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# PRODUCTIVITY IN URBAN TRANSPORTATION

## HEARINGS

BEFORE THE

## SUBCOMMITTEE ON URBAN AFFAIRS

OF THE

## JOINT ECONOMIC COMMITTEE

## CONGRESS OF THE UNITED STATES

NINETY-THIRD CONGRESS

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WEDNESDAY, JULY 3, 1974

# PRODUCTIVITY IN URBAN TRANSPORTATION

**MONDAY, APRIL 8, 1974**

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON URBAN AFFAIRS
OF THE JOINT ECONOMIC COMMITTEE,
*Washington, D.C.*

The subcommittee met, pursuant to notice, at 11:05 a.m., in room 345, Cannon House Office Building, Hon. William S. Moorhead (chairman of the subcommittee) presiding.

Present: Representative Moorhead.

Also present: Ralph Schlosstein, economist; Michael J. Runde, administrative assistant; and Walter B. Laessig, minority counsel.

## OPENING STATEMENT OF CHAIRMAN MOORHEAD

Chairman MOORHEAD. The Subcommittee on Urban Affairs of the Joint Economic Committee will please come to order.

Today the Urban Affairs Subcommittee begins a series of hearings designed to carefully analyze some of the alternatives available for improving urban transportation. Such an analysis is particularly important at a time when energy and environmental considerations have stimulated interest in urban transportation expenditures.

Over the past several weeks we have heard unfavorable reports from several of our major cities about their transit systems. The New York Subway System which carries over one-third of all transit trips in the country, is hopelessly in debt. Similarly, the newest and most exciting system, BART in San Francisco has announced that in addition to all their other problems, they will need $13 million just to stay in business beyond October. At the same time public transportation carries a woefully low percentage of total urban trips, a percentage which has declined every year since 1950.

These hearings will focus on a realistic appraisal of what we can expect our transit systems to accomplish over the coming years. We will attempt to produce objectives for urban transportation expenditures, alternatives best designed to meet these objectives, and finally how we are to measure the achievement of these objectives. Hopefully, by discussing these issues we can aid in the resolution of debates in almost every major metropolitan area concerning the direction of future transportation investments.

During the course of these hearings we expect to hear from administration officials. State and local officials, representatives of the transit industry and expert witnesses of a longstanding interest in this area. Today we are fortunate to have with us a panel of three experts who will survey recent developments in urban transportation and discuss

methods by which we might improve urban transportation in the future.

Our first witness is Prof. George Hilton of UCLA. Professor Hilton is a specialist in transportation economics who has recently completed his work on the Task Force of Railroad Productivity and the Council of Economic Advisers. He also chaired President Johnson's Task Force on Transportation Policy in 1964.

Our second witness is Prof. Martin Wohl of Carnegie Mellon University. Professor Wohl is a coauthor of "The Urban Transportation Problem," probably the most important book about urban transportation and is now a professor of civil engineering. A special welcome to Professor Wohl, who is a scholar from my own district, Pittsburgh, Pa.

Finally, we have Mr. Henry Quinby, who is employed by a transportation consulting firm. Mr. Quinby is the author of a chapter on transit productivity in the upcoming book, "Transportation and Traffic Engineering Handbook."

We certainly appreciate you gentlemen coming here and sharing your knowledge with us.

We will first hear from Professor Hilton.

Professor Hilton, we have your prepared statement. We also have another paper of yours, "The Urban Mass Transportation Assistance Program." Without objection both of those statements will be included as part of the record at the end of your oral statement.

If you could in any way summarize your prepared statement, we would appreciate it.

## STATEMENT OF GEORGE W. HILTON, PROFESSOR OF ECONOMICS, UNIVERSITY OF CALIFORNIA, LOS ANGELES

Mr. HILTON. Yes, I will endeavor to summarize it briefly.

In my prepared statement I attempt to demonstrate that the urban transit industry is inappropriately organized. It is organized into monopolies in every city. Most of these are now publicly owned. However, there are some major transit systems which are still privately owned.

This is such a universal organization of transit systems that it is widely accepted uncritically. But this in my view is undesirable. Transit systems are monopolistically organized for reasons which are entirely historical, because the economies of scale in the power distribution systems of electric railways were such that the introduction of the electric streetcar after 1888 brought about the unification of transit systems in essentially every city.

Once the bus was developed it was introduced as a set of competitive vehicles in the form of the jitneys of 1914–15. These were owner-operated common carriers which had a comparative advantage for providing short trips faster than streetcars with a higher quality of service. They were more demand-responsive, and they were free to move off routes. They operated as a continuum from demand-responsive vehicles of the general character of taxicabs to line-haul vehicles of the general character of what we know as the present generation of buses.

These were put down in every city to protect the street railways. That meant that as costs moved in favor of the bus, and as urban became more diffused, buses replaced streetcars within the monopolistic particular framework of the local transit companies. The buses continued to run on linear routes most of which were radial to central business districts, stopping at virtually every block, and providing a standard of service similar to that which the streetcar had provided.

This assured a lower quality of service than the buses provided in a competitive framework, and it also assured that the buses would be more expensive.

The jitneys had been a casual activity of owner-operators, whereas the street railways and the transit systems, when buses had replaced street railways, were monopolies.

The existence of monopoly in the industry stimulated a strong union. And it proved to be among the strongest unions in the economy, with monopoly again apparently in the range of 15 to 25 percent per year.

