**Proposed Improvements to Static Macroscopic Airport Curbside Models Through the use of VISSIM Simulation**

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Airports are one of the most complex multimodal facilities in existence. Within the airport system, the terminal building’s primary function is to facilitate the transfer of passengers and goods between ground and airborne transportation modes. Terminal curb areas are key components in facilitating the transference of different modes of ground access and egress with air passengers.

Curbside roadways are one-way roadways located adjacent to the terminal buildings for vehicles to stop to pick up and drop off airline passengers and their baggage. There could be multiple configurations of curbside roadways, the most typical being a roadway that consist of one or two inner lanes where vehicles park in a nose-to-tail manner for passenger to board or alight, a maneuvering lane directly adjacent to the loading/unloading lane/s, and one or more through or by-pass lanes for vehicles to traverse from one end of the terminal to the other. In some cases, parking area along the curb is free for all (e.g., “not assigned”) in others, spaces are assigned by ground transportation mode or specific vehicle classes (e.g., parking shuttles, or hotel shuttles, or taxis). The latter is more common on curbside areas serving the arriving passengers (bag-claim pick-up areas)

Curbside roadways are a unique class of roadways. Unfamiliar drivers mix with significant numbers of frequent users of the airport such as taxi and transportation network company (TNC) drivers and even professionally driven large shuttles vans and buses. Curbside roadways typically operate at very low speeds, as drivers read signage to try to find their terminal destination, attempt to maneuver into and out of curbside spaces, wait at pedestrian crossings, and avoid pedestrian activity around vehicles stopped at the curbs. Double and triple parking and jaywalking frequently occur on curbside roadways despite the visible presence of traffic enforcement officers.

Traffic operating characteristics of curbsides roadways differ significantly from most other roadways because of the interactions between vehicles maneuvering around curbside spaces, pedestrians in the roadway, and vehicles traveling in the through or bypass lanes. The capacity of a curbside roadway is defined both by the number of vehicles that can be accommodated while stopping to pick up or drop off passengers and the number that can be accommodated while traveling past the curbside in the through lanes. The capacity of the through lanes is impacted by vehicles that are parking on the loading/unloading lanes as well as maneuvering into and out of them and can cause traffic congestion, delays and queues.

While certain standard highway capacity analysis procedures can address some aspects of these type of operation, they are not well suited to capture the dynamic and complexity of the full spectrum of operating conditions that exist on airport terminal area curbside roadways. For several decades, practitioners have used different methodologies to estimate capacity and determine operational level of service for this type of facility ranging from simple rules of thumb to obtain the linear feet of curb space for a specific curb demand, to queuing analyses, time-space analyses, and most recently simulation tools.

In July 2010, the Airport Cooperative Research Program (ACRP) published its Report #40 “Airport Curbside and Terminal Area Roadway Operations”, which presents measures of curbside roadway performance, definitions of curbside roadway levels of service, and analytical methods for estimating curbside roadway capacities and levels of service. It also describes use of a macroscopic method, QATAR, for analysis of airport curbside roadways.

While these methodologies provide a great planning tool to determine facility requirements (curb lengths and number of lanes), there is still a significant gap between what these macro models can estimate and the observed conditions on any given curbside. As operational conditions become more congested, the additional interaction between vehicles and pedestrians as well as the increase of weaving and merging for maneuvering into and out of loading/unloading areas, changes in driver behaviors, etc. makes the use of static procedures even more limited.

Traffic simulation models, especially those such as VISSIM with the ability to model curbside parking and multiple types of modal behaviors, have closed the gap allowing practitioners much closer representations of the dynamic and complexities of curbside roadways through simulation.

Ricondo has been using VISSIM simulation for airport roadway and curbside analysis for more than a decade, having the opportunity to develop some of the largest and most complex curbside modeling systems for large airports such as LAX, ATL, MIA, SFO, and many others.

Even with the advances and benefits of simulation, static macro curbside models are still valuable methodologies and Ricondo continues to use them in combination with VISSIM simulation.

As part of this experience, Ricondo has worked on improving the QATAR macroscopic method to better consider pedestrian crossing impacts on vehicular through capacity. Typically, pedestrians cross from parking facilities or outer curb roadways to the terminal and vice versa stopping the through traffic on by-pass lanes. The impacts on through capacity depends on the type of control that is used for pedestrians, if uncontrolled with full priority, impacts are maximized and capacity significantly reduced, if controlled by signals, the impact is minimized.

This presentation summarizes the findings from Ricondo’s research and development as a complement to the QATAR methodology to consider pedestrian crossing impacts.

In addition, while simulation provides several measures of effectiveness (MOE) related to curbside operations (e.g., speed, delay, density, parking duration, utilization rate, queue lengths, travel times, and others), there is no good correlation between static level of service and simulation MOEs. This presentation proposes an approach to compare simulation results with macroscopic analysis results and levels of service.