Project Summary

Texas Department of Transportation

0-5548: Development of Field Performance Evaluation Tools and Program for Pavement Marking Materials

Background

Historically, the prequalification or eventual selection of pavement marking materials (PMMs) is based on material specifications from lab testing and from American Association of State Highway and Transportation Officials (AASHTO) specifications. However, those specifications do not correlate well with the field performance of a PMM and they do not address the aspects of effective field evaluation procedures. In recent years, TxDOT has increased the use of performance based specifications such as the requirements of a minimum, initial performance. However, the same product may display different field performance because of external factors such as climate, traffic condition, roadway surface type, and installation quality. In addition, new PMM types and products have become available at a faster pace and their field performance is mainly unknown. It is critical, therefore, to develop procedures to evaluate the field performance of PMM products and provide guidance and data to TxDOT districts so that high quality PMM products will be used and good, long-term performance ensured.

Currently, field test procedures vary and there is no consensus on recommended procedures. Accelerated field tests often use AASHTO's National Transportation Product Evaluation Program (NTPEP) transverse line deck design; however, there has been no consensus on the relationship between the field performance of transverse lines and longitudinal lines (skip lines, edge lines, or lines in the travel lane). Therefore, it is very important to investigate the correlations between the performance of test deck lines of different designs and the actual field performance of PMMs. Based on the findings of the correlation study, a best test deck design and PMM evaluation procedure can be recommended.

What the Researchers Did

Over a three-year period, researchers conducted the following tasks to investigate the correlations of field performance between test deck lines of different locations and orientations in order to recommend the best field deck design/testing procedure:

- Researchers conducted an extensive survey of existing PMM field test deck designs.
- Researchers developed a comprehensive field test deck design that includes transverse lines, longitudinal lines in the travel lane in a five-line pattern and a seven-line pattern, and longitudinal lines at normal skip line and edge line locations.

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- Three PMM field test decks were installed in three TxDOT districts (see figure). The test deck locations were selected based on traffic condition, pavement surface type, geographic and other environmental factors. A variety of PMM types were included in the test decks.
- The field test decks were monitored throughout the duration of the project. The retroreflectivity data were collected and used for correlation analysis.
- The researchers conducted correlation analysis on field performance between test lines of different locations and orientations.
- The researchers investigated the effects of different application procedures and application quality.
- The researchers developed a tracking database for monitoring and comparing performance of PMM products.

Figure. Test Deck Layout.

What They Found

This research yielded many findings with respect to PMM test deck design and field performance, including the following:

- Transverse lines produced similar performance change patterns to longitudinal lines in the travel lane.
- The five-line longitudinal design produced similar results as the seven-line design.
- Accelerated testing lines have positive correlations with lines in normal skip line and edge line positions.
- Installation procedures (truck vs. hand-card and extruded vs. sprayed) affect PMM field performance.
- Installation quality significantly affects PMM field performance, both in terms of retroflectivity and durability.

What This Means

Based on the findings from this project, the researchers concluded that:

- Transverse lines produced similar results with longitudinal lines in the travel lane.
- Accelerated testing results had positive correlations with normal field performance.
- Application procedures of test lines affected field performance.
- There is a critical need to emphasize the quality of PMM installation as it is directly related to the performance in the field.

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