

provided transportation to the extent of 43 7 per cent of the passenger-miles Similarly, the 10 9 per cent of foreign motor trucks are responsible for 32 8 per cent of the total gross ton-miles of traffic on the state highways

These analyses show clearly that highways are no longer neighborhood affairs, to be discussed in town meeting and to be maintained by local organizations It is some time since their care became properly a function of the state Now motor vehicles have given them decided interstate importance The indiscriminate use by the average automobile owner of the highways of several states, suggests the logic of enlarging the political unit which plans and builds the primary highway system, and enlarging also the taxable area which pays for such development Federal aid is national recognition of this altered situation

## DISCUSSION OF REPORT OF COMMITTEE ON HIGHWAY TRAFFIC ANALYSIS

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### THE THREE-LANE TWO-WAY ROADWAY

Considering the "two-way roadway" the Committee report points to the question of relative amounts and character of traffic

An illustration of the variation to be observed at different points along a given road is taken from the records of the Pennsylvania traffic count of 1923, shown in Table I The road indicated is the Lincoln Highway between Pittsburgh and Philadelphia

The traffic is found to vary greatly with the distance from the larger centers of population Figure 1 shows a range of about 700 per cent in average daily traffic The range in number of trucks is about 800 per

TABLE I

Vicinity	Population	Average daily traffic	Number of trucks	Number of loads over 21,000 lbs
5 miles from Philadelphia	2,000,000	6,852	778	86
90 miles from Philadelphia (close to York)	47,512	3,042	466	18
200 miles from Philadelphia (close to Bedford)	2,330	995	94	4
68 miles from Bedford (close to Greensburg)	15,033	2,281	200	14
Just outside Pittsburgh	600,000	3,204	295	23

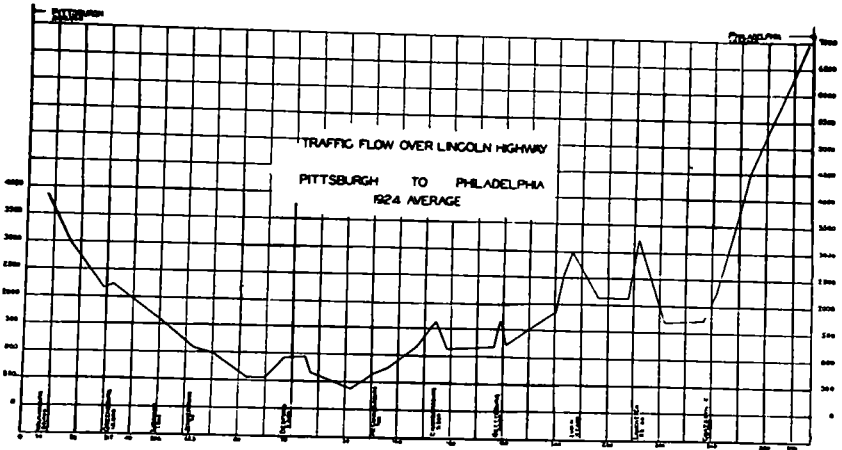


Figure 1

cent The number of trucks is approximately 10 per cent of the total of vehicles and the number of loads over 21,000 pounds is approximately 10 per cent of the number of trucks

The figures quoted are of stations near centers of population 100 miles or so apart, and the traffic varies greatly between these points. For example, near York, which has a population of 47,512 and is about 90 miles from Philadelphia, the count was 2,576 passenger cars and 466 trucks, while near Coatesville, which has a population of 14,515, and is only 41 miles from Philadelphia, the count was 1,779 passenger cars and 266 trucks

Further analysis shows seasonal, daily, and hourly variations, Figures 2, 3, and 4 (The figures were obtained from the cooperative motor transport survey conducted by the United States Bureau of Public Roads and the Pennsylvania Department of Highways) Roughly speaking, the summer daily average is double the annual daily average. Sunday traffic is double average day of week and mid-afternoon is double average hour of day. The average of 24-hour counts at three stations showed traffic distribution in approximate percentage as follows: 12 midnight to 6 A M, 4.1 per cent, 6 A M to 12 M, 23.7 per cent, 12 M to 6 P M, 40.1 per cent, and 6 P M to 12 midnight, 32.1 per cent. The lightest hour was 3 to 4 A M, 0.1 per cent, and the heaviest hour 3 to 4 P M, 8.0 per cent. Over half of the traffic, approximately 51.9 per cent, was counted in 7 hours, from 2 P M to 9 P M. Approximately, 21.2 per cent was night traffic, 8 P M to 4 A M.

