REPORT OF COMMITTEE ON HIGHWAY TRAFFIC ANALYSIS

Chairman, G E HAMLIN
Connecticut State Highway Commission, Hartford, Connecticut

The Committee on Highway Traffic Analysis has considered the assigned subjects and submits the following report, which will be supplemented by two brief reports by J G McKay

THE THREE-LANE TWO-WAY ROADWAY

A three-lane two-way roadway is one upon which the traffic movements are in both directions and which is only wide enough for three moving vehicles to be abreast

The data and conclusions relative to the status of the three-lane two-way roadway, from the viewpoint of its safe utilization by highway traffic, are based on investigations by the United States Bureau of Public Roads, the Michigan State Highway Department, and other sources of information

The three-lane two-way roadway has been generally employed where it was considered that the highway would be subjected to an amount of traffic exceeding the traffic capacity of a two-lane roadway and, in some cases, under conditions where it was not considered economical or practicable to construct a four-lane roadway It is evident that a three-lane roadway will permit vehicles to pass each other with greater frequency than is the case on a two-lane roadway

If the ideal movement of traffic is that which will permit each vehicle continuously to travel at its desired speed, but within the legal regulation limit, it is apparent that the traffic capacity of a two-lane roadway from this standpoint will be very low Traffic capacity, considered from the viewpoint of the maximum number of vehicles which can pass a given point in a given period, far exceeds the capacity which has been termed ideal For two-lane roadways, the actual traffic capacity varies within wide limits as it depends on many variables including the width of roadway, the location of the lanes in which vehicles travel, the widths of the various vehicles, the speeds and distances apart at which vehicles travel, the number of vehicles traveling at each speed, the kind and number of vehicles traveling in groups, retardation points, and the relative amount and character of traffic in each direction

Investigations indicate that the 20-foot roadway is of ample width to provide adequate clearances between the sides of vehicles and the edges of the roadway, and between passing vehicles On one roadway under investigation, where the maximum hourly traffic was 750 vehicles, the clearance between vehicles was 3 to 4 feet No instances of three

vehicles being abreast were noted As the average width of three automobiles is 16 feet 6 inches, it is evident that there would not be satisfactory clearances between the vehicles and between the vehicles and the edges of the roadway.

The Committee concludes that 22 and 24 foot roadways are not required for two lanes of traffic

Roadways between 24 and 30 feet in width usually have middle lanes which encourage utilization On 24-foot roadways, the United States Bureau of Public Roads found that the average clearance between automobiles was 6.1 feet and between trucks, 5 1 feet In another investigation of a roadway of this width, having a maximum hourly traffic of 1,250 vehicles, the clearance between automobiles was found to vary from 5 feet to 6 feet 6 inches and between trucks from 4 to 6 feet At the point of observation, it was noted that three vehicles were abreast from one to seven times per hour, in each case all the vehicles being automobiles. Considering that the average width of an automobile is 5 feet 6 inches, the natural conclusion agrees with observations, namely, that the vehicle occupying the middle lane forced its passage between the other two vehicles Generally fast and reckless drivers constituted the majority of operators who endeavored to use the middle lane.

On a 30-foot roadway, having a maximum hourly traffic of 1,050 vehicles, it was found that the clearance between automobiles varied from 8 to 10 feet and between motor trucks from 5 to 9 feet At the point of observation, three vehicles were abreast 7 to 21 times per hour It is evident that the middle lane of a 30-foot roadway is very generally utilized

The illustrative data submitted indicates that roadways of from 24 to 30 feet in width are used as three-lane two-way roadways Unfortunately, however, traffic movements on the middle lane cannot be governed by a right-of-way regulation Hence the use of three-lane roadways provides conditions under which accidents may frequently occur The Committee, therefore, from the standpoint of encouraging design which will promote the safe utilization of highways, recommends the use of the four-lane roadway when the highway transport survey indicates that the traffic capacity of a two-lane two-way roadway will be exceeded

TRAFFIC ANALYSIS

Interstate Traffic—Interstate traffic on Federal Aid highways is a significant part of total traffic Of the total traffic at 94 traffic stations on the Pennsylvania highway system, 17 7 per cent of the passenger cars and 8 2 per cent of the loaded motor trucks are foreign vehicles, and at 36 traffic stations in Ohio, 18 6 per cent of the passenger cars and 7 4

per cent of the loaded motor trucks are of foreign registration In Connecticut on the primary system, 21 1 per cent of the passenger cars are foreign vehicles and account for 43 4 per cent of the passenger vehicle miles, 10 9 per cent of the motor trucks are foreign and account for 32 8 per cent of the gross ton miles of traffic

Population and Highway Traffic —Transportation surveys conducted by the United States Bureau of Public Roads in Connecticut, Pennsylvania, and Cook County, Illinois, indicate a close relation between population per square mile, the trend of population growth and industrial development and the amount of traffic using the highways A comprehensive plan of highway development should consider in addition to an analysis of highway traffic, the density and trend of population in relation to highway needs

