Is Traffic Engineering Worth the Money?

by

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The title of this paper could have several meanings. To some people, it may mean that we should reduce the funds now being spent on traffic engineering and spend them on some other phase of transportation. I prefer to use another meaning for this discussion. We could twist the title around just a little and ask, "Are we getting our money's worth out of traffic engineering." We might ask, also, if we should not be allocating more funds to this function of highway transportation.

It is sometimes interesting to reflect upon the beginnings of an activity. Traffic engineering was born in desperation and in many areas the birth was long overdue. Its most spectacular achievements have occurred within the past twenty years. Greater accomplishments can be expected in the years ahead.

It would be impossible in this short discussion to review all of the contributions of traffic engineering to the planning and design of highways, to the operation of these facilities, and to the safety, convenience, and economy of transportation. A more difficult task would be to determine the economic value of such benefits compared to the cost of providing them.

There is little doubt that traffic engineering has played a substantial role in the reduction of accidents. An intersection having an accident record of six fatalities per year for several years is channelized or otherwise improved by the sound application of traffic engineering. During the year after the improvement there was one fatality. The cost of the improvement may have been as much as $4,000. For that expenditure five lives were saved. Certainly there is no question about the value of spending that money for traffic engineering. But all too often, this is the end of our appraisal. Ten years later, accident records show that the fatality rate remained one per year in spite of increased traffic. No one mentions that for $4,000 spent ten years ago, 50 lives were saved and that 50 more lives may be saved in the next ten years.

This example has been duplicated at hundreds and hundreds of intersections. In addition, the application of traffic engineering to the reduction of accidents has not been confined to intersections only.

Today, through the efforts of many traffic engineers and others who have worked so hard on the National Joint Committee on Uniform Traffic Control Devices, a new standard has been published for the design, use, and application of traffic control devices. Some people may question certain particular features of these specifications. There seems to be no doubt in anyone's mind about the need for and value of a national uniformity in the use and application of signs, signals, and markings. All of the benefits of uniform control devices are difficult to assess. Safe, convenient, and economical motoring depends, among other things, upon the motorist's ability to make the right decision at the proper time. Certainly uniform control devices of the high standards established will speed up and facilitate his ability to make the correct decision.

Beginning back in the mid-1920s attempts have been made to determine the economic costs of traffic congestion. A very comprehensive review of information available was presented in a paper by John W. Gibbons and Albert Proctor, both of the Automotive Safety Foundation, at the 1954 meeting of the Highway Research Board. The estimated costs of traffic congestion vary over wide ranges depending on the factors which one considers to have a bearing on such costs. In any case, the costs of traffic congestion are staggering. Traffic engineering can and has reduced the economic cost of traffic congestion tremendously. For example, by establishing one-way streets and good progressive signal timing, constant speed of operation can be attained by most of the motorists using a major street. Under such operations delays at signalized intersections are substantially reduced compared to those encountered when the street carried two-way movements. The AASHO report "A Policy on Road User Benefit Analysis for Highway Improvement" issued in 1953 contains some interesting data relating to the extra costs to the motorist of interrupted operation over that for continuous operation. The extra cost per vehicle stop of 20 seconds from an approach speed of 20 miles per hour is given as 1.2 cents. Thus, if a motorist must stop ten times in a mile on a congested street, his extra costs over constant speed operation would be 12 cents. This is only one item of many making up the total economic costs of traffic congestion.

In the past eleven years since the Department of Traffic was formed in New York City notable gains in traffic efficiency and safety have been made through the application of sound traffic engineering principles and measures. Many severe traffic conditions were overcome, and in addition the city was able to absorb huge periodic increases in population and vehicles.

It is characteristic of many of us in dealing with the problems of traffic to think in terms of vehicles. In New York City, at least, one must also think in terms of people. The population of the city is approximately 8 million. In addition, 14 million people visit New York City annually. Surrounding the city in the adjacent metropolitan counties are another 7 million people, many of whom commute to the city every day. The city is made up of five boroughs—three of them each have a population greater than the city of Detroit, and the borough of Brooklyn exceeds Los Angeles in population. If each of these boroughs was a separate city, Brooklyn would become our second largest city, and Queens would replace Detroit as our fifth.

In order to understand more completely the size and complexity of traffic engineering in New York City, it may be helpful to know that there are 6,000 miles of streets and 30,000 intersections, 8,000 of which are signalized. Today, there are about 370,000 traffic signs posted in the city.

In 1960, the vehicles registration was 1.5 million, which represented a ten year increase of 50 per cent. The average annual increase in traffic volumes has been about 4 per cent.

Keeping the above information in mind as a background for appraisal, let us review briefly some of the major accomplishments of traffic engineering and the total cost of all traffic engineering service.

The annual increases in traffic volumes have been accommodated for the most part by the application of modern traffic engineering measures and controls. This is specifically true of Manhattan where no expressways have been constructed and where only a few streets have been widened or extended. The major multilane expressway program now under way and scheduled for completion in 1963 was initiated in 1956. The completion of the Long Island Expressway and the Brooklyn-Queens Expressway within the past two years has provided major relief to through traffic movement on adjacent arterials and local streets. When the expressway program is completed, through traffic movements will be much improved in the Bronx, Queens, and Brooklyn, and in addition they will provide local relief to many adjacent arterials. However, during construction additional burdens are placed on traffic engineering to devise means of handling detoured traffic. Because of about 50,000 street openings per year and expressway construction, the

Department of Traffic establishes about 3,000 detours annually. For instance, to detour traffic on a single job, the department installed 700 signs.

