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Abstract Details

Title: Design of Toll Plaza using a Coupled Multiple Queue-Multiple Server Queuing Model

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Abstract: Toll plaza operation is a critical component of roadway operations throughout the country, as tools provide both revenue for expansions and opportunities for demand management. Electronic tolling has introduced a new form of driver decision making at toll plaza due to the additional payment. Describe the user convince marking at toll plaza due to the additional payment. Despite the user convince these facilities gives to consumers, this form of collection has not come without safety and operational concerns. Recommendation for future research include to examine traffic flow and safety impact at toll plaza under varying traffic condition and demand with open road tolling lanes strategies. Developing enhancements to vision to address parameters limitation associated with discrete choice modeling at toll plaza. Multi-server queuing analysis can be used to estimate average time and queue length at toll plaza and parking exit plazas giver arrival rates, number of services, and services rates. These queuing models approximate the performance of queuing system with multiple queues. To gain and understanding of how such a system will operate, a traffic simulation model that reflects the specified vehicle arrival and services rates to allow for a multiple channel arrivals was applied to several parking exit plaza concepts. After discussing the natural behavior of traffic and making a few reasonable assumptions to simplify traffic streams in a toll plaza, we break the travel process in a toll plaza into two stages: Toll collection and Margins. We apply queuing theory to each stage, modeling each stage as a queuing system. Having determined that an optimal toll plaza minimizes travel time, we derive a formula to calculate the average wasted time per driver in terms of number of incoming lanes, traffic flow and number of toll booths.

Keywords: Queuing Model, Toll Plaza, Coupled.