Forecasting Highway Traffic —The prediction of expected future traffic on a highway system based on the projection of the trend of motor-vehicle registration is a reasonably accurate measure of future highway traffic In Massachusetts from 1909 to 1924, and in Maine, Maryland, Michigan and Wisconsin from 1919 to 1924, motor vehicle traffic on the highways and motor vehicle registration increased at approximately equal rates

THE ELIMINATION OF OBSTACLES IMPEDING THE FREE FLOW OF TRAFFIC

The movement of traffic over any route as a whole depends upon the ability of traffic to move freely at all points along that route

The principal obstacles to the movement of traffic are railway and highway grade crossings, narrow highway bridges, sharp turns, narrow width of travelway, excessive grades, improper cross slope at curves, convergence of arterial highways near city limits, and passage of the traffic route through congested sections of villages and cities

Traffic Obstacles —Since the function of a highway is the continuous safe movement of traffic along the entire route it is recommended that a constructive program of improvement be based upon investigation of the obstacles on the route

The Committee believes that the elimination of the obstacles to traffic on many highway routes will be justified due to an increase in the safe movement of traffic, and that in some cases the program of widening can be economically deferred by this method

Traffic Signals —In order to facilitate the safe movement of traffic, regulation becomes necessary at congestion or danger points This regulation in many cases takes the form of an automatic signal or similar device which governs the flow of traffic These devices have increased in number and variety in the past few years Investigation

has shown that the operation in many cases is proving at least a partial solution of the traffic problem

Some types of these signals, however, by their location or operation are defeating the end for which they are installed

The Committee is of the opinion that the installation of a fixed signal supported by a pedestal at the intersection of highways in many cases is not justified, that an unnecessary traffic hazard may be introduced whereby travel is discommoded and retarded, if not in the case of large units partially blocked, that the possibility of failure of operation of automatic traffic signals increases the hazard, and that such signals should be placed in general above, or at the corners of the intersection, leaving the pavement for free necessary movement of vehicles

Within villages and cities through which a highway passes the local parking of vehicles operation of trolley lines, narrow or inadequately improved streets and construction, maintenance and police control of the highway route are under an independent jurisdiction Local, vehicle and pedestrian traffic add to the difficulty of free movement of through traffic

It is a fallacy to believe that the benefit which accrues to a community from routing through traffic through the congested business section is at all commensurate with the cost of constructing and maintaining an adequate right of way, the danger and inconvenience to local, vehicle, and pedestrian traffic, and the loss of local business

The loss of time and inconvenience caused to through traffic by its necessary passing through congested areas far exceeds any local convenience or benefit The Committee recommends that in the constructive program for highway improvement there shall be seriously considered the planning of arterial highways outside of the congestion areas by which the necessity for entering these areas may be avoided

ADEQUATE RIGHTS OF WAY FOR FUTURE DEVELOPMENT OF HIGHWAY SYSTEM

The Committee desires to emphasize the necessity of determining accurately the present rights-of-way on all highways, and the obtaining of additional land where necessary for future development of such highways

Business development follows the improved highway and property values increase rapidly In many cases in a short period of time improvements far out-value the land At the time development is proposed, the desire for a modern highway will aid somewhat in the acquiring of the land at a reasonable cost Such acquisition will also prevent the erection of structures which become obstacles to the movement of traffic by the restriction of sight line or the presence of standing vehicles on the right-of-way

The Committee recommends that the method of acquisition of highway right-of-way by a highway department be simplified to permit the immediate occupancy of such land

The Committee is of the opinion that properly conducted highway transport surveys will give the requisite information upon which to base the acquisition of the necessary rights-of-way on various parts of the highway system to provide facilities for potential traffic

TYPE OF PAVEMENT BASED ON TRAFFIC REQUIREMENTS

The selection of surface type on any highway cannot be necessarily based on its designation as a primary, secondary or tertiary route, due to the fact that this designation is based on the value of the route to the State as a whole, rather than on the character and volume of the present and potential traffic using such route.

The Committee is of the opinion that the type of surface is a question of economic design and that this problem should be reported by the Committee on that subject, rather than by the Committee on Highway Traffic Analysis

POPULATION AND HIGHWAY TRAFFIC

J G McKay

U S Bureau of Public Roads, Washington, D C

A comprehensive plan of highway development must consider not only the present population and its distribution but also the trend of population and industrial development

The city of Chicago, the economic center of Cook County, Ill, included in 1920 approximately 20 per cent of the land area and 88 5 per cent of the population of the county. As distance from the city increases, population and industrial development as well as highway traffic decreases

The location of the city on Lake Michigan has limited the trend of population and industrial development to three directions, north, west and south The development in these directions is indicated by the expansion of the area of the city from a small section located in the vicinity of the present "Loop" district to its present area of over 200 square miles In spite of this great increase in area, population and industrial development have expanded beyond the political limits of the city, and in an economic sense, the city includes a large number of cities and villages which are contiguous to the city proper

In 1920 there were 74 incorporated cities and villages, exclusive of Chicago, in Cook County Three of these cities and villages had a population in excess of 25,000 persons, eight a population in excess of 10,000, and 14 a population in excess of 5,000 Of the 74 cities and vil-