TRANSPORTATION FOR GREATER METROPOLITAN AREAS

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It is a great pleasure and an honor to address this distinguished group on a subject which is important to all of us. I am no prophet, but after 40 years in the transportation field I have some ideas on how the future should look, and perhaps how it will.

The basic transportation problem facing all our cities today is that of opening a way for people and the essential goods of industry and commerce to move freely through streets choked with private automobiles.

There always has been a traffic and transportation problem in large cities and one means of mass transportation after another was developed to solve it. First we developed mass carriers on the surface—horse cars, trolley cars, buses, trolley coaches—then we had to go off the streets, underground and up in the air.

Today we are living through a movement away from the mass transit systems and increasingly greater reliance upon the private automobile. This trend, if unchecked, threatens on the one hand to deprive our cities of essential revenues if interference with the flow of people and goods proceeds to the point where business is forced to decentralize.

The automobile is undoubtedly the characteristic expression of American civilization today. A very large part of our economy is directly based on the manufacture and servicing of automobiles and providing them with fuel and highways. The automobile has enabled millions of our people to travel with comfort and flexibility never before available to people of moderate means. It is a major element of our high standard of living and, in addition to the strictly utilitarian values of the automobile, it has become a symbol of status. Sociologists have noted that families in need have cut down on food

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and other essentials to keep an automobile. Now I am not selling automobiles—perhaps I would be better off if I were. But no discussion of transportation would be complete without recognition of the increasingly important role of the automobile.

Some writers of city problems have stated that nothing can be done, that our cities are doomed, and the sooner we disperse them and decentralize the better. Theoretically, decentralization may be a fine idea. People with more room in which to live and play, factories on large accessible sites, close to their workers—it all sounds fine.

But, practically, it poses many problems. The older central sections of cities from which the outward movement takes place are usually the most valuable areas, and the source of the greatest tax revenue. Their decline creates a financial problem, and unless they are rebuilt, they create slum problems. The peripheral and suburban areas where the growth is taking place require the expenditure of large sums to provide facilities for the new population—streets, parks, schools, hospitals, sewers, water and the myriad other services that people need. And the transportation problem will persist and may become even more difficult. With our mobile population and work force few individuals live close to their jobs. Transportation to the job is either by automobile which requires highways and parking space, or by a mass transit system which finds it increasingly difficult to serve a more sparsely populated area at a low fare.

Decentralization, even if it were possible and desirable, which it is not, is not the answer, at least not within the visible future. Additional highways alone are not the solution to our traffic problem. The transportation problem in our cities today requires a more comprehensive approach which recognizes the inter-dependence of existing transit systems. With the increasing and unrestricted flow of automobiles, the greatest need for parking space is in the most congested part of our cities. It is manifestly impossible to provide downtown all the parking space that might be wanted by everyone who could drive to work.

Since it is impossible in our cities today to provide sufficient highway and parking space for everyone who would like to drive downtown, and since it is essential to get people to and from their jobs, and highly desirable for them to get downtown for other purposes, we must find ways and means of getting them there. This brings us to our mass transit systems, the only alternative.

Despite unparalleled population growth of metropolitan centers, and unprecedented high levels of employment, traffic on mass transit systems has steadily declined since about 1947, and there appears to be no slackening in the trend. This decline has been brought about in part by the almost universal adoption of the five-day week, by longer vacations, more liberal sick leave provisions in industry, television keeping people at home, and similar factors. But a major factor has been the shift of travel to automobiles.

Increasing costs common to all industries, accompanying a declining passenger load, have put the transportation industry in a difficult position.

Fare increases have helped—even though they have generally been too late. But increasing the fares resulted in additional loss of passengers over and above the secular trend. It also seems to me that the point of diminishing returns from increasing fares is being approached and perhaps has been reached on some properties.

To complicate the problem, the loss of transit riding has not been evenly distributed. The loss has been greatest in the non-rush hours. It has, therefore, been impossible to pare operating expenses to keep pace with the decline in traffic. In some respects then, mass transit has come to be a stand-by service—used to full capacity for about four hours—two hours in the morning and two in the evening —five days per week, and during periods of inclement weather when people are reluctant to, or cannot use, their cars.

Despite the decline in transit traffic, there still will always be a large population of riders for whom mass transit must be provided. These are those too young or too old to drive cars—groups becoming increasingly important in our population. There are those who do not have cars, another group becoming more important in the older sections of cities, as the more prosperous residents move to newer areas, or to the suburbs. There are large numbers of transit riders from families where someone else is using the car. And last, there are those wiser people who have been discouraged from driving a car downtown by traffic and the difficulty of finding parking space. For all of these people, and for the business dependent on them, mass transportation is absolutely essential.

Mass transit must, therefore, be encouraged and aided by all the forces of government and society to serve the riders, and to relieve the traffic problem. It is the only alternative to a complex

breakdown of traffic flow in our cities today. Every avenue to maximize the use of transit systems must be explored. Such proposals as zone fares to encourage short haul riding, and lower fares in non-rush hours must be studied and tested, if study indicates a possibility of success and satisfactory methods of administration.

