IMPROVEMENT OF PLANNING LEVEL ANALYSIS PROCEDURES FOR TWO-LANE HIGHWAYS

PROBLEM STATEMENT

The concept of Level of Service (LOS) is central to the *Highway Capacity Manual* (HCM) and complementary software programs (e.g., HIGHPLAN). Level of Service is a qualitative assessment of the operational performance of a roadway facility based on quantitative performance measures (called service measures). Many transportation infrastructure funding decisions are based on LOS analyses, and the resulting LOS designations are intended to represent user-perceived quality of service. However, issues related to the existing analysis methodology for two-lane highways warrant investigation.

The first issue deals with needed revisions to FDOT's HIGHPLAN software, which is used for highway LOS analysis. Previous research identified computational discrepancies in the two-lane highway analysis methodology of the HCM, which resulted in an NCHRP project to investigate and correct the computational discrepancies. Since the resulting revisions affect HIGHPLAN, the methodological and computational revisions from the NCHRP project need to be tested. Once verified for accuracy, the revisions then need to be implemented into the HIGHPLAN program.

The second issue deals with the perceived limitations in the scope of two-lane highway classifications and the appropriateness of chosen service measures for the various classifications, particularly with regard to two-lane highways in developed areas (e.g., two-lane highways through small towns or coastal areas). FDOT believed that the current two categories of classification and their corresponding service measures did not correlate well with user perceptions of LOS on two-lane highways in developed areas.

The third issue deals with the development of an experimental two-lane highway analysis methodology at the facility level (i.e., combining two-lane highway segments and signalized intersections). FDOT is unsatisfied with the scope of analysis provided in the HCM for two-lane highways because it is limited to segments: a facility-level analysis procedure would provide more practical value to the Department. A facility-level analysis would allow the various features (e.g., occasional isolated intersections) that are typical to an extended length of two-lane highway to be addressed in a combined analysis, with a single performance measure and LOS value resulting.

OBJECTIVES

This project consists of three tasks:

1. Verify the accuracy of the revised methodological and computational revisions from the NCHRP project and implement the revisions into the HIGHPLAN program.

2. Determine (1) if additional two-lane highway classifications are warranted and (2) the appropriate performance measures for assessing LOS for each classification.

3. Develop an experimental methodology for the analysis of two-lane highway facilities, specifically addressing the combination of two-lane highway segments with signalized intersections.

FINDINGS AND CONCLUSIONS

Task 1: The NCHRP project revisions to the two-lane highway methodology were tested and ultimately validated. They were incorporated into a new version of the HIGHPLAN software. The computational methodology for HIGHPLAN was fully documented and is included in the final report.

Task 2:   A roundtable discussion was held with transportation analysts familiar with the HCM methodology for two-lane highway analysis and several focus groups were held with non-transportation specialists. Participants provided their opinions on two-lane highway classifications and important performance measures.

The findings show that (1) motorists consider several factors in their assessment of trip quality on a two-lane highway, and (2) the function and/or development setting of the facility seems to determine their quality of service expectations. Two-lane highway classifications are largely based on expectations of travel speed. However, this research shows that expectations for passing should also be considered, in addition to travel speed, when distinguishing among facility classifications.   Further, current classifications do not address rural developed two-lane highways (e.g., facilities through small towns, developed coastal areas). These types of facilities should receive their own classification (Class III) and specific performance measure ('percent free-flow-speed' was identified as the most preferred measure).

Ultimately, the development of a more comprehensive LOS methodology should be pursued. The outcome of such research might be a level of service function, defined in terms of multiple variables (performance measures) and corresponding coefficients that could be applied to all categories of two-lane highways.

Task 3: A two-lane highway facility analysis methodology was developed. It implements a single service measure for the facility, *percent time-delayed*. This measure accounts for the difference in actual travel speed versus free-flow speed on the two-lane highway segment and the delay incurred at the signalized intersections. The fundamental premise for the integration of two-lane segments with signalized intersections is the determination of the effective length of the signal influence area both upstream and downstream of the signalized intersection. This allows the analyst to properly segment the facility into its component parts and apply the performance calculations over the appropriate lengths.

BENEFITS

The results of Task 1 (1) ensure that FDOT's HIGHPLAN software stays faithful to the *Highway Capacity Manual* and (2) document the computational methodology, which will assist the software user community in understanding the analysis procedure and interpreting results.

The results of Task 2 provide significant insight into traveler perceptions of two-lane highway classifications and important performance measures for the assessment of LOS, which will benefit future efforts to revise the existing HCM classification system and LOS methodology for two-lane highways. This will ultimately allow the FDOT to more accurately assess LOS conditions on its two-lane highways and to make more appropriate decisions regarding infrastructure investments.

The results of Task 3 will allow analysts to perform LOS analyses at the facility level for two-lane highways. This will provide a more meaningful assessment of conditions over an extended length of a two-lane highway, especially roads through small towns with isolated signalized intersections.

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