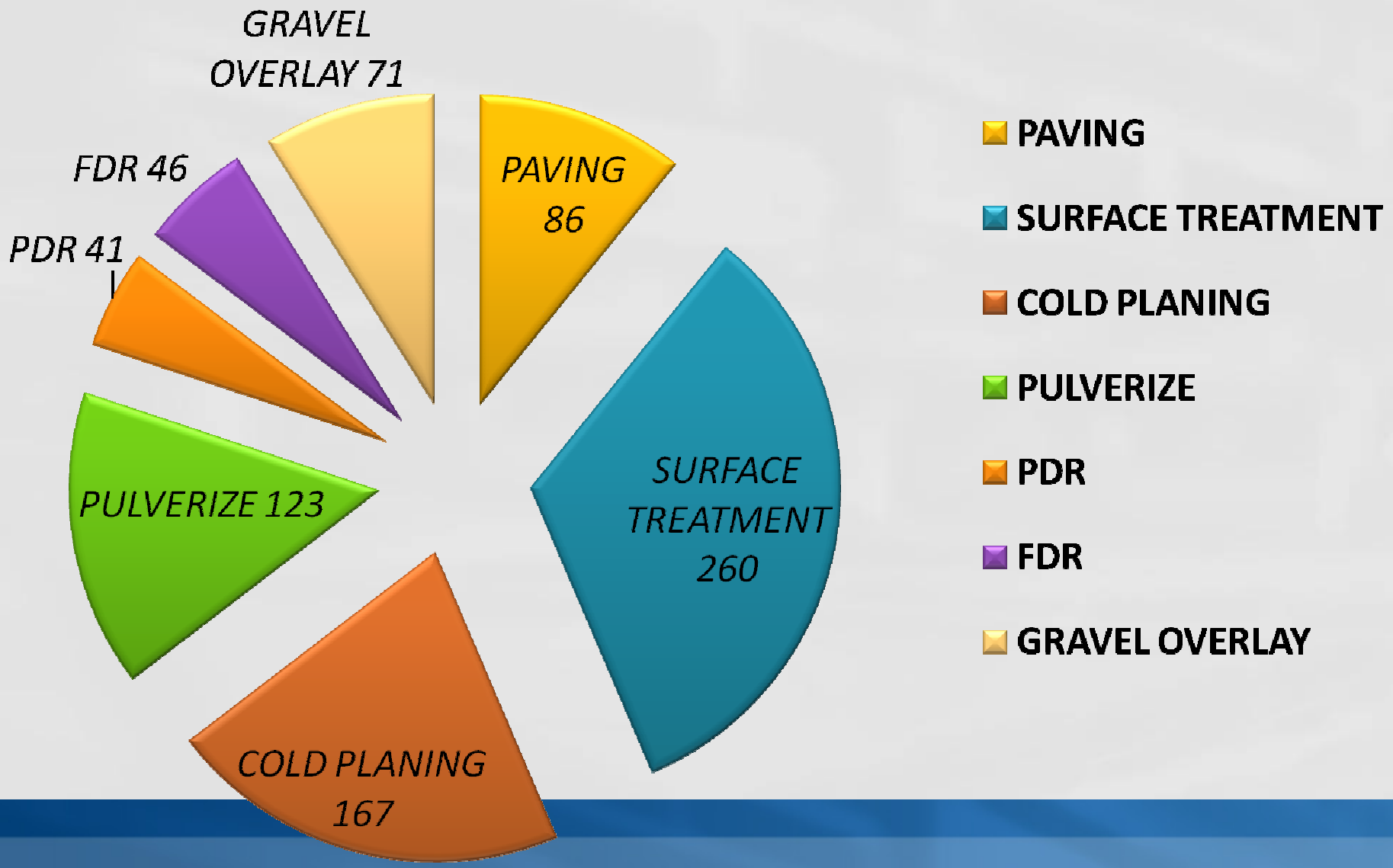
Expense of an Infrastructure Deficit

- Reduction in capital budget in 90's
  - Almost no capital budget
  - Most of road network is beyond preservation stage
  - Surface treatments / overlays not an option
  - Remaining strategies are expensive