One obvious way to maximize use of transit, and solve the traffic problems, would be to bar unessential private cars from the congested areas of the city. This, however, would be politically impossible and practically undesirable. But the same result can be achieved indirectly to a substantial extent. The enforcement of existing parking regulations would go a long way in this direction. Insistence that new buildings make provision for off-street loading and unloading areas and construction of additional parking garages would help. The provision of large low cost parking fields outside the central area and adjacent to rapid transit stations and other transit facilities would be of the greatest help. And finally, improvement of transit equipment is necessary. We can never give the transit rider the same comfort and door-to-door service offered by a private car under the best conditions. But with parking difficulties, door-to-door service is rarely available today; the transit system can offer greater speed in many cases, and lower cost, most of the time.

In the mass transportation industry, we must also encourage technological advances and experimentation to develop new and better facilities to improve the service we offer and to reduce cost of operation. Which brings me—after this somewhat lengthy and perhaps melancholy discourse on transit in general—to two specific innovations—which will be of interest to you.

The Grand Central-Times Square shuttle in New York City needs rehabilitation and modernization and is very expensive to operate. In studying this problem I sought means to develop a more efficient method of handling this shuttle traffic. The shuttle is one of the more heavily used sections of the transit system, carrying over 60,000 people per day in each direction. It is a closed system so that a special transit method developed for the shuttle could be applied without affecting the other parts of the system. It was my desire to devise a way of carrying the passengers within the space occupied by the two center tracks of the four-track route, so that the outer tracks could be converted to walk-ways and air raid shelters.

Some kind of conveyor system seemed to offer a possible solu-

tion. Its continuous operation features offered high capacity in a small space, and the low operating manpower requirements would result in a low operating cost. We know that many passenger conveyor ideas had been suggested and some moving sidewalks and similar schemes actually operated, usually at expositions. But there was nothing proposed, or in existence, that seemed to offer any practical application for the shuttle.

I suggested to the Goodyear Tire and Rubber Company and the Stephens-Adamson Manufacturing Company, who had solved many industrial conveyor problems, that this was a fertile field for study.

The major problems were to develop a passenger conveyor system that could handle over 12,000 passengers per hour in each direction with present subway standards of safety, would give a speedy, comfortable and convenient ride, would be less expensive to operate than the present shuttle, and would not cost more than the conventional rehabilitation previously studied for the shuttle. It was desirable to fit this system into about half the space now occupied by the shuttle.

The conveyor system that was designed satisfies all of these conditions. It will carry 16,000 passengers per hour in each direction at least as safely, and more comfortably, than the subway. Passengers will make the trip in two minutes, with no waiting for trains. The present shuttle trip is two minutes of running time, plus the waiting time between trains. It was estimated that operating and maintenance costs would be 40% of present shuttle costs, and that installed in existing tunnels, the cost of the conveyor equipment would be less than 60% of conventional subway equipment. The proposed conveyor would occupy only the two center tracks of the shuttle. The remaining two trackways could be converted to well-lighted air raid shelters and walk-ways and adjoining basements would become potential shops to increase business and tax revenue to the city.

The proposed system differs from previous passenger conveyor proposals in that the passengers would ride in cars carried on belts and on banks of rubber tired wheels. Conveyor belts are used at low speed for passengers and cars at loading and unloading areas and at high speed to transport the cars from station to station. Banks of wheels, equipped with pneumatic tires, accelerate and decelerate the cars between conveyor belts moving at different speeds, and carry the cars around all turns. Passengers at stations walk onto the mov-

ing loading belts which have a speed of about one and one-half miles an hour. Parallel to and moving at the same rate of speed is the car loading belt. Riding on this belt are seven foot square, ten seat passenger cars. Nineteen cars pass the loading area every minute.

Passengers step from the loading belt into a car which is empty as it arrives at the loading area and is moving at the same speed as the loading belt. Doors open automatically when the cars reach the loading area and then slowly close prior to the time the cars clear the loading area. The passenger loading belt is nine feet wide and sixty feet long. The car loading belt is of the same length, but only five feet wide, so that cars overhang the belt both front and back, and fit snugly against the passenger loading belt. The cars are closely spaced, bumper to bumper, as they pass the loading area.

Once clear of the loading area, the passenger cars are rolled for about 50 feet over a bank of pneumatic tired accelerator wheels which quickly steps up their speed to 15 miles an hour. The acceleration is at the comfortable rate of two and three-quarter miles per hour per second. Spacing between the cars is increased as they are accelerated and they then ride on to the main line conveyor belt, running at 15 miles an hour. This endless high speed belt transports the cars between stations.

