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Performance Evaluation of Diverging Diamond Interchange Compared to Single Point Diamond Interchange in Riyadh City

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Abstract : In the last decades, population growth has gradually exceeded transportation infrastructure growth, and today's transportation professionals are facing challenge on how to meet the mobility needs of a rising population especially in the absence of adequate public transport, as is the case in Saudi Arabia. The traffic movement congestion can be decreased by carrying out some appropriate alternative designs of interchanges such as diverging diamond interchange (DDI) and single diamond interchange (SPDI). In this paper, evaluation of newly implemented DDIs at the interchange of Makkah road with Prince Turki road and the interchange of King Khaled road with Prince Saud Ibn Mohammed Ibn Mugrin road in Riyadh city was carried out. The comparison between the DDI and SPDI is conducted by evaluating different measures of effectiveness (MOE) such as stop delay, average queue length, and number of stops. In this connection, each interchange type was evaluated for traffic flow at peak hours using micro-simulation program namely 'Synchro/SimTarffic' to measure its effectiveness such as stop delay, average queue length, and number of stops. The results of this study show that DDI provides a better result when compared with SPDI in terms of stope delay, average queue length, and number of stops. The stop delay for the SPDI is greater than DDI by three times. Also, the average queue length is approximately twice that of the SPDI when compared to the DDI. Furthermore, the number of stops for the SPDI is about twice as the DDI.

Keywords : single point diamond interchange, diverging diamond interchange, measures of effectiveness, simulation
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