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An Analysis of New Service Interchange Designs

Authors : Joseph E. Hummer

Abstract : An efficient freeway system will be essential to the development of Africa, and interchanges are a key to that efficiency. Around the world, many interchanges between freeways and surface streets, called service interchanges, are of the diamond configuration, and interchanges using roundabouts or loop ramps are also popular. However, many diamond interchanges have serious operational problems, interchanges with roundabouts fail at high demand levels, and loops use lots of expensive land. Newer service interchange designs provide other options. The most popular new interchange design in the US at the moment is the double crossover diamond (DCD), also known as the diverging diamond. The DCD has enormous potential, but also has several significant limitations. The objectives of this paper are to review new service interchange options and to highlight some of the main features of those alternatives. The paper tests four conventional and seven unconventional designs using seven measures related to efficiency, cost, and safety. The results show that there is no superior design in all measures investigated. The DCD is better than most designs tested on most measures examined. However, the DCD was only superior to all other designs for bridge width. The DCD performed relatively poorly for capacity and for serving pedestrians. Based on the results, African freeway designers are encouraged to investigate the full range of alternatives that could work at the spot of interest. Diamonds and DCDs have their niches, but some of the other designs investigated could be optimum at some spots.

Keywords : interchange, diamond, diverging diamond, capacity, safety, cost
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