The industry was so expensive to operate within this economic organization that in most cities only radial routes in central business districts could possibly make money. In the largest cities these were expected to subsidize crosstown lines and other lightly traveled lines. The demand for the sort of trip which such transit monopolies provided economically the radial trip in and out of central business sections declined, partly because the geographical forces of cities were virtually all for a more diffused urban pattern with lower population densities and smaller concentration of economic activity in central business districts, and partly because as people's income rose, they tended to desert transit for automobiles. This resulted in transit being a declining industry, probably by 1918, and definitely by 1924.

This combination of circumstances also resulted in the transit industry being over-capitalized relative to what it would have been under a competitive framework. If transit were provided on a jitney basis by owner-operators, it would probably be provided mainly in vehicles of the general character of Volkswagens Microbuses; that is, vehicles of around eight passengers. Such vehicles could operate faster and more demand-responsively, than present 50-passenger diesel buses on specific routes.

I have in my prepared statement called the committee's attention to a recent report of the Institute for Defense Analyses for the Department of Transportation, "An Evaluation of Rail Rapid Transit and Express Bus Service in the Urban Commuter Market." This report demonstrates that the existing transit service of diesel buses running on schedule, stopping at virtually every block, is appropriate only for relatively densely traveled routes, and for people with low evaluation of time. More generally competitive buses of the character of the Volkswagen Microbus with owner-operators, as I mentioned, would be a cheaper vehicle capable of a higher quality of service.

On the other hand, buses of the character of the present 50-passenger diesel buses are more appropriate vehicles for providing longer distance line haul services. They are most appropriate for service of the character of the Shirley Highway express buses here in Washington and its Virginia suburbs. They can provide such services at higher speeds, get closer to people's homes, and provide the services at a much

lower cost than the rail systems which in the largest cities tend to provide services of that character. They can also provide it at a much smaller expenditure of energy, because the bus is a lighter vehicle and it operates longer distances between stops. Electric railways providing such service have the vehicles accelerating and decelerating practically all the time, and because of that, and in part because this is a heavier vehicle, they require considerably more expenditure of energy.

Unfortunately Federal policy in this area, as embodied in the urban mass transportation assistance program, is based on a presumption that the opposite is true. It is based upon a presumption that the industry is undercapitalized. It is based on the presumption that if the industry were more heavily capitalized, if the buses were more expensive, if buses on the most heavily traveled routes could be replaced with rail systems, the industry would be more competitive with automobiles.

Unfortunately we have abundant reason to believe, on the basis of the experience in this program, that this is incorrect. Replacing old buses with new buses with a 2 to 1 matching grant, which has until recently been done, tends simply to induce a substitution of depreciation for maintenance and other variable expenses of the vehicle. It tends to shorten the life expectancy of buses, and to waste resources through interfering with the optimal mix of capital versus variable expenses.

I endeavored in my prepared statement to call the attention of the committee to a paper by Prof. William B. Tye III in part 6 of the "Economics of Federal Subsidy Programs," issued by the committee in 1973: "The Capital Grant as a Subsidy Device: The Case Study of Urban Mass Transportation." In this paper he estimates that about 22½ to 23½ percent of Federal expenditures on buses tends to be waste because of this biasing of the optimal mix of inputs.

And again, this is not in my prepared statement: It is estimated by one of the staff members of the Transportation Systems Center of the Department of Transportation in Cambridge, Mass., that the grants for bus replacement are the most cost effective in the urban mass transportation assistance program. From what we know of the experience of rail lines built under this program, such expenditures are not at all cost effective.

The rail lines built in the median strips of the Dan Ryan and Kennedy Expressways in Chicago, the Quincy Line of Massachusetts Bay Transportation Authority in the Boston area, and the airport extension of the Cleveland Transit System Rapid Transit Line, plus the earlier line in Chicago, the Skokie Swift, are all consistent with the conclusion that the institution of a rail line will attract over 80 percent of its passengers from existing bus and rail lines, and less than 12 percent of its passengers from an ex-driver category. This attraction of ex-drivers will consist of a number approximately equal to the growth in vehicle counts on the parallel freeway in the course of about 6 months to 1 year. This is so small relative to the daily variance of vehicle counts on a major freeway that it is imperceptible in the vehicle counts.

In a mixed rail-bus transit system, the rail portion is usually the more unprofitable, though it declines more slowly. Instituting a new rail line will, in general, increase the cost of operation of the system,

and tend to ruin the cross-subsidization of the minor lines by the major buslines.

Section 13(c) of UMTA's statutory authority provides a protection of job rights of unions. A union must approve a capital grant or demonstration grant in the program. UMTA funds may be used for conversion of transit systems from private to municipal ownership. Section 13(c) also applies to such transfers. These tend to strengthen the union, and tend to increase the operating costs.

I would point out too, that the BART system, which was begun without Federal funds, has received funds now amounting to approximately 17.7 percent of its capital investment. This has made it subject to section 13(c). This resulted in BART's losing a strike in the summer of 1973, which increased its anticipated deficit from around $10 million per year to something in excess of $18 million per year.

Thus I would conclude on all grounds that the urban mass transportation assistance program has not succeeded in what it has attempted to do. It has not reversed the decline of transit. There was a slight increase in ridership of transit in 1973, but rather clearly because of the increase in the cost of running automobiles. This is consistent with the failure of the urban mass transportation assistance program: In general, it does nothing to make the operation of automobiles more costly, and therefore it does not change the preference as between automobiles and public transportation of any large numbers of drivers.

The urban mass transportation assistance program makes more capital intensive an industry which is already too capital intensive. And it tends to increase the operating costs of an industry in which the operating costs are already excessive, because it tends to strengthen the union in the field.

Thank you.