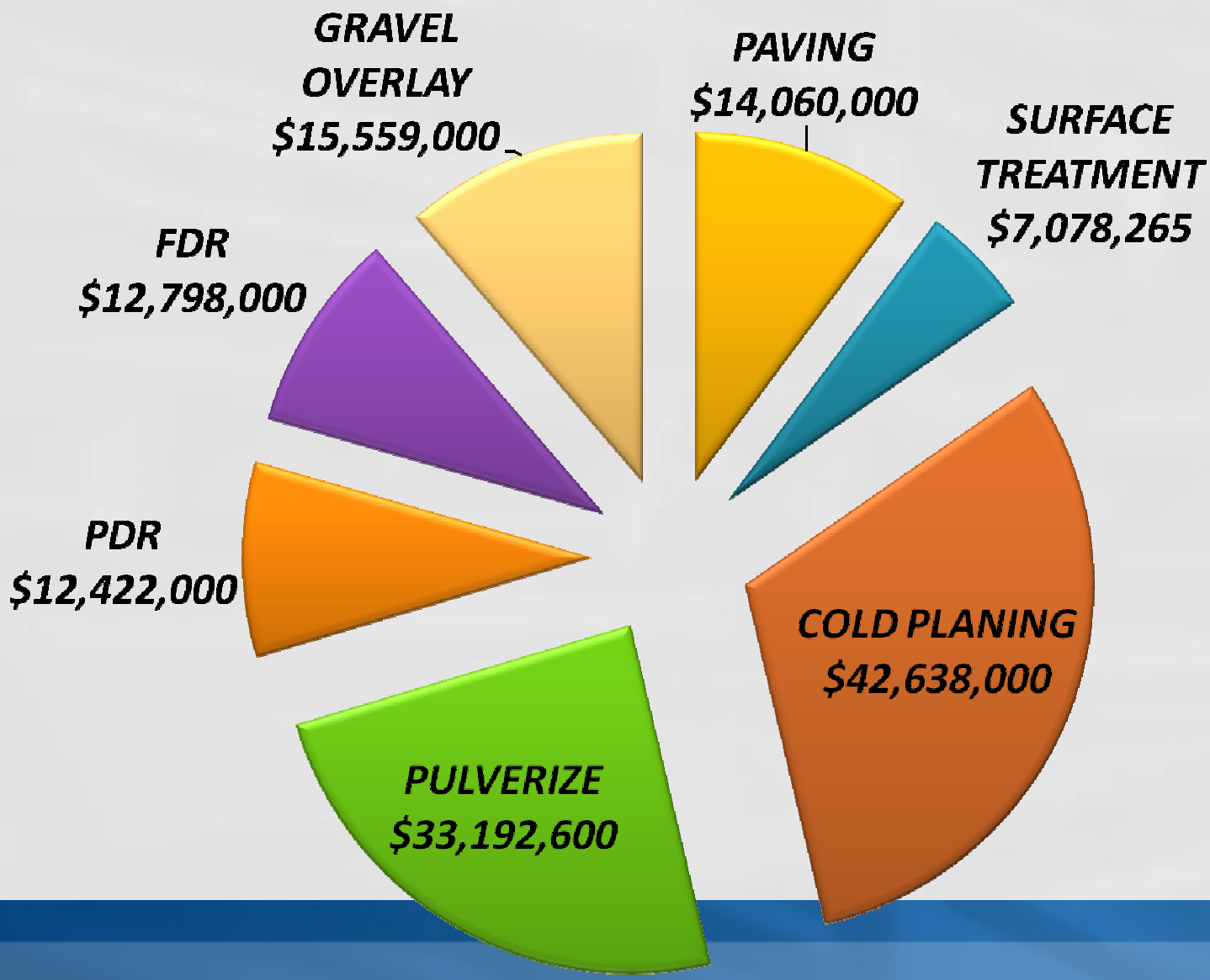
Expense of an Infrastructure Deficit
NSTIR Typical Re-Construction Options

