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Building freight-friendly environment

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Abstract

This study uses data collected from pole-mounted portable video recorders to shed light on delivery vehicle activities and their interactions and impacts on other stakeholders who share urban space. Data were collected at over 60 locations in the Chicago area in the summer of 2013. The overreaching aim of the study is to facilitate infrastructure design and management that can better accommodate delivery trucks and reduce conflicts with other road and sidewalk users.

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1. Introduction

A study by Han et al (2005) estimated that illegal parking by pickup and delivery vehicles is the third leading cause of urban non-recurring congestion behind vehicular crushes and construction. With the backdrop of continuing trends of urbanization and growth in e-commerce, it is reasonable to expect conflicts involving pickup and delivery trucks will increase in urban areas. Unfortunately, not much is known about creating an urban environment that can reduce or manage such conflicts. Regulating truck access is the past and current tool of choice for most municipalities but such approach is not likely to produce best results because it fails to recognize the fact that trucks have very little

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control over the timing or location of the pickup and delivery activities. Prohibition of trucks by route, zone, or time of day restrictions will likely to push problems to other areas or time periods and may be even counterproductive.

Surprisingly, there have been very little research on the factors that affect the severity of conflicts involving delivery trucks. A paper by Pivo (2002) studies street design features in Seattle based on the interviews of truck operators and observations to develop some recommendations for improvements. His effort, however, focused on improving truck operations and did not investigate the cause of truck-related congestion. Many cities have conducted urban freight studies that developed recommendations for improving truck operations and mitigating truck-related congestions, but they are based mainly on anecdotal information and transferability of the findings is uncertain. Also, they are often limited in scope and perspectives, and thus tend to overlook complex interactions between land use, streetscape, policies, and urban design. While field observations are invaluable for understanding such complex interactions, it is difficult to study sufficient number of locations in a consistent manner to conduct generalizable research.

Availability of digital video cameras, especially portable units (an example of a pole-mount video camera unit is presented in Fig. 1) has introduced novel, often economical, way to collect information on traffic patterns and travel behavior (Antoniou et al 2011, Jackson et al, 2013, St-Aubin et al, 2013). While most of the applications of video recorded data in transport research have been in the areas of safety and traffic flow analysis, such technology provides an opportunity to collect data on truck activities that are not possible with the traditional methods relying on personal observations or surveys. The main objective of this study is to analyze delivery vehicle activities in various environments using video images recorded by pole-mounted cameras in the Chicago area. While the analysis results presented in this study are still exploratory in nature, they demonstrate the potential of video recordings as a powerful data collection tool that provides a consistent and in-depth examination of the interaction between built environment and truck behaviors.

Fig. 1. An example of portable video camera for traffic data collection (Source: Miovision)

2. Background

Amid the increased attention on carbon emissions from transportation sources as well as declining automobile uses among the younger population, many US cities are finally committing to develop compact, multi-modal urban environment where cars and trucks are expected to share road spaces with transit vehicles and non-motorized travelers. To responds to such trend, the most recent revision to the venerable Highway Capacity Manual (HCM), long a reference for transportation facility planning and design, includes chapters that address multi-modal level of service analysis for urban corridors that facilitate a comparison of various design options to accommodate pedestrians, light rails, and bicyclists alongside automobiles (Ryus et al, 2011).

While a number of studies have been undertaken to address various issues associated with the interactions between passenger vehicles and non-motorized travelers (Peng et al, 2012 and Brosseau et al, 2013 are recent examples), the roles of trucks in urban environment have not been examined extensively. Kawamura et al (2014) studied the relationship between various built environment factors and the rates of parking citations given to trucks,