At the other station, the passenger cars are slowed down at the same rate in a 50-foot run over a bank of decelerator wheels and are delivered bumper to bumper on the car unloading belt moving at approximately one and one-half miles an hour. The car doors open and passengers step out onto a passenger unloading belt moving at one and one-half miles an hour, the same speed as the cars, and walk or ride to the exit at the end of the belt. The passenger and car unloading belts are the same dimensions as the loading belts. The empty car is then carried around a loop at the end of the shuttle system on a bank of wheels and deposited on the car loading belt ready to carry another load of passengers. The continuous flow of cars eliminates waiting and platform congestion.

I first broached this idea to those companies in 1948. It took until 1951 to develop a plan on paper that seemed workable and overcame the hurdles of safe passenger loading and unloading on moving belts, and on ways of accelerating and decelerating the cars. In April of 1953 a working model that proved the feasibility of the design was shown in New York City.

During the many months of exhaustive engineering to perfect the conveyor belt subway plan, full-scale testing equipment to solve human element problems, was built. A rubber conveyor belt 60 feet long and nine feet wide and a mock-up of five full-size cars were set up for human engineering. The cars operated adjacent to the belt duplicating actual loading and unloading conditions on the New York City subway belt system. An accelerating and decelerating system was built to determine the maximum rate at which a passenger car could be speeded up and slowed down on a conveyor belt system. These test installations proved the workability of the subway belt system. Hundreds of tests were made with all kinds of people, old and young, nimble and lame, carrying packages and leading children with not one mishap and it has been determined that a belt conveyor is the most efficient and least costly means of moving large numbers of people over short distances.

There is no reason why such a conveyor subway system cannot be extended to longer systems with way stations. All that is required for a way station is a bank of decelerating rollers, low speed unloading and loading belts, and accelerating rollers. Similar and simpler passenger conveyor systems are being developed for large parking fields, airports, railroad terminals, stadiums and other locations where great numbers of people have to be moved quickly and cheaply.

The second improvement to which I refer, which holds out great promise for many cities with transporation problems in which conventional subway construction is not feasible or cannot be financed is the Houston monorail, an entirely new concept of intra-city rapid transit. Before this line had been brought to my attention I had looked with disfavor on monorail operations as I felt no technological improvements had been made during the past 50 years in such proposed developments.

The Houston developers have put some new thinking into monorail planning. This system can operate overhead with stations at ground level, and underground for inter-city or central city operations. It will have the speed and capacity lacking in such proposed developments of the past and will be relatively inexpensive to construct and maintain. It will operate with a minimum of noise and will provide a smooth, comfortable ride combined with safety. The simplified design is pleasing to the eye in contrast to the ugly structures of the past. A pilot line was opened to the public for inspec-

tion in Houston last week, consisting of a full-size operating section one thousand feet long. The test confirmed fully the favorable predictions made about this new kind of monorail, and I am more enthusiastic than ever about its possibilities.

I have endeavored to offer some general principles for a solution, and have described some of the newest developments in the transportation industry. While we do not yet have all the answers, we must re-examine our approach to traffic and transportation problems and consider all ideas for a solution to any particular phase, no matter how revolutionary they may seem.

Here in Boston you are fortunate to have a Governor who has vision and is eager to do something about improving the situation and that he is supported by Mayor John B. Hynes of Boston and other officials and public spirited citizens anxious to make contributions toward a common goal.

As I stated in my 1950 report to the then Governor, the quickest and most economical way to encourage the travelling public to mass transportation systems is to make a study of physical connections to be made between mainline commuter services and the Metropolitan Transit Authority. There is an opportunity to provide fast, modern, safe, efficient and comfortable service at an attractive fare. It may be possible for mainline railroads to sell rights of way to the turnpike authority and relieve themselves of unprofitable commuter services. A more attractive service, such as the newly designed monorail could be installed over the turnpike right of way without interfering with surface traffic. Thus, additional turnpike facilities with the newest ideas in rapid transit, together with the use of electronics, centralized train control and the low-center of gravity train, (some of the innovations which I have enthusiastically supported) will go a long way toward relieving transit and transportation problems within a short period of time.

Unless cities can solve their traffic and transportation problems efficiently and economically, it will become expensive to do business in them and the forces for decentralization will become overwhelming. We must be ready and willing to break decidedly with the past if we are to improve upon our present modes of urban transit.

Surface traffic in the heart of a city should be kept to a minimum. Its primary function should be to serve as a feeder to rapid transit, rail and express bus lines at key stations. These stations

ideally should be on the fringe of business areas and include ample parking facilities for private cars. The motorist should park his car at such a perimeter facility and then proceed to his destination via an efficient local mass transportation system.

In closing let me say that I believe the present study by Governor Herter's Committee on Regional Transportation is a step in the right direction. The downtown traffic congestion is a problem which concerns the greater metropolitan area and requires a coordinated study of all media of transportation. The important thing to point out, however, is the need to plan along generous lines and to provide adequate facilities not only for the demands of the near future but the probable travel demands of 25 to 30 years from now.

Great progress has been made in this age through engineering opportunities for those in the engineering profession are as good if not better than ever before. The engineer with a fresh view of the problem, using the broadest possible approach to its solution has the best chance of coming up with the right answer.