Real-Life Experiences with Major Pavement Types

Introduction

From engineering economics point of view, treatment options for pavements can range from routine maintenance or preventive maintenance to full-structural replacement, with many intermediate steps in-between. The benefits of timely treatment application and the implementation of a robust and strategic preventive maintenance plan can go a long way in mitigating major and expensive repairs.

Differences in treatment/repair applications, pavement cross-sections, and in-situ conditions can vastly impact long-term pavement performance. In some cases, the influence of climatic, geologic, and traffic conditions can have a more dominant influence pavement performance than differences in their structure or mix design factors.

Findings

1. Data analysis of the Historic Contracts database shows that the most common types of repair and treatment options in the state of Indiana, ranked in decreasing order, were (1) partial 3R, (2) major structural overlays, (3) resurfacing—non 3R/4R standards, (4) preventive overlays and (5) minor structural overlays (formerly, functional overlays).

2. Frequency distribution data indicates that the average time between recurrence of these repair projects ranges from 11.8 years (resurfacing) to 13.5 years (minor structural overlays), with a standard deviation of approximately 6 years in all repair types.

3. The distribution of partial 3R projects, resurfacing projects (not in accordance with 3R/4R standards), and minor structural overlay projects were weighted to the left of maximum frequency, indicating that such projects were more frequent in the earlier part of the pavement life.

4. Major structural overlays and preventive overlays were weighted to the right of maximum frequency. In other words, such treatments last longer or are used during the latter part of pavement life.

5. The LTPP sites selected for this study that were situated in the southern part of the state had
higher precipitation levels and lower values of freezing indices compared with sites located in the northern and central portions of the state.

6. The effectiveness of partial-depth patching to repair PCC joints was validated by the low levels of spalled transverse joints of the treated SPS-4 section versus the untreated companion section.

7. Based on the comparison of the JRCP GPS-4 sites, it appears that a combination of several factors, including climate, traffic, type of soil in the subgrade and type of bound base used, had noticeable influence on the overall performance of the pavements.

8. Types of seal coat treatments (slurry seal, crack seal, and aggregate seal coat) used in the SPS-3 asphalt concrete sections did not impact their rutting resistance. However, the section that received aggregate seal coat had fewer thermal (transverse) cracks than sections with the other two treatment methods.

9. No differences in rut resistance or transverse crack count was observed between the SPS-9 asphalt concrete sites analyzed in this study. The test variables in these mix and binder validation study site does not appear to have impacted their overall performance.

10. The GPS-2 section with a granular subbase layer had a lower transverse crack count when compared to the section without a granular subbase. This factor did not impact the rut depth values of these two sections.

Implementation

The findings of this research provide additional, objective insights into the most common types of repairs of deteriorated pavements in Indiana and the frequencies at which such repairs were performed. Identification of these parameters allows INDOT to ensure that existing (or modified) specifications and design philosophies account for these factors. The data presented in the report can be considered when performing life cycle costs analysis; thus it has a potential to inform future management and design decisions and maximize their cost effectiveness. The results can be implemented by asset management, design, materials and construction personnel through policies, specifications, and construction memos.

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