

Capacity Analysis of a Highway Link

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ABRIDGMENT

•THE PURPOSE of this work was to examine existing traffic conditions and to evaluate various improvements for increasing the capacity of a selected urban highway network. Two study methods were utilized: (a) a systems approach to capacity evaluation (utilizing stochastic methods where possible), and (b) data collection and analysis through the use of time-lapse photography.

The systems approach was used to formalize a realistic process for the evaluation of capacity on the study network when the overall impact of the environment on the network and the impact of the network on the environment were considered. The network was considered as a large subsystem of the system of major trafficways. It was then divided into 3 smaller subsystems, and analytical models were developed for each. The subsystems were (a) section 1, free-flow highway; (b) section 2, tollbooths located on a bridge; and (c) section 3, 2 major intersections providing the interface of the study with a freeway facility. Section 1 was analyzed by using procedures from the Highway Capacity Manual. Section 2 was analyzed by using queuing theory. The validity of the queuing theory models was tested by using the data collected from the time-lapse photography. Nomographs for the analysis of section 3 were developed and tested by using data from the time-lapse photography.

The time-lapse photography provided an inexpensive and rapid means for gathering extensive data. The technique proved very beneficial in testing the assumed probability distributions.

The study indicated that major reconstruction of the bridge, tollbooths, and intersections would be required to enable the network to handle the predicted volumes. Of major significance, however, was the fact that this study procedure indicated that such improvements would be of little value unless the freeway at the end of the network either was improved or had its demand volumes reduced.