DRISI
Caltrans Division of Research, Innovation and System Information

Research Results

Fighting for Curb Space: Parking, Bike Sharing, Urban Freight Deliveries, Ride-Hailing, and Other Users

A comprehensive literature review on several topics related to curb space management, discussing various users, summarizing different experiences, and focusing the discussion on Complete Street strategies.

Planning, Policy and Programming

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WHAT WAS THE NEED?

There is a need to optimally allocate curb space, one of the scarcest resources in urban areas, to the different and growing needs of passenger and freight transport. Although there are plenty of linear miles of curbside space in every city, the growing adoption of ride- hailing services and the rise of e-commerce with its residential deliveries, and the increased number of micro-mobility services, have increased pressure on the already saturated transportation system.

Traditional curbside planning strategies have relied on land-use based demand estimates to allocate access priority to the curb (e.g., pedestrian and transit for residential areas, commercial vehicles for commercial and industrial zones). In some locales, new guidelines provide ideas on flexible curbside management, but lack the systems to gather and analyze the data, and optimally and dynamically allocate the space to the different users and needs.

WHAT WAS OUR GOAL?

Specifically, this study examined how curb space is prioritized for a sample of selected cities and guidelines, and the specific strategies implemented to make each component of the transportation system work more effectively. Several management strategies that have been implemented nationwide include parking prioritization, demand-based parking, flex zones, transit prioritization, holistic planning, and Complete Streets.

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DRISI provides solutions and knowledge that improves California's transportation system

WHAT DID WE DO?

This study conducted a comprehensive literature review on several topics related to curb space management, discussing various users (e.g., pedestrians, bicycles, transit, taxis, and commercial freight vehicles), summarizing different experiences, and focusing the discussion on Complete Street strategies. Moreover, the authors reviewed the academic literature on curbside and parking data collection, and simulation and optimization techniques.

Considering a case study around the downtown area in San Francisco, the authors evaluated the performance of the system with respect to a number of parking behavior scenarios. In doing so, the authors developed a parking simulation in SUMO following a set of parking behaviors (e.g., parking search, parking with off-street parking information availability, double-parking). These scenarios were tested in three different (land use-based) sub-study areas representing residential, commercial, and mixed-use.

WHAT WAS THE OUTCOME?

As expected, the results show that in busy areas (e.g., commercial), where parking demand may exceed the supply, searching for parking might lead to traffic congestion and will cause extra emissions. Vehicles searching for available parking spaces not only slow down traffic, which will impair the efficiency of movement, but also cause a waste of time accessing the parking facility and producing additional emissions, particularly during peak hours when available parking spaces are scarce. Open real-time parking information is often used to help improve the traffic. With the simulations, the authors concentrated on average vehicle kilometers travel, total queue and average travel times, and carbon dioxide emissions.

WHAT IS THE BENEFIT?

As cities continue to grow, curb space becomes an increasingly valuable commodity. Thus, adequate curb management is critical for an efficient flow of people and goods. Moreover, transportation agencies must plan and develop strategies to improve system efficiency and sustainability (Marsden et al., 2020), though there have been reported challenges in the management process (Butrina et al., 2020). Agencies have tried structural reorganization (Karlin-Resnick et al., 2018), curb management pilot projects (Dey et al., 2017), and stakeholder education (Dey et al., 2019) to effectively manage curb space.

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