Chairman MOORHEAD. Thank you very much, Professor Hilton.

[The prepared statement of Mr. Hilton and the article entitled "The Urban Mass Transportation Assistance Program" follow:]

PREPARED STATEMENT OF GEORGE W. HILTON

My name is George W. Hilton and I am Professor of Economics at the University of California, Los Angeles. I am the specialist in transportation of the USLA Economics Department where I teach courses in both urban and intercity transportation. In 1964 I was Chairman of President Johnson's Task Force on Transportation Policy and in 1972–73 I was a member of the Task Force on Railroad Productivity of the Office of Productivity and the Council of Economic Advisers; I am one of the authors of its report. In the 1968–69 academic year I was Acting Curator of Rail Transportation of the Smithsonian Institution. I am the author of *The Transportation Act of 1958, The Electric Interurban Railways in America* in collaboration with John F. Due, *The Cable Car in America* and numerous other works both on railroading and urban transit. In particular, I am the author of *Federal Transit Subsidies: The Urban Mass Transportation Assistance Program*, a monograph currently being set in type for publication in the spring by the American Enterprise Institute. I greatly appreciate the Committee's invitation to appear.

Congressman Moorhead's letter of invitation to me indicated that the Committee is mainly interested in improving performance and productivity of urban transportation and that it would like my views on this subject in a fashion parallel to our recent report, *Improving Railroad Productivity*, the Final Report of the Task Force on Railroad Productivity. The problem is an analogous one in several respects. Both railroading and rapid transit are declining industries, both are inappropriately organized, and as a consequence, both have opted for technology which would not have been adopted if the industry were appropriately

organized. In both cases the inappropriate economic organization of the industry and the technology which has been adopted has prevented the industry from providing the function which society should expect from it.

Briefly, *Improving Railroad Productivity* argues that the railroads are inappropriately organized in being under a mixed public-private cartelization under the Interstate Commerce Commission. They are in the position of being simultaneously joint venturers and rivals to one another. This causes them to continue using a technology of individual cars coupled with the Janney coupler and the Westinghouse air brake, both of which were developed in the immediate post Civil War period. This technology is thoroughly undesirable by modern standards because it involves excessive labor costs, a low rate of utilization of the equipment, a high level of damage claims and several other disadvantages. The railroads continue to use it because it suits the economic organization of the industry in being compatible as between railroads. A competitive industry, we argued in the report, would probably use a containerized technology for everything except bulk cargo, and thus would not be dependent on interchange between railroads, because the companies could reach offline points by truck movement of the containers. Accordingly, railroads could use incompatible technology which they would develop in competition with one another for moving the containers by rail for long distances.

The inappropriate organization of urban transit is of a somewhat different character. Transit systems are organized into monopolies for reasons which are entirely historical. The introduction of the electric streetcar in 1888 brought about a quick unification of the street railway systems of virtually all American cities into city-wide monopolies because the optimal method of distributing electric power to streetcars was to have a single generating station and a city-wide grid of substations and overhead electric wires. The introduction of the electric streetcar was a very great technological improvement over the horsecar and the cable car which had preceded it, but this did not result in a fall in the traditional nickel fare. Rather, the change resulted in granting of city-wide transfer privileges. This meant that the city-wide nickel fare was a discriminatory price. People who traveled distances of less than 2½ miles cross-subsidized people who made longer trips. Most city governments felt that the effect of this arrangement in difusing the urban pattern was desirable. This arrangement, however, gave the economy an incentive to develop an alternative: a means of transportation which was capable of competitive rather than monopolistic organization, which had a comparative advantage for moving people at higher speeds and which provided a higher quality of service than the streetcar. This was, of course, the bus. Apart from a single bus line operated with foreign equipment on Fifth Avenue in New York, the bus, as a large scale mover of people had its origin in the jitney movement of 1914–15.

Beginning in Los Angeles in July 1914, automobiles, most of which were Ford Model T touring cars, were used as common carriers in rivalry to street railways. The movement spread rapidly about the country and by the second quarter of 1915, the movement was nationwide and there were approximately 60,000 jitneys in the United States. The jitneys amounted to a competitive market in transportation, providing a continuum of services from that of cutrate taxicabs to line haul services of the character of the street railways. It was a casual activity in which automobile owners operated most frequently for short periods; about 40% of the operators in the industry at any given time were full time operators and 60% operated only in rush hour. Some of these operated for two hours before and two hours after work and many others simply posted their homes as a destination in one direction and their places of work in the other direction. This resulted in the city being criss-crossed with an infinity of home to work routes in rush hours.

Although the automobiles with which the jitney movement began were universally considered inappropriate for a common carrier service, by 1915 specialized bus bodies for the Ford Model T chassis or for a truck chassis were being developed. Had the jitneys been allowed to survive, they would have evolved into a competitive urban transit industry. They were, however, put down in every American city. I would like to deposit for the record, or at least for the Committee's file, an article, "The Jitneys," which Professor Ross D. Eckert of the University of Southern California and I wrote and which appeared in *The Journal of Law and Economics* in October 1972. As Professor Eckert and I attempted to demonstrate, the jitneys were put down in an effort to protect the street railways, from whose monopolistic organization the cities reaped certain direct and intangible benefits.

Putting down the jitneys had several consequences all of which are directly relevant to the present problem of urban public transportation. Because automobiles could not be used as common carriers, putting down the jitney assured that there would be a grossly excessive number of home to work trips by automobile and that most of the seats in the automobile would be empty. The way in which roads are priced—by a flat excise on gasoline, a price which is not differentiated by hour of use of the road—accentuates this problem, for the tax gives no pecuniary disincentive to driving in rush hours. Equally important, putting down the jitneys meant that as the bus replaced the streetcar, it would do so through urban transit monopolies simply replacing electric railway technology with bus technology as ridership declined and as costs moved in favor of buses.