One point was not brought out by the Committee in the determination of widths, and that was peak hour traffic, which must be considered in designing pavements especially near large cities.

There is no question that 22-foot pavement is a dangerous width, as this encourages three-lane movement, but 24-foot pavement may be used with safety if traffic lanes are painted, especially if the road is not subjected to heavy truck traffic. Ten-foot lanes are desirable at all

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 TRAFFIC ANALYSIS  
 1924 AVERAGE - 12 MONTH COMPARISON

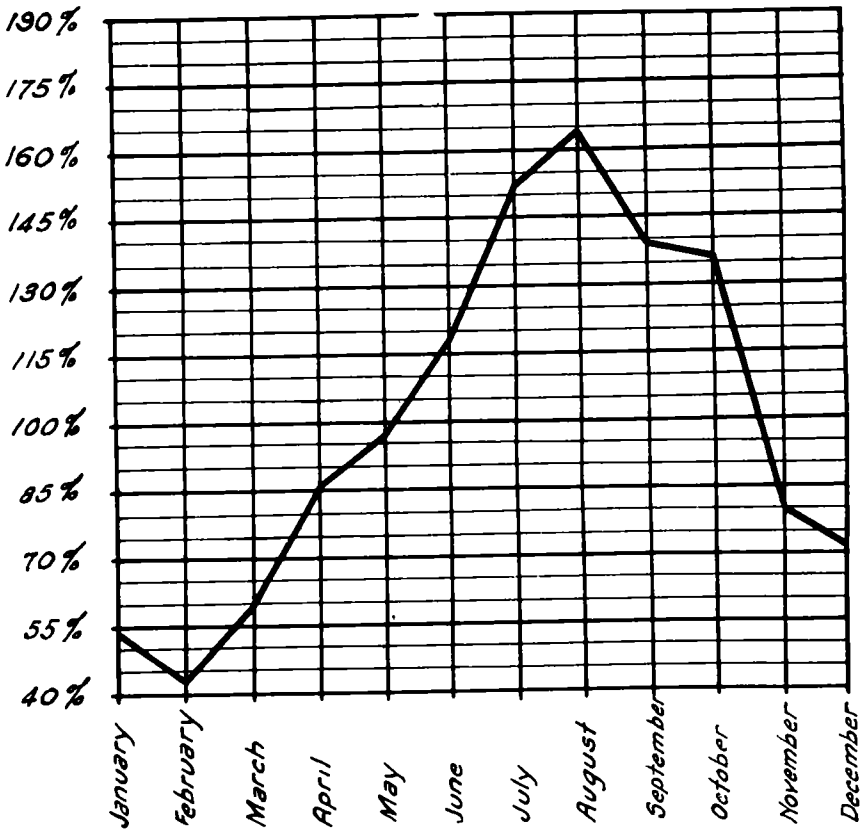


Figure 2

times, but 9 foot and even 8 foot may be used, but of course this materially slows up the traffic, as the careful operator will not drive his car at the legal speed limit unless he is sure that he has sufficient clearance

The recommendations for four-lane traffic roads is laudable in the

extreme, but it must be remembered that funds for road construction are so limited that three-lane roads have been built and will be constructed for years to come. This will add considerably to the safety of the traveling public and also increase the carrying capacity of the road until such time as funds become available for construction nearer to the ideal.