- Pulverization of existing asphalt and gravelling
- Partial depth reclamation
- Full depth reclamation
- 150mm gravel Interlay
- Cold planing

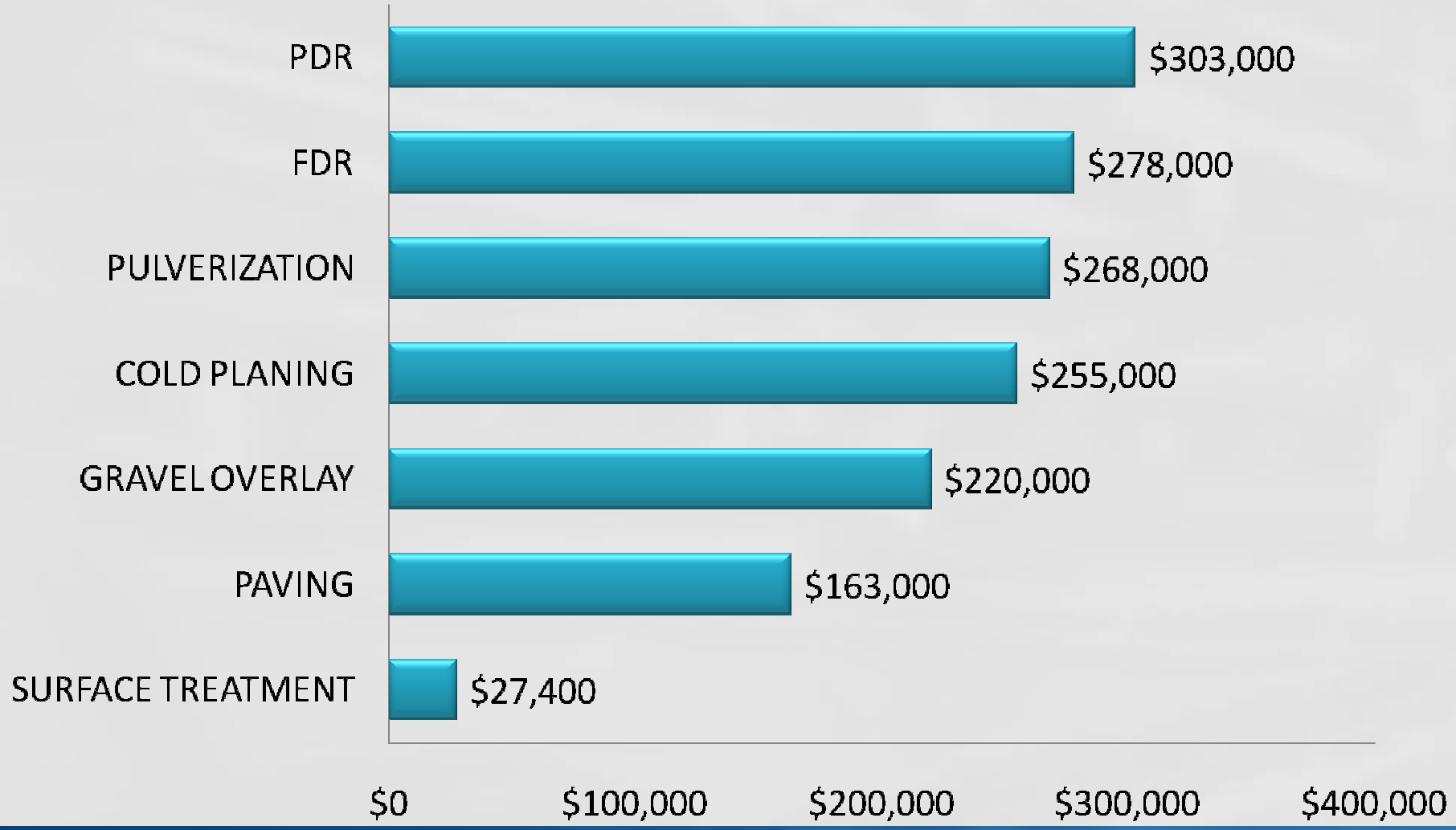
Capital Program by Treatment - Km



Capital Program by Treatment - Cost



Cost by Distance – per Kilometre



Cold In Place Recycling

Types of CIP in Nova Scotia

- Partial Depth Reclamation
  - Emulsion Stabilization to 100mm
  - Expanded Foam Stabilization to 100mm
- Full Depth Reclamation
  - Expanded Foam Stabilization to 200mm

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Overlays

- Assume 1:1 strength ratio between existing asphalt and stabilized material
- Majority of CIP projects - one or two lifts of asphalt depending on deflection criteria
- NSTIR is considering a double chip seal overlay on certain roads

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Dunmore Road – FDR Trial Project

- In 2007 NSTIR did a trial project using a double chip seal as an overlay
  - Low volume road
  - Very low % truck traffic
  - Full depth reclamation of asphalt and underlying base to 200mm

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Dunmore Road – FDR Trial Project

- Road was inspected in spring 2008
- Some potholes occurred, primarily in areas with surface defects
- Year 1 defects repaired under standard one year warranty
- Allowed recyclers to bid as general Contractor

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Dunmore Road – FDR Trial Project - Photos

Cold In Place Recycling

Dunmore Road – FDR Trial Project - Photos

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Route 354 – Partial Depth Reclamation

- Recycled in 2006 – PDR and two lifts of asphalt
- Significant washboarding and frost heave in spring of 2007
- Road settled by 2008
- Longitudinal joint separation in spring 2008 – repaired under warranty
- Coring of centre joint showed significant water damage to recycled layer




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Route 354 – Partial Depth Reclamation - Photos

Cold In Place Recycling

Route 354 – Partial Depth Reclamation - Photos

Cold In Place Recycling

Route 354 – Partial Depth Reclamation - Photos