The street railways were a declining industry in the sense of having chronically substandard rates of return by 1918 and the passenger counts of the industry began to decline in 1924. The bus adapted itself to declining demand conditions better than the streetcar in being more flexible in the sense of being able to deviate from its route and in certain other respects. This method of conversion, however, meant that urban transit continued to be provided by monopolies; the buses ran on fixed routes on specified schedules in the manner in which the streetcars had done. This organization of the industry put a small number of men, the drivers, in a crucial position to tie up the transit of cities and thus produced a strong union, the Amalgamated Transit Union. The jitneys, being a casual industry, had been essentially unorganizable and the service had been provided by people whose alternative employments were relatively unattractive. Consequently, a jitney system would have been much cheaper to operate than the transit monopolies have proved to be.

Currently, some 75 to 85 per cent of the costs of a transit system will be wages. The high level of wage costs of transit systems puts them in a situation in which they can only decline. In virtually all cities, the only transit routes with enough demand to be profitable are radial from the central business district. Cities of less than a quarter million usually have no transit routes other than radial routes. In larger cities, the earnings of the radial routes cross-subsidize cross-town routes which are characteristically high unprofitable. Unfortunately the demand for service on radial routes is typically declining. Vitually all of the geographical forces at work on American cities are for more diffused patterns of living and employment. The automobile obviously has permitted point to point trips which were previously extremely difficult, and thus has tended to produce a highly diffused pattern, but most other modern tendencies are in the same direction. Trucks have replaced railroad trains; airports have replaced railroad stations; television has replaced theaters and cinemas; wide-ranging single story factories in suburbs have replaced multi-story factories in cities, and so on. In particular, Negroes, as they replaced immigrants as the principal dwellers in innercity areas, neither worked, shopped, dined nor amused themselves in central business districts to the extent that their predecessors had done. Especially, they pursued highly diffused home to work trips. Transit, as it was characteristically organized into monopolies with unionized labor, was chronically unable to satisfy the demand for trips in this diffused pattern. Further, the nature of the demand conditions for urban transit was such as to bring about a contraction of output. The industry is confronted by relatively inelastic demand conditions. The American Transit Association finds that in connection with the post-war fare increases, elasticity of demand with respect to price is between –.3 and –.4 which is to say that a 1 per cent increase in fares resutls in a 3/10 to 4/10 of 1 per cent decline in ridership. Most of this responsiveness to fare changes is in off-hour riders. Peak-hour riders, having higher incomes and little discretion in the short run whether to make the trip or not, manifest much lower elasticities of demand than this. Consequently, a transit monopoly to maximize its profits or minimize its losses has an incentive to raise its fares and to reduce its volume of output.

There is a further matter that demand for transit is positively correlated with increases in income only in relatively low income brackets, apparently under $4.000 per year in family income. In higher income brackets Americans tend to turn away from transit and to substitute automobiles for transit service with increases in income. This mixture of circumstance has caused transit to be one of the most rapidly declining American industries. As is well known, the industry has gone from producing over 23 billion rides per year in 1946 to a low of about 5.2 billion rides in 1972. By the mid-1950's the private sector was unable to carry on the operations of most large transit systems and most have been transferred

to municipalities. At present, the municipalities find themselves unable to keep such systems going and are turning to the Federal Government in hopes of securing operating subsidies.

As one would expect, it is extremely difficult for transit systems to produce increases in output per employee, given the demand and cost conditions which I have outlined. In *Improving Railroad Productivity*, our Task Force demonstrated that the railroads deal with a similar situation simply by running successively longer trains. The diesel-electric locomotive, centralized traffic control and several other devices have permitted them to run longer, less frequent trains and to increase the average productivity of the employees more rapidly than the increase in productivity of employees in the economy more generally. This is done at the cost of a deterioration in the quality of railroad service, for the longer trains involve more damage to cargo through the action of coupler slack and longer periods of waiting for cars to be made up into trains. Thus, railroad damage experience and uncertainty of delivery both become more adverse as a consequence of this means of attempting to increase productivity.

It should be apparent that a transit system does not have precisely this method of trying to increase productivity. The great majority of transit passengers—70 per cent and more—are on buses, not on trains. The analogous methods of securing a high level of average productivity per employee in transit is to use the familiar diesel bus of about 50 passenger capacity.

I would call the Committee's attention to a report entitled "Evaluation of Rail Rapid Transit and Express Bus Service in the Urban Commuter Market," prepared by the Institute for Defense Analyses for the Department of Transportation in October 1973. This report, which is of high quality, demonstrates that the technology of urban transportation is overly capital intensive. A 50-passenger diesel bus operating on a schedule, stopping at every block, or virtually every block, is an optimal way of moving people only for densely populated areas of people of low valuation of time, such as Woodward Avenue in Detroit, for example. The report demonstrates that urban transit more generally in areas of lower population density or higher evaluation of time should optimally be provided by vehicles of the size, speed and general character of Volkswagen Microbuses. With owner-drivers of relatively unattractive alternative employments, this form of service could be provided economically. Where the Urban Mass Transportation Administration has attempted to provide such services with unionized drivers they have proved highly unprofitable and have not proved viable. The report demonstrates that diesel buses of the sort used in transit are actually most suitable for line haul express bus services such as the Shirley Highway project here in Washington and its Virginia suburbs. In such services, buses of this character can move passengers more cheaply and usually more speedily than the rail services which provide this function in the largest metropolitan areas. Accordingly, both in inner-city service and in suburban service this industry is overcapitalized.

