# LIFE-CYCLE COST ANALYSIS AND PERFORMANCE COMPARISON OF ASPHALT OVERLAYS ON PCC PAVEMENTS IN WET-FREEZE REGIONS OF CANADA

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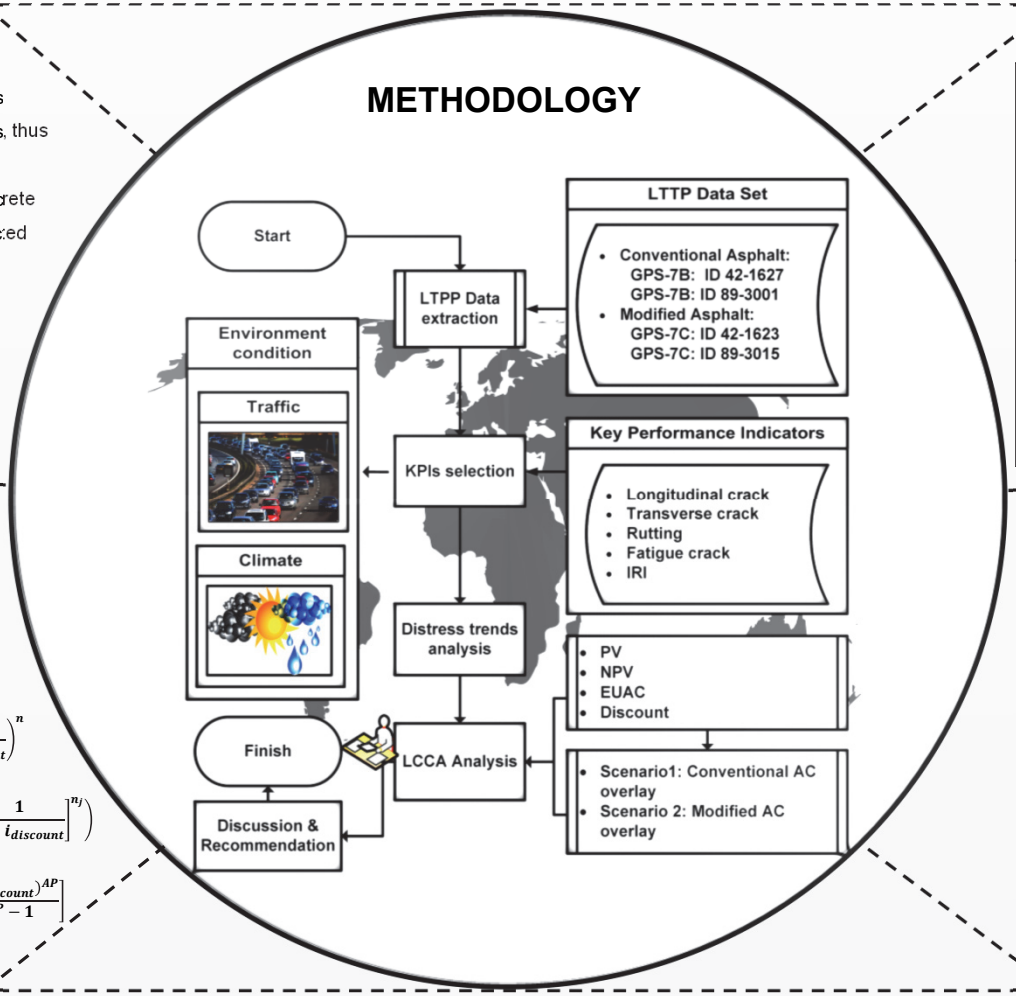
## INTRODUCTION

- Long term pavement performance studies and continuous evaluations can help inform better rehabilitation strategies, thus suggesting more innovative rehabilitation designs.
- This research addressed the performance of asphalt concrete over PCC pavements on four LTPP data sites in the selected wet-freeze climate locations of the US and Canada.

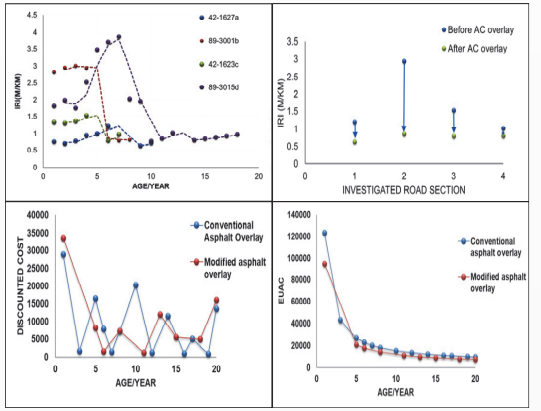
## OBJECTIVES

- Examine the effectiveness of two AC overlay types on PCC pavements
- LCCA based AC overlay strategy analysis

## METHODOLOGY




## RESULTS




## DATA & EQUATIONS

| Type of Overlay | Conventional Asphalt | | Modified Asphalt | |
|---|---|---|---|---|
| Experiment section | GPS-7B: ID 42-1627 | GPS-7B: ID 89-3001 | GPS-7C: ID 42-1623 | GPS-7C: ID 89-3015 |
| Date constructed | 01-May-1967 | 01-Jun-1977 | 01-Jun-1983 | 01-Sep-1984 |
| Functional Class | Rural Arterial | Rural Arterial | Urban Arterial | Rural Arterial |
| Climate region | Wet-freeze | Wet-freeze | Wet-freeze | Wet-freeze |
| Date of first AC Overlay | Jun-2010 | Jun-2009 | Apr-2008 | Aug-2003 |

- PW: Present Worth($)
- C: Future cost($)
- $i_{discount}$: discount rate;
- NWP: Net Present Worth($)
- IC: Initial Construction Cost
- $M\&R_j$: Cost of the $j^{th}$ repairing activity
- EUAC: Equivalent Uniform Annual Cost

(1) $$PW = C \times \left(\frac{1}{1+i_{discount}}\right)^{n}$$

(2) $$NPW = IC + \sum_{j=1}^{k}\left(M\&R_j \times \left[\frac{1}{1+i_{discount}}\right]^{n_j}\right)$$

(3) $$EUAC = NPW \times \left[\frac{i_{discount} \times (1+i_{discount})^{AP}}{(1+i_{discount})^{AP}-1}\right]$$

## CONCLUSIONS&SUGGESTIONS

- The surface distresses take longer periods to occur on the modified AC overlays
- The severities of road defects on modified AC overlays are lower than conventional asphalt overlays.
- Both types of overlay treatments resulted in similar levels of IRI after few successive years of service
- The rate of roughness changing is lower if modified asphalt is used on milled surfaced with thicker overlays
- LCCA scenarios suggest that modified AC overlays should be used instead of conventional AC overlay to achieve cost-effective and better long-term performance

## ACKNOWLEDGEMENTS

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