

DESIGN WARRANTS FOR LEFT TURNING  
VEHICLES AT SIGNALIZED INTERSECTIONS

INTERIM REPORT

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## ABSTRACT

From the beginning of this project, time has been spent solely on the investigation of left turn design as warranted by magnitudes of delay.

At the present time, video recorders and time lapse photography have been investigated as methods of collecting delay data. Data recorded with these techniques have so far been found to be either inaccurate or unusable.

Following satisfactory development of delay measurement techniques, data from approximately ten sites will be collected. These data will be compared to output from the UTCS-1 computer simulation program available from the Federal Highway Administration. If simulated delay from these sites agrees with field data, then the simulation program will be used in development of warrants. If simulation output and field data do not agree, then a larger number of intersections will be used as a data base for development of warrants.

## HIGHLIGHTS

One approach to an intersection was studied on several different occasions. The approach studied was the eastbound approach to the intersection of Route U.S. 1 and Franklin Corner Road near Trenton, New Jersey.

In the first study, video cameras were mounted inside a van positioned approximately 650 feet upstream from the stop-line of the intersection (Figure 1). One video camera was aimed upstream of the van and recorded vehicles approaching the intersection. The second camera was aimed downstream of the van and recorded vehicles leaving the intersection. A digital clock was superimposed on each camera to keep track of inbound and outbound times of vehicles and traffic movements were recorded for periods of fifteen to thirty minutes.

Upon viewing the video recordings, it was found that trucks between the camera position and the intersection blocked the view of vehicles exiting the intersection. This led to great difficulty in estimating times of vehicle departures. Delays determined by observers viewing the same arrivals and departures of vehicles on the tapes indicated a wide variation in their estimates. This was attributed to the problems in estimating vehicle departure times.

It was felt that an increase in height of the camera recording outbound vehicles would overcome the problem of trucks blocking the view. To obtain this height, the cameras were mounted on a lift truck parked on the approach; however, the truck noticeably affected traffic and the data were discarded. Positioning the truck across the intersection from



the approach also had a noticeable "rubbernecking" effect on through traffic.

Because of this effect, it was decided to mount the cameras on utility poles near the intersection with associated recording equipment well away from the approach, connected to the cameras by cables. This should make the cameras as inconspicuous as possible and give adequate height. At present, recording activities are delayed due to the wait for the delivery of mounting hardware.

In addition to video recording, time lapse photography was also attempted. However, the camera used could not be adapted for use of automatic time lapse electric drive - a necessary feature if the camera is to be remotely mounted. Because of this, time lapse photography was not considered any further.

It is hoped that the UTCS-1 computer simulation program, available from the Federal Highway Administration, will agree with the delay data obtained when the field studies are complete. In order to check the accuracy of the simulation in New Jersey, approximately ten (10) intersections will be used for obtaining delay data. This delay data will then be compared to the simulation data for these intersections.

If the field data and the simulation output agree, then further development of delay warrants will be based on the output from the UTCS-1 program.

If the field data do not agree with the simulation output, then further studies will be used to develop warrants for left turn design based on delay values collected on a larger number of intersections.