Unfortunately, the present Federal policy in this field as embodied in the Urban Mass Transportation Assistance Program is based on the opposite presumption that the industry is undercapitalized. Some 85 per cent of the funds in this program go to capital grants to the transit industry for conversion to municipal ownership of private transit systems, for replacement of buses, and for the building of rail systems. Slightly less than two-thirds of the funds go into rail systems. Fortunately, we know the effect of expenditures of each of the three varieties. Conversion of private transit systems to public ownership characteristically slows the rate of decline of ridership but increases the deficit of the enterprise.

The consequences of the capital grants for bus replacement are the subject of a study which was published by your Committee last year, 1973, in Part 6 of *The Economics of Federal Subsidy Programs*. In that volume, Professor William B. Tye III of the Air Force Academy had an article, "The Capital Grant as a Subsidy Device: The Case Study of Urban Mass Transportation". In this he summarized his dissertation at Harvard in which he demonstrated that the capital grants which were then at a rate of $2 of Federal contribution to $1 of local, produced a substitution of depreciation for variable expenses which shortened the optimal life of buses by about 50 per cent. This bias of the transit enterprise's choice between capital and variable inputs caused. Tye estimated, about 22.5 to 23.5 per cent of Federal expenditure on buses to be wasted.

The effect of capital grants on the building of rail systems can also be stated with considerable assurance. UMTA to date has financed four rail lines in Chicago, one in Cleveland and one in Boston. The experience of all of these is con-

sistent with the presumption that instituting a new rail line will result in more than 80 per cent of its passengers being attracted from pre-existing public transportation and less than 12 per cent being attracted from driving their own automobiles.

The superior attraction of a rail system over a bus line is in general enough to divert a number of drivers equal to about the ordinary growth in counts of vehicles on a parallel freeway in a period of six months to a year. This in turn is too small relative to the daily variance in vehicle counts to be preceived. Such rail systems are extremely expensive, ranging in capital costs from $5 million a mile for the line built in the median strip of the Dan Ryan Expressway in Chicago to more than $20 million a mile, the estimated cost of the Bay Area Rapid Transit in San Francisco. There is growing recognition among academic observers, apparently within the Department of Transportation itself, and to some extent within municipal governments, that rail systems are not cost-effective methods of securing the reduction in traffic congestion and reduction in atmospheric pollution which are sought of such systems. Professor John Kain has estimated that Atlanta, with a simple system of admitting automobiles at on-ramps with a traffic light set to assure that the traffic on the freeway would operate at 50 to 55 miles per hour, and separate ramps to allow the buses to enter the freeway without getting into the queues of automobiles waiting at the traffic light, could generate more external benefits than with its projected rail rapid transit system for less than 2 per cent of the investment.

The UMTA program has encompassed since its inception a series of demonstration grants whereby transit authorities have been enabled to experiment with new uses of existing technology or with new technology. This program has in general been a failure. It has not brought forth new technologies rival to buses, railways, ferryboats and automobiles whereby people move regularly. The only class of projects which can be considered successful is that of express buses on freeways, as on the Shirley Highway here or on I–5 in Seattle. UMTA has run express buses on reserved lanes which have in general attracted large numbers of drivers and caused apparent reductions in vehicle counts on the highways. The technique of speeding up automobiles and buses through traffic lights at on-ramps which I have just described, was developed at Texas A&M University with an UMTA grant.

Other UMTA demonstration programs such as mini-buses in downtown Washington and Los Angeles, dial-a-ride systems in Haddonfield, New Jersey and demand-responsive systems of other sorts elsewhere have been unsuccessful. They have encountered the problem which I mentioned earlier, that they are essentially efforts to provide taxicab service at bus fares with unionized labor.

UMTA's statutory authority includes Section 13(c) whereby the approval of the union is required for a capital grant or demonstration project. This essentially assures that the capital used in the grant or project will be used in complementary to the union's members and not in substitution for them. This has proved to be a powerful source of the strengthening of job rights and strengthening the union generally. It has also made rail systems financed through UMTA relatively expensive to operate. The Bay Area Rapid Transit was initially financed locally but the infusion of UMTA funds before completion, made BART subject to Section 13(c). This in turn precipitated a strike in the summer of 1973 which added an estimated $8 million to BART's prospective deficit. BART is now anticipated to fail to cover its operating expenses by about $20 million per year.

The UMTA program has been unsuccessful for reasons which follow directly from the nature of its statutory authority. UMTA makes more capital intensive an industry which is already too capital intensive. UMTA is able to do nothing about the pricing of the industry nor can its change the industry's economic organization into monopolies with a unionized labor force. Indeed, UMTA tends to strengthen that economic organization. Most basically of all, there is nothing in UMTA's statutory authority which makes driving more costly to drivers. As a consequence, changing the alternatives available to drivers mainly by making those alternatives more capital intensive changes the behavior of only a small number of drivers who are on the margin between driving and using public transportation. Although the UMTA program from its inception in 1961 through 1972 did not reverse the decline of ridership in transit, the increase in the price and decrease in the availability of gasoline in 1973 did bring about a small reversal in the decline.

I would suggest to the Committee that the approach embodied in the UMTA program cannot be successful. Changing the program to provide also for the

variable expenses of transit systems will also be a failure. Modifying the UMTA program to provide both capital funds and varaible expenses might free the program from the bias in choice between capital and variable expenses of which Professor Tye has written, but it will do nothing to change the economic organization of the industry or change the pricing of roads and therefore it will also be ineffective.