To keep pace with these constantly increasing traffic needs, the department installed, maintained, and assisted in the enforcement of 58,200 parking meters located in over 200 major business and commercial areas. Six thousand two hundred of these meters are in off-street facilities. Studies were made and plans completed for the construction of 22 off-street parking facilities now completed and operated by the department. They provide 8,000 parking spaces in busy commercial districts.

In 1950 practically all traffic signals were of the two-color type (red and green without a yellow warning period). There are presently over 66,000 signal faces installed in the city. In 1954 a major signal modernization program was initiated. Since then, 20,000 new modern signal faces were put in operation, progressive signal timing was installed on a large part of the major arterial street system including radio control of signals on North Conduit Blvd. in Queens. In addition, many intersections are traffic-actuated. One thousand six hundred fifty WALK-DON'T WALK pedestrian control signals were installed at 300 busy intersections. These devices reduced pedestrian accidents at some locations by as much as 75 per cent.

In the field of traffic safety, the department carried on a special school safety program for 1,200 public, private, and parochial schools which included the preparation of safe-route-to-school maps, special marking of over 9,000 school crosswalks, and the installation of school crossing signs. In 1957 a city-wide pedestrian safety program was initiated. Over 1,000 governmental, business, and civic organizations participated in a united attack on pedestrian accidents. Their united efforts over a three-year period reduced pedestrian deaths 6 per cent in 1958, about the same downward trend in 1959, and a 27 per cent drop in 1960.

The department is responsible for the location of 18,000 bus stops, which require frequent revision and relocation to insure safe and efficient bus operations.

Each year, over 50,000 traffic signs were installed or replaced and 10 million feet of center lines, lane markings, and crosswalks were painted.

The borough of Manhattan, which has depended most upon traffic engineering to handle the increasing traffic loads, has a population of 1,698,000 and an area of about 22 square miles. The south half of

Manhattan referred to as "The Hub"—a nine-square-mile area from Central Park south to the Battery—experiences tremendous fluctuations in traffic volumes. The Regional Plan Association reports in its Bulletin No. 99 that 3,349,000 persons and 590,000 vehicles entered The Hub daily in 1960. Between 1948 and 1960, the number of vehicles entering The Hub daily increased by 208,000. To accommodate this increase, major traffic engineering improvements were made.

The most difficult to accomplish, but perhaps the most rewarding in results, was the conversion to one-way operation of most of the major north-south avenues. Since 1950, 12 heavily travelled avenues in Manhattan were changed to one-way operation. Six of them were converted since 1956. As each pair was changed to one-way operation, successive improvements in the safe, efficient, and convenient movement of persons and goods were obtained.

HOW ONE-WAY AVENUES IMPROVED TRAFFIC IN MANHATTAN

One-Way Improvements	6th and 7th (Broadway) Avenues	7th and 8th (Varick) Avenues
Pedestrian Accidents Reduced	20%	30%
Total Trip Time Reduced	36%	34%
Stopped Time Reduced	70%	65%
Number of Stops Reduced	72%	65%
Crosstown Delay Reduced	40%	53%
Crosstown Capacity Increased	20%	20%

The 1961 costs for traffic engineering in New York City were $7,625,000. This includes salaries, services, and capital expenditures excluding that spent for off-street parking facilities and results in an annual cost of about 95 cents per person. In some of the other large cities, from $1.00 to about $2.00 per person has been allocated to traffic engineering functions. In the eleven-year period beginning in 1951, a total of $45,489,000 was spent in New York City on traffic engineering. This is a small price to pay for such outstanding accomplishments. Much more could have been done if the funds allocated to this important function had been more realistic.

Let us turn now to a study conducted by the Bureau of Public Roads on Wisconsin Avenue in Washington, D. C. The purpose of the study was to determine what could be accomplished to increase the traffic-carrying capability of urban arterial streets if all presently known traffic engineering control techniques were developed within the existing right-of-way. In two additional phases of the study, determinations were made of the increased traffic-carrying capabilities if minor widening and major construction were carried out. The best-known traffic operations techniques were utilized to maintain a proper balance between the need to increase capacity levels and at the same time adequately serve the access requirements of adjacent land.

The results of the study indicate the following:

1. By applying traffic engineering controls without general widening, channelization, and other physical improvements, capacity could be increased in the order of 30 to 70 per cent depending on existing street widths and conditions at particular locations.

2. By applying traffic engineering controls with channelization, some street widening, resurfacing, and provision of bus bays at bus stops, capacity could be increased in the order of 92 per cent to 126 per cent depending upon the amount of widening which could be obtained.

   Good traffic engineering on rural highways as well as in urban areas is worth much more than we are paying for it. Additional funds would permit the full utilization of presently known techniques.

   In the event that someone may gain the impression that traffic engineering can solve all of our traffic needs, it should be emphasized that traffic engineering is only a part of the job of providing adequate transportation. More limited access facilities are needed both in the rural and urban areas. In the large metropolitan regions, the commuter problem is becoming critical. In these areas all modes of transportation require substantial improvement.

   Traffic engineering cannot rest on present knowledge and techniques. Research must be expanded and accelerated to solve some of our present and certainly our future problems.

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