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INCORPORATING VARIABLE PEAK-TO-DAILY RATIOS INTO FSUTMS TO REDUCE ASSIGNMENT ERRORS (Volume II)

PROBLEM STATEMENT

The standard highway assignment model in the Florida Standard Urban Transportation Model Structure (FSUTMS) is based on the equilibrium trip assignment method. This method involves running several iterations of all-or-nothing capacity-restraint assignment with an adjustment for travel time to reflect delays encountered in the associated iteration. The first iteration loads trips to the network based on free-flow travel times. All subsequent iterations of assignment utilize the network travel times from the previous iteration as the travel times for the current iteration. The iterative link time adjustment process is accomplished through the widely used Bureau of Public Roads (BPR) volume-delay equation.

While the output volumes from traditional forecasting models are usually given in daily traffic, the input capacities are typically given in hourly traffic. Therefore, it is important to convert the corresponding hourly capacity output to its daily equivalent by dividing the hourly capacity by a factor called the peak-to-daily ratio. This ratio, referred to as CONFAC in FSUTMS, is computed as the highest hourly volume of a day divided by the total daily volume. It carries the same effect on the v/c ratio as a time-of-day factor, which converts a daily volume to its hourly volume equivalent.

Prior to FSUTMS version 5.3, a single CONFAC, typically 0.1, was used for all facility types. This was deemed insufficient to address the different peaking characteristics associated with different types of facilities, and is believed to be one of the culprits of assignment errors. Consequently, FSUTMS version 5.3 adopted a "multiple-CONFAC" structure that allows the use of different CONFACs for individual facility types. However, this still assumes that all roadways belonging to a specific type have the same peaking characteristics. Studies have shown that the peak-to-daily ratio is a decreasing function of the level of congestion.

OBJECTIVE

The objective of this research is to improve the accuracy of trip assignments in FSUTMS by (1) calibrating the relationships between CONFAC and a congestion measure for each facility type, using traffic count data, and (2) applying the calibrated relationships in FSUTMS' trip assignment.

FINDINGS AND RECOMMENDATIONS

The study found that the output accuracy between constant and variable CONFAC assignments was not significantly different, that the desired improvement in assignment results of the variable CONFAC model was not empirically evident. This result was somewhat expected given the existence of relatively flat CONFAC curves over a wide range of congestion levels in the calibrated

models. In other words, in most cases, there was not a significant difference between a constant CONFAC and a CONFAC generated from the calibrated CONFAC functions.

While the empirical results from this research did not support the desired outcome, the concept of applying variable CONFACs should remain encouraging and should not be discounted. It is recognized that many other factors beyond the scope and control of this study could contribute to its results, including the accuracy of the traffic counts for calibration, the accuracy of ground counts used in model evaluation, the appropriateness of the BPR equation and the associated parameters, etc. It is recommended that future research focus on the following areas:

- The accuracy of the variable CONFAC model might be improved by recalibrating the parameters used in the BPR function. The calibration is an involved task that is beyond the scope of this research.

- The use of the developed methodology warrants the application of different volume-delay functions. If the other volume-delay functions could be applied, the accuracy might improve. Additional research is needed to determine if the results are generally true for various transportation networks.

- Although the constant CONFAC model can reasonably replicate the FSUTMS assignment results, it is necessary to evaluate the direct integration of the variable CONFAC models into the FSUTMS source code. More definitive conclusions about the potential advantages of variable CONFAC models can then be drawn.

- The impact of using other assignment algorithms rather than the current equilibrium assignment should be investigated.

BENEFITS

This research was intended to improve FSUTMS' traffic assignments by incorporating variable peak-to-daily ratios in the assignment procedure. While the empirical results within the study scope did not support the hypotheses proposed by the researchers, they contribute to a better understanding of the current assignment procedure and to potential future improvements to long-term transportation demand forecasts in Florida.

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