My recommendation to the Committee is that Congress should end the UMTA program, use such suasions as it has on cities to repeal and anti-jitney statutes so as to develop competitive urban transportation systems, and allocate funds on the Federal level for research into a system of variable user charges for the pricing of roads. Professor William Vickrey, the principal academic proponent of such a pricing policy, has suggested that for about $20 a vehicle automobiles and buses could be fitted with meters which would be energized from wires buried in streets. The number of impulses from the wires to the meters would vary depending upon the social cost of driving. Driving into a central business district in a morning rush hour and out in the later rush hour would be perhaps five times as costly as making the trip in an off hour. This would give people a pecuniary incentive to avoid driving in rush hours, to use transit for rush hour trips into and out of central business districts, to avoid such trips entirely or to try to reschedule one's working hours so as to avoid the peak period. Such policies would speed up buses by getting them out of the queues of vehicles which present road pricing creates. This would make buses more effective substitutes both for automobiles and for rail systems, the only important attraction of which is their private rights-of-way which give them freedom from such queues of automobiles. Improvements in road pricing of this character are a function which only the government can perform; providing transit is not such a function. Providing transit on a jitney basis would be a relatively attractive employment opportunity to large numbers of ghetto and barrio residents. Under the policies which I am recommending, society could readily secure its urban transportation services more cheaply, more quickly and more comprehensively than it does with the present organization of the industry.

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## The Urban Mass Transportation Assistance Program

(By George W. Hilton)

As Cervantes definitively demonstrated to society, there are two interpretations of anything. Inevitably, observers have developed alternative hypotheses to explain the decline of the urban transit industry. Society in the course of the twentieth century has gone from a dependence of about 90 per cent on the streetcar for urban trips to an almost equally high dependence on the automobile at present. The urban transit industry, which had produced 23 billion rides as recently as 1946 had declined to producing 8 billion by 1963, and the industry's financial performance was such that its very survival was questionable.

The first interpretation of the decline of the transit industry is found in *The Urban Transportation Problem* of John R. Meyer, John F. Kain, and Martin Wohl,[1] plus some additional writings of the same authors, and consistent writings of some other authors. Meyer, Kain & Wohl argue that the decline is a consequence of changes in geographical and demographic patterns of cities, almost all of which have tended to produce more diffused urban areas. Substitution of television for theaters and cinemas, trucks for railroads, computers for unskilled clerical labor forces, airports for railroad stations, Negroes for immigrants as slum-dwellers, and several similar conversions have all tended toward decline of central business districts. Meyer, Kain & Wohl particularly stress that the automobile is used in complementarity with single-family housing, so that the trend to suburbanization gave the automobile a strongly positive income elasticity of demand: as consumers' incomes increased, they proved to increase demand for services of automobiles more than proportionately. In contrast, transit proved to have either negative or insignificantly positive income elasticity of demand. The automobile proved the least costly method of moving people for the light-density routes which suburbanization created. Urban motorists were found to pay their way over-all, but rush-hour drivers probably receive a subsidy because of the use of average-cost rather than marginal-cost pricing of roads by governments. The consequence is a congestion of traffic into and out of central business districts which is the analog of the queuing created by non-price rationing

[1] Cambridge, Mass.: Harvard University Press, 1965.

elsewhere in the economy. In addition, the nature of road-pricing gives no incentive to use transit in accordance with its comparative advantage for home-to-work trips.

Though not particularly stressed in the Meyer, Kain & Wohl volume, the same authors and some other writers have argued that the organization of urban transit systems into monopolies causes their labor costs to be excessive through generation of a strong union, and causes them to be unresponsive to demand changes, relative to a "jitney" system of owner operation of buses.[2] In such a system, transit would be provided by a continuum of vehicles from private automobiles registered to handle passengers incidental to trips to and from work to buses run by full-time owner-operators.

As rival to the foregoing interpretation is another, exposited in *Urban Transportation and Public Policy*, by Lyle C. Fitch and Associates,[3] that urban transit has declined because it has been undercapitalized. Fitch and his collaborators argued that channeling of public funds into roads through the highway trust fund and other fiscal devices created an imbalance in transportation policy which had as its consequence an inability of transit systems to compete with the automobile on equal terms. Rush-hour travellers, who had proved themselves relatively unresponsive to price changes, were presumed to be highly responsive to improvements in the quality of the service. Such improvements might take the form of replacement of existing buses with newer and more commodious buses, or substitution of rail lines for bus lines, or bringing forth through experimentation new systems of public transit.

The interpretations of the decline of urban transit in Meyer, Kain & Wohl and Fitch are not entirely irreconcilable; the treatment of the consequences of user charges on roads undifferentiated by hour, for example, is essentially the same in both books. The two interpretations, however, lead to diametrically opposite policy conclusions: Meyer, Kain & Wohl to a prescription that transit should move to more demand responsive, labor-intensive systems, and Fitch to a recommendation that transit be made more capital-intensive through infusions of federal funds into the industry. Fitch explicitly recommended that federal intervention be restricted to capital grants on the ground that it was upgrading of the quality of service which was urgently required, and that operating subsidies might result in waste or dissipation of funds in gains for the union.

