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Impact of Vehicle Travel Characteristics on Level of Service: A Comparative Analysis of Rural and Urban Freeways

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Abstract : The effect of trucks on the level of service is determined by considering passenger car equivalents (PCE) of trucks. The current version of Highway Capacity Manual (HCM) uses a single PCE value for all tucks combined. However, the composition of truck traffic varies from location to location; therefore a single PCE-value for all trucks may not correctly represent the impact of truck traffic at specific locations. Consequently, present study developed separate PCE values for single-unit and combination trucks to replace the single value provided in the HCM on different freeways. Site specific PCE values, were developed using concept of spatial lagging headways (the distance from the rear bumper of a leading vehicle to the rear bumper of the following vehicle) measured from field traffic data. The study used data from four locations on a single urban freeway and three different rural freeways in Indiana. Three-stage-least-squares (3SLS) regression techniques were used to generate models that predicted lagging headways for passenger cars, single unit trucks (SUT), and combination trucks (CT). The estimated PCE values for single-unit and combination truck for basic urban freeways (level terrain) were: 1.35 and 1.60, respectively. For rural freeways the estimated PCE values for single-unit and combination truck were: 1.30 and 1.45, respectively. As expected, traffic variables such as vehicle flow rates and speed have significant impacts on vehicle headways. Study results revealed that the use of separate PCE values for different truck classes can have significant influence on the LOS estimation.

Keywords : level of service, capacity analysis, lagging headway, trucks
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