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1924 AVERAGE :- 7 DAY COMPARISON**

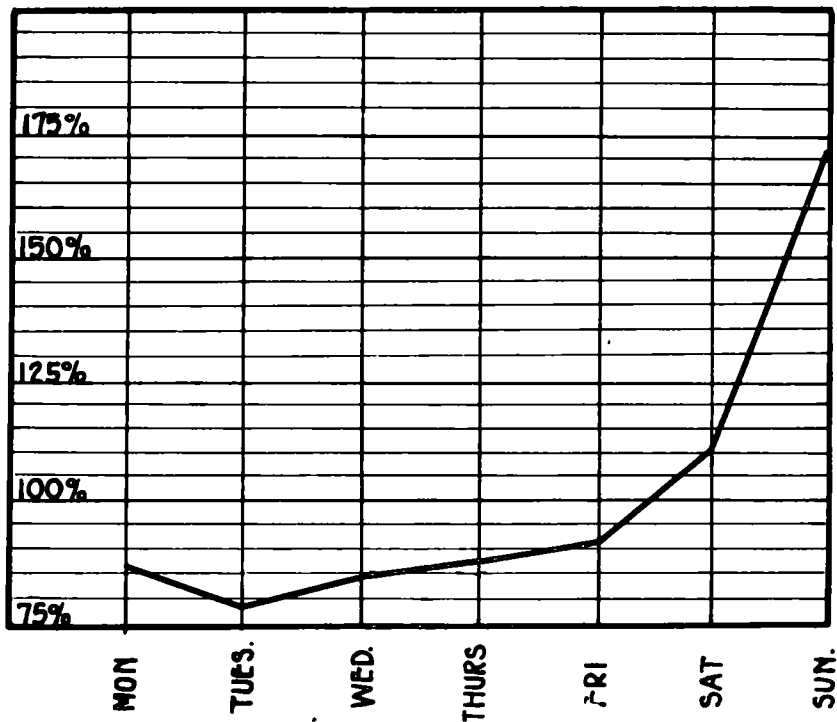


Figure 3

TRAFFIC ANALYSIS

*Interstate Traffic*—As to interstate traffic, the Pennsylvania traffic counts brought out an interesting comparison of grouped counties. Counties bordering the adjoining states showed 75 per cent Pennsylvania cars and 25 per cent foreign, while counties in the central section

of the state showed 96 per cent Pennsylvania cars and 4 per cent foreign

*Population and Highway Traffic and Forecasting Highway Traffic*—The Committee report shows the connection between traffic analysis, study of population growth and industrial development, and forecasting highway traffic. Unquestionably a study of population growth, of resources, and of industries, is necessary to supplement the traffic

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~ TRAFFIC ANALYSIS ~  
1924 AVERAGE - 24 HOUR COMPARISON.

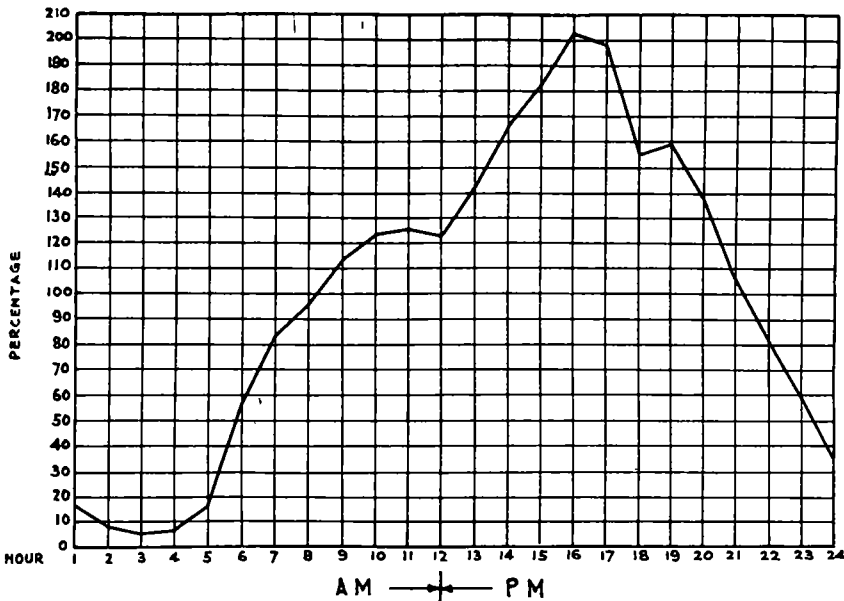


Figure 4

analysis, and the most valuable use of the traffic studies is to furnish basis for traffic forecast