The Urban Mass Transportation Assistance Program provides a test of the relative validity of the two hypotheses, for it was based entirely on the latter; in fact, the Fitch volume had its origin in a public document that led to the Urban Mass Transportation Act of 1964, which separately funded the program, and which provides its basic statutory authority. The program has two major categories of expenditure, the demonstration grants and capital grants, plus a variety of minor categories for higher education, executive training, and planning of projects which will not be treated here because of limitations of space. Both the demonstration grants and capital grants are allocations of federal funds to public bodies, though the Act provides that the funds may be spent for equipment operated under contract by privately-owned carriers. Funds have been expended at a ratio of $2 of federal money to $1 of local. Demonstration grants are intended for experimentation with new uses of existing technology, such as buses on a monthly subscription basis and demand-responsive scheduling of buses, or alternatively, development of new technology, such as tracked air-cushioned vehicles, personal rapid transit, and hovercraft. The capital grants are based for conversion of transit systems from private to public ownership, replacement of buses with new ones, purchase of ferryboats (to a limited extent) and to building or re-equipment of rail transit systems. About two-thirds of the funds of the Urban Mass Transportation Administration (UMTA) go into rail systems, and many of the proponents of the program, as well as apparently some of its former administrators looked upon the program as mainly one of building rail systems parallel to building of freeways by highway departments.

The program was very explicitly intended to produce external benefits: reduction in traffic congestion and atmospheric pollution; increased mobility for the poor, the young and the elderly; and incentive for creation of compact, transit-oriented urban patterns of the New York-San Francisco type in distinction from cities of the low-density, automobile-oriented sort, such as Los Angeles and

[2] John F. Kain and John R. Meyer, "Transportation and Poverty," *The Public Interest* No. 18 (1970), 75–87; Ross D. Eckert and George W. Hilton, "The Jitneys," *The Journal of Law & Economics*, XV (1972), 293–325.

[3] San Francisco: Chandler Publishing Co., 1964. See also Thomas E. Lisco, "Mass Transportation, Cinderella in Our Cities," *The Public Interest*, No. 18 (1970), 52–74.

Houston.[4] Profitability and even ridership were subordinate criteria to the production of the desired externalities. Evaluation of the externalities was mainly subjective; UMTA does not require benefit-cost analysis of its applicants. The externalities were sought through arresting and reversing the decline of the transit industry without changing the industry's economic organization of transit in local monopolies of linear routes with an organized labor force. In fact, Section 13(c) of UMTA's statutory authority provided a powerful strengthening to the present economic organization of transit by requiring that any grant be approved by the unions involved. In order to secure an agreement of the Union under Section 13(c), the transit enterprise had to provide a protection of job rights which essentially assured that capital would be used in complementarity to the employees, not as a substitute. This made it impossible for UMTA to establish owner-operated "jitney" systems, notably. It also assured that such demand-responsive systems as UMTA might establish would be staffed at union pay scales. UMTA is, however, without powers to subsidize variable expenses of transit systems, and had not powers over fares, except insofar as a change in fares might be part of an experimental program under a demonstration grant.

## THE DEMONSTRATION PROGRAM

The Demonstration Grant Program has carried on well over one hundred projects almost all of which can be classified under three headings; the bus programs, the rail programs and projects concerned with new or experimental systems.

The bus program contained one set of projects which was markedly successful and several others which were uniformly unsuccessful. The successful class of projects was bus priority on freeways. In Seattle, beginning in 1970, UMTA sponsored a set of reversible lanes and exclusive on-off ramps for buses which allowed them quick access and egress to and from the central business district and then allowed them non-stop running for distances as much as 8 miles along Interstate 5. Integral with the project was establishment of a park and ride lot for 550 automobiles at the north end of the reversible lanes. Ridership on the buses ran between 10,700 and 12,100 per day.[5] A more permanent project of the same character was undertaken on a reversible land in the median strip of the Shirley Highway, the principal freeway running straight south from Washington, D.C. Reversed lanes for buses to downtown Washington were also established. By March 1973 ridership in the morning rush hours were reported to have reached 12,855 and diversion of the automobiles was estimated at more than 3,000 from the Shirley Highway.[6] Also in this category of projects, the Texas Transportation Institute at Texas A&M University developed a technology whereby the admission of automobiles to the Gulf Freeway in Houston was limited by a traffic light at on-ramps. Automobiles were admitted at a rate consistent with free-running speeds on the freeway. The speed of buses in a six mile section of the freeway was shortened from 20 minutes to 12 minutes and capacity to the freeway and riders was increased about 12 per cent. The technology, which entails buses being admitted to the freeway by separate entrances to keep them out of the queues of automobiles, is considered highly successful and is being installed on I–35 running south from Minneapolis.[7]

UMTA initiated express bus services on freeways in Baltimore, Buffalo and Providence which also proved viable at the expiration of the UMTA demonstration period. Unfortunately, UMTA's other bus programs have been uniformly unsuccessful. Subscription bus services designed to pick up workers at doors and deliver them to factories in the morning and to provide the reverse trip in the afternoon were tried in Flint and Peoria but neither provide viable.[8] The Flint project had to be abandoned before its scheduled completion. A pair of bus lines established at Hempstead, Long Island to connect a lightly populated suburban area with the Long Island Railroad Station with which it was hoped

[4] E.g., "Capital Grants for Urban Transportation: Information for Applicants," (Washington: Urban Mass Transportation Administration, 1972).

[5] Project WASH–MTD–2. For experience under this and other projects, see my *Federal Transit Subsidies: The Urban Mass Transportation Assistance Program* (Washington: American Enterprise Institute, pending publication).

[6] Project TRD–82.

[7] Project TRD–14.

