



Operational Evaluation of Right Turns Followed by U-turns as an Alternative to Direct Left Turns by Aimsun

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Abstract

The first objective of this study is the evaluation of u-turn in advance of signalized intersection. First mentioned the comparison of direct left turn and right turn follow by u-turn by two factors, travel speed and delay, next simulated Real situation and compared to result of access point operation “u-turn as alternative to direct left turn” by delay, v/c ratio, LOS of signalized intersection, with use of case study field data. We concluded that When DLT volume is low, elimination of DLT and operate RTUT has an adversely affect the delay of approaches but In moderate and high traffic volume, vehicle making DLT suffer longer delay and travel time than those make RTUT, also LOS of signalized intersection improved after DLT elimination.

The findings of this study are helpful in providing local and state transportation agencies with recommendations for the design and selection of RTUT in advance of signalized intersection.

Keywords: u-turn, DLT, Aimsun, RTUT, signalized intersection.

1. INTRODUCTION (with two 9 pt lines space from the keywords)

Nowadays, more and more local transportation agencies in Iran installing non-traversable median and replacing full median opening with directional median opening specially in advance of signalized intersection. Hence drivers want to make direct left-turn (DLT) at signalized intersection would need to turn right onto the major street and then take u-turn (RTUT) at downstream median opening.

Because of the removal of direct left-turn at signalized intersection the signal eliminated or signal phasing reduce to two phase. The purpose of using non-traversable medians and directional median openings is to reduce conflicts and to improve safety along multilane highways. For example, replacing a full median opening with a directional median opening will reduce conflict points from 32 to 8 (1).

A few studies have analyzed the capacity gains and delay reductions associated with providing U-turns as an alternative to direct left turns. A study by Koepke and Levinson found that the directional U-turn design provided about

14 to 18 percent more capacity than the conventional dual left-turn lane designs. Results of simulations of critical lane volumes showed reductions of about 7 to 17 percent in critical lane volumes, depending on the number of arterial lanes (six or eight) and the traffic mix.

A Michigan study cited capacity gains of 20 to 50 percent as a result of prohibiting left-turns at intersections and providing two-phase signal operations. Reported level of service comparisons for 4- and 8-lane boulevards, suggested a 20 percent capacity gain. This increase is consistent with that estimated by Koepke and Levinson (2).

In NCHRP Report 420, previous studies regarding the safety and operational effects of various indirect left-turn treatments were summarized and the results were compared. It was reported that replacing direct left-turns from driveways with right-turn/U-turn treatment could reduce crash rates by 20% (1).

Vehicles making RTUT at a signalized will generate around 26% fewer conflicts than those making DLT. This conclusion is in consistent with previous studies and the conflict analysis results provided a good supplement for the crash data analysis results obtained from previous studies (3, 4, 5, 6, and 7).