*The Elimination of Obstacles Impeding the Free Flow of Traffic*—The Committee's comments and recommendations on elimination of obstacles impeding the free flow of traffic, on traffic signals, on routing arterial highways around congested areas, and on acquisition of adequate rights-of-way are well conceived and clearly expressed

TYPE OF PAVEMENT BASED ON TRAFFIC REQUIREMENTS

The chief justification for traffic counts and transport surveys is that information so obtained may be used in the determination of future traffic. From an analysis of the derivation of the traffic upon any

given road, taking into consideration the population for a certain distance on each side, the population of towns that would contribute to through traffic, the roads that would be the feeders, the manufacturing plants and the agricultural and mining development, it would be possible to use these figures for the forecast of traffic upon other roads similarly located upon which construction is contemplated

In its application the method finds expression by the extension of a curve, for population for a given locality and in an estimate of motor vehicle registration for the time of the future estimate. In these estimates, that is, the curve extension and the computation of future registration, use is made of the industrial factors that have been mentioned. Then, the forecast of future traffic is made on the assumption that the traffic will increase with the increased registration, in direct proportion.

While there may be some objection to attempting to forecast traffic at this time for 15 years, on account of the meager data that is available and the tremendous increase in traffic in the last 10 years, we believe that it is desirable to attempt a forecast rather than the "hit and miss" determination of types that has been the practice in the past.

The average life of a flexible type pavement is from 7 to 15 years, and the average life of the durable type, which has concrete in some form either as base or wearing surface, is much longer, ranging from 15 to 25 years. Therefore, the determination of the economical pavement must be based upon the future traffic, and this future traffic forecast should be for the maximum life of the flexible type pavement. Submitted herewith is the form used by the Pennsylvania Department of Highways for estimating the future traffic upon any given road.

I think it worth while noting that there are four doubles that constitute an approximate check on the forecast of peak loads:

Double the average hour is the afternoon peak hour

Double the average day is the Sunday traffic

Double the annual daily average is the summer daily average

Double the present traffic is the probable future traffic within the life of the flexible type pavement

FORM FOR ESTIMATING FUTURE TRAFFIC

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF HIGHWAYS

Estimate of 1940 Traffic

Application No 3745, Route No 522, Gulford-Greene Twp, Frankln County  
 Location of road, towns connected, etc Beginning at the end of present State-  
 and Application 585, Sec 2, near Mont Alto Boro, and running in a northerly  
 direction through Gulford and Greene Twps to a point of intersecton with Tr 1,  
 Leg Route 43, the Lincoln Highway in Fayetteville

Character of territory served, Agricultural, etc

An estimate of 1920 population of the area served is 7,094 persons, as follows

County	Township or Borough	Population		Per cent area served	Population served
		1920	1910		
Franklin	Gulford	3,498	3,484	40	1,399
	Quincy	3,086	3,517	75	2,323
	Washington	3,531	4,743	10	353
	Wavnesboro	9,720	7,199	25	2,430
	Mont Alto	589		100	589
		20,424	18,943		7,094

Variation, 1910-1920 7 per cent increase

Estimate of 1940 population of this area, 7,800 persons

Estimate of 1924 M V Registration, 169 M V's per 1,000 persons, or 1,199  
 M V's

Estimate of 1940 M V Registration, 271 M V's per 1,000 persons, or 2,113  
 M V's

Ratio of traffic to registration (1924) 0.412 per 1,000

Annual daily average traffic (1924) based on District Engineer's Report, is  
 trucks, passenger cars, Total 350 M V's

Estimate of 1940 annual daily average traffic by formula

$$\frac{R(1940) \times T(1924)}{R(1924)} = T(1940) \quad \frac{2113 \times 350}{1199} = 617 \text{ M V's}$$

	Present (1924)	Future (1940)
District Engineer's estimate	350	700
Headquarters dependent forecast		617 M V's
Independent headquarters estimate and forecast	494	862

Note Average daily winter, 70 per cent, maximum summer 187 per cent of  
 annual daily average traffic

Date 11/19/25

From H K Craig, O R 709

To Mr W A Van Duzer