Assessing the Appropriateness of Providing Separate Openings for U-Turns at Signalized Intersections

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Generally the right turns along with the U turns is one of the main contributory factors for the delays at signalized intersections. If any intersection is experiencing a high amount of U turns, the effective time that can be allocated for the other phases and directions would get reduced. Therefore if time given for the U turns can be reduced at the intersection, sufficient amount of capacity improvement can be obtained and thus the congestion at the intersection can be reduced.

The concept of providing separate openings for U turns has been experienced in the world, with concepts like super street junctions or j junctions, but no significant research was conducted based on the applicability of such in the Sri Lankan context.

With respect to that, the objective of the research was to assess the appropriateness of providing separate openings for U turns at signalized intersections in the local context. Further it is needed to develop a guideline to be followed when introducing separate openings for U turns.

The Orugodawatta junction was considered as a case study, whereas high number of U turns are observed at the junction for North bound direction and a 12 hour traffic flow count was taken on an average week day along with a video recording.

Based on the basic analysis it was obtained that, 5% of the vehicles travelling North bound Direction are U turns which is quite high for a normal intersection. Further, it was found that out of all the vehicles traveling in North bound Direction, 17% of the vehicles can be considered as either right turns or U turns. On the other hand, out of all the right turns occurring from south to east direction, 25% of the right turns are actually U-turns, which is very significant. It is also observed that on average a right turn takes nearly 1 second and a U turn takes nearly 3 seconds.

Blink 2005 software, which is specifically designed for traffic signal designs is used for further analysis. A comparison is done based on the Cycle time between the two instances, with and without the separate opening and it was obtained that the cycle time at the present situation is 291 seconds and with the introduction of the Separate opening the cycle time can be reduced to 240 seconds.

Further, cycle time variation for different proportion of U turns are also calculated. Based on the results obtained it can be concluded that more than 10% of the cycle time reduction can be obtained when the U turns are more than 15% of the total right turns occurring at a signalized intersection, by eliminating the U turns and introducing separate openings for U turns.

Key words: Separate U-turn opening, Delay at signalized intersections, Intersection geometry

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