

Vehicle and Pedestrian Delay Estimation at Unsignalized Crosswalks Considering Adjacent Signals

隣接する信号の影響を考慮した無信号横断歩道の車両・歩行者遅れ時間推定



東京大学 生産技術研究所 井料研究室 (交通空間機能学) Muhammad Abdullah

<http://www.iis.u-tokyo.ac.jp/~m-iry/>



BACKGROUND AND OBJECTIVES

Midblock crossings are the crossing points for pedestrians present at locations other than intersections. Vehicle and pedestrian delays act as an important measure of level of service. The global objective is to determine the applicability of various crosswalk control strategies considering delays. However, this particular research is aimed at evaluating vehicle and pedestrian delays at **unsignalized midblock crosswalks** considering **pulsed vehicle arrivals** (generated due to the presence of traffic signals in urban areas) as well as **driver yielding behavior**.



<http://www.uctsrts.com/midblock-crossings.html>

FACTORS INFLUENCING DELAYS

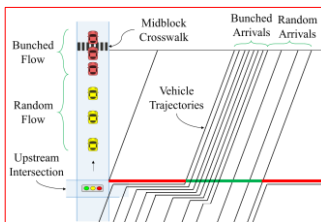
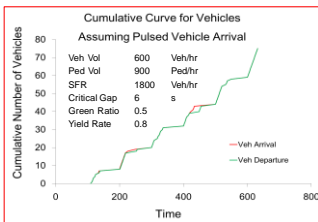
Among several factors that influence delays at crosswalks, followings are considered in this study:

- Pulsed arrival of vehicles
- Yielding behavior of drivers

There are some factors that occur as a result of above mentioned factors, for example, queue formation due to yielding behavior and platoon formation due to presence of upstream signal etc. etc.

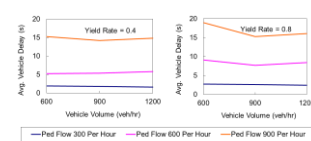
SIMULATION DESCRIPTION

Existing delay models do not take into account the **simultaneous impact** of pulsed vehicle arrivals and the yielding behavior. Moreover, it is a fairly complicated task to evaluate them analytically. Hence, a **point-queue based simulation** was carried out to evaluate the impact of these factors on vehicle and pedestrian delays.



RESULTS AND DISCUSSION

Vehicle Delays

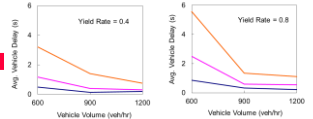


Under Random Arrivals

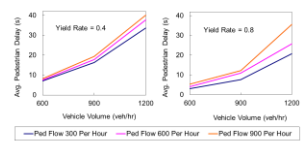
- Do not change much with increase in vehicle volume possibly due to the formation of **longer queues** owing to yielding behavior

Under Pulsed Arrivals

- Increase in vehicle volume increases **vehicle platoons**, therefore, yields less delays



Pedestrian Delays

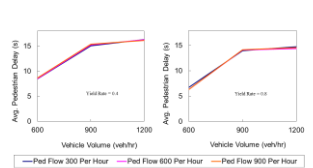


Under Random Arrivals

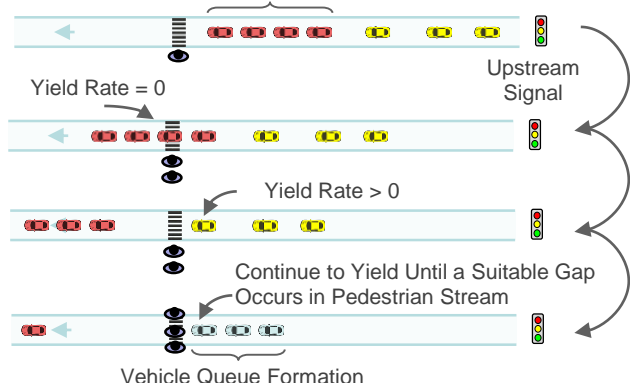
- Increase with pedestrian volume
- Increase with vehicle volume

Under Pulsed Arrivals

- Do not vary much with pedestrian volume
- Increase with vehicle volume and attains a **certain maximum value** because of the red interval (when no veh arrives)



Platoons Do Not Disperse



FUTURE WORKS

Overall, vehicle and pedestrian **delays are lower when pulsed arrivals are assumed**. Therefore, the assumption of Poisson vehicle arrivals under such scenarios may lead to **overestimation of delays**.

Other crosswalks control strategies e.g. signalized, signalized two-stage, and coordinated with adjacent signals etc. will be evaluated in terms of delays. A detailed comparison will help determine the applicability of various crosswalk treatments under different scenarios.