

SUMMARY REPORT 165-11(S)

STUDY OF TRAFFIC RESPONSIVE RAMP CLOSURE CONTROL

**SUMMARY REPORT
of
Research Report Number 165-11
Study 2-18-72-165**

**Cooperative Research Program of the
Texas Transportation Institute and the Texas Highway Department**

**In Cooperation with the
U. S. Department of Transportation, Federal Highway Administration**

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Study of Traffic Responsive Ramp Closure Control

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This summary report describes one phase of Research Study No. 2-18-72-165 entitled Development of Urban Traffic Management and Control Systems.

The objective of ramp closure control is to improve over-all operation by reducing traffic input to the freeway. The study was designed to reduce demand at Lombardy overpass by closing Griggs, Wayside, and Telephone entrance ramps for short periods of time between 6:45-8:15 a.m. In addition to the bottleneck at Lombardy, Cullen entrance ramp is also a bottleneck area, and closure of that ramp was studied as well. The following became evident after ramp closure was analyzed:

- Freeway speeds and volumes increased.
- Shockwaves were not observed during the freeway study.
- Congestion cleared much earlier on the freeway.
- Diverted motorists experienced little delay.
- There was a balance of compliments and complaints.

Ramp Closure Study Procedures

Congestion on the Gulf Freeway during morning peak periods occurred because of bottleneck locations with limiting capacity. One bottleneck location is at the Lombardy overpass where a five percent grade reduces capacity. The other bottleneck is at Cullen entrance ramp which has high demand and no ramp metering control. By diverting traffic away from the bottlenecks, demand is reduced and congestion is relieved.

To improve the total freeway operation, it was proposed that Griggs, Wayside, Telephone, and Cullen entrance ramps be closed for 15 to 20 minute periods between 6:45-8:15 a.m. Traffic would be diverted along the frontage road to the next entrance ramp downstream of the bottleneck or streets leading to the Downtown area.

The decision to open and close the ramps was based on observations on the closed circuit television system. Evaluation of freeway parameters taken from the computer during a traffic slowdown triggered the decision to close ramps.

Analysis of Data

Studies were conducted before ramp closure in October and during ramp closure in November. Freeway operations showed significant improvements because of improvement in freeway volumes, and a 20 percent improvement in freeway speeds. Shockwaves observed before the study dissipated during closure. The freeway cleared much earlier with ramp closure. Although there was a reduction of the input of traffic demand to the freeway at the controlled (closed) ramps, this was more than offset by increases in volumes at the other points of entry along the freeway.

Ramp operations changed during the closure of Griggs, Wayside, and Telephone. The metering ramps increased in volumes with slight increases in queues. Dumble queue, in particular, increased considerably and resulted in added delay to diverted motorists. About 47% of all motorists were diverted to Dumble entrance ramp, and 53% used other alternative routes.

Recommendations

A more detailed study should be conducted on automatically initiating closure and advising motorists of the closure. A decision matrix for each ramp should be developed with the operational and managerial options outlined for the operating agency. Altogether, a more automated system of ramp closure could easily be installed and it would prove to be a benefit to freeway systems.

The published version of this report may be obtained by addressing your request as follows:

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