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Route 224 – Partial Depth Reclamation

- Recycled in summer 2007 after a week of wet weather
- Recycled mix started to push when compacted
- Once opened to traffic the material became unstable

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Route 224 – Partial Depth Reclamation - Video

Cold In Place Recycling

Route 224 – Partial Depth Reclamation - Video

Cold In Place Recycling

Route 224 – Partial Depth Reclamation - Video

Cold In Place Recycling

Route 224 – Partial Depth Reclamation

- Bridging effect from existing asphalt was removed during process, exposing the weak, water saturated structure of underlying material
- Vibratory compaction and pumping from heavy truck traffic caused subgrade to weaken
- Recycled material mixed and sank into underlying gravels
- Had to cancel recycling process and switch project to gravel overlay

Cold In Place Recycling

- 20% of the 2008 capital program was CIP recycle projects
- Most expensive treatment but offers unique advantages
- Mitigates cracking
- Retains strength
- Double chip option
- Maintains road elevation
- Some issues still need to be worked out

Cold In Place Recycling Construction Issues

- On narrow roads planer too wide – mixes in shoulder gravel and creates gutter
- Mix pushes, loss of material/thickness
- Overlap on second pass compromises mix design. Crown off centre
- Seasonal – avoid fall and spring

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Testing Issues

- Mix design – difficulty replicating planings (gradation / liquid demand / fines)
- Difficult to measure compaction and maximum tension
- Disagreements over max. theoretical density
- Mix design and QC testing expensive
- Cores can crumble

Cold In Place Recycling Specification Issues

- Started program as QC/QA – favored dry, open, mixes (mix design by Contractor)
- Penalty for compaction, tension, and moisture
- Switched to method specification in 2008
- Department representative controls mix design and construction methods
- Separated binder from unit price

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ANY QUESTIONS?