

Automatic Freeway Surveillance and Evaluation Techniques

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ABRIDGMENT

•SINCE the original installation of the unique pilot freeway detection system in 1962, the Chicago Area Expressway Surveillance Project has refined this experimental detector-computer system to provide automatic surveillance, control, and evaluation for a total of 24 directional miles on two Chicago area expressways. Critical surveillance-evaluation detectors transmit data over leased phone lines to a process-control computer in the project office. The digital computer processes detector data into on-line, real-time, freeway surveillance, entrance ramp metering control and evaluation outputs.

Some operational surveillance and control outputs are visually displayed on a map panel depicting current freeway traffic conditions and on a console depicting current control modes. Most evaluation outputs, however, are preserved on punched paper tape or on printouts developed on-line with two automatic typewriters. This report primarily describes how the electronic surveillance system is used to automatically evaluate freeway traffic operations throughout each rush period.

On one automatic typewriter, an on-line lane occupancy plot is developed by the digital computer. The average 5-minute occupancy of the detector in the second lane from the median at each freeway surveillance station is recorded via on-line printout each 5 minutes throughout each rush period, thereby providing a distance-time picture of freeway congestion.

On the second automatic typewriter, an "excess vehicles" plot is developed by the digital computer from a closed system of freeway and ramp detectors. Using the input-output technique of computing subsystem density changes, the excess total travel time experienced by rush-period traffic is determined.

Examples are presented in the report to illustrate the extremes of rush period freeway operations, as well as additional refinements in the printout format. The data of each printout have been summarized in one tag-type parameter, which resulted in a correlation coefficient of 0.78 when each lane occupancy printout was compared with each excess vehicle printout for 30 successive rush periods. Several applications for the refined surveillance/evaluation system are suggested. Further research possibilities with data being catalogued on a routine basis are pointed out.