[8] Projects MICH–MTD–2 and ILL–MTD–3–4.

to provide the home to station trip for less than 10 per cent of the cost of owning a second automobile also proved unsuccessful.[9]

UMTA attempted 83 routes in 15 cities intended to provide outward mobility for ghetto residents to factories or other places of suburban employment. These projects, which were intended to offer a service which existing routes of transit companies typically provide very imperfectly or not at all, proved highly unsuccessful—one of the least productive classes of project in UMTA's entire experience. All reported losses ranging from 39¢ per passenger trip in Chicago to $7.40 in St. Louis. The sponsor of the project in St. Louis reported that many had used the bus to find jobs, bought automobiles quickly and forsaken the bus. The performance of this program was so unsatisfactory that the General Accounting Office undertook a review of the projects and in a memorandum to the administrator of UMTA suggested that the program was such a demonstrable failure that continuance was not warranted and would in fact constitute a subsidy of operations, as distinct from an experiment, thereby rendering the expenditures in violation of UMTA's statutory body of authority.[10]

UMTA has undertaken a demand responsive project in Haddonfield, New Jersey, an old established suburban community of Philadelphia. The project is unprofitable, is attracting somewhat more than a third of the anticipated ridership and is apparently providing at bus fares a service that represents latent demand for taxicab service not manifested at local taxi rates.[11]

Under the demonstration program UMTA initiated only one rail line but that proved an excellent indication of what could be expected of inauguration of rail lines under the capital grant program. The line was the Skokie Swift of the Chicago Transit Authority which made use of five miles of track between the village of Skokie and the north terminus of the north-south rapid transit line in Chicago to provide an express service over the route of a recently abandoned interurban line. The service was inaugurated on April 20, 1964 and by 1967 reached a peak of 7,500 riders per day. The Chicago Area Transportation Study surveyed the ridership of the Skokie Swift in 1966 in an effort to estimate its impact on travel patterns and demand for rival or complementary facilities. Of its southbound passengers 12.3% had formerly driven to the Chicago Loop, 11.2% had formerly driven to elevated stations, 2.4% had been passengers in the automobile to the loop, 3% had been automobile passengers to the elevated; about 20.8% had formerly taken the bus to the elevated and 7.7% had taken the bus to the loop, about 9.4% had taken suburban railroad trains to the loop, 27.7% had not made the trip and the remainder used other methods or left their formal modes of travel unknown. The Chicago Area Transportation Study concluded that institution of the rail line had diverted from the principal highway facility, the Edens-Kennedy Expressway, about 900 automobiles per day, which was imperceptable relative to the growth or variance of vehicle counts and the facility which had utilization well in excess of 100,000 vehicels per day.[12] Since 1957 the Skokie Swift has shared the decline in passenger volume of the Chicago Transit Authority system as a whole. The peak two hour load southbound on winter weekdays has fallen from 2,350 in 1967 to 1,750 in 1972.

The other projects in the rail portion of the demonstration grant program were mainly efforts at improvement of electric railway technology: tunneling methods, ventilation systems, control mechanisms, fare collection devices, and the like. By far the largest of these projects was an effort jointly with the management of the Bay Area Rapid Transit District to develop an automatic train control mechanism for the BART system.[13] The mechanism upon BART's initiation of service proved to malfunction, to give erroneous indications to the trains and not to have fail-safe properties. In the course of testing, pre-revenue operation and revenue operation of the Hayward line in the fall of 1972, BART suffered six accidents, all of which involved the system malfunctioning. To date this problem has prevented the BART system from initiating full operation between downtown San Francisco and the East Bay area. The problem can presumably be rectified but at a cost which has not as yet been estimated.

UMTA's program in new technology has allocated the largest sector of its funds to technologies of automatic unmanned vehicles operating on guideways

[9] Project NY–MTD–11.

[10] *Department of Transportation and Related Agencies Appropriations for 1973*. Hearings before a Subcommittee of the Committee on Appropriations, House of Representatives. 92nd Congress, 2nd Session (1972), pp. 656–659.

[11] Project NJ–DMG–2.

[12] Project ILL–MTD–1. "The Skokie Swift: A Study in Urban Rapid Transit," Chicago Area Transportation Study (1968), p. 23.

[13] Projects CAL–MTD–2 and CAL–MTD–7.

known generically as personal rapid transit. UMTA has made an experimental installation of such a system to connect two campuses of West Virginia University with downtown Morgantown, a small linear route of 2¼ miles with three stations. It was hoped at the outset to install the system for $13.5 million. By 1971 the estimate had been raised by $37.5 million and by 1973 to $64.3 million. To date the system has not been made operable though UMTA hopes that the installation can be put in service by 1974.[14] Other pilot installations of new technologies have fared a little better. A line of tracked air-cushion vehicles was proposed for Los Angeles in 1970 but subsequently dropped, possibly as a consequence of the earthquake in the area in 1971. A hovercraft was put in service between the San Francisco and Oakland airport that proved to have operating costs of 23¢ per seat mile and to have poor riding qualities.[15] This was quickly abandoned. A grant was made for study of a gravity vacuum tube vehicle but the project was abandoned before any installation was attempted.[16]

Many of the demonstration grants of all types were so trivial in character, as for example larger destination signs on buses, improved design of shelters and so on, that no important consequences could have been expected from them.

### THE CAPITAL GRANT PROGRAM

The low level of success of the demonstration program inevitably caused successively more of UHTA's funds to be channeled into a capital grant program. Currently more than 85% of UMTA's expenditures go for capital grants.

The capital grants are used mainly for three purposes. First, conversion of privately owned systems to public ownership; second, grants for replacement of buses and third, grants for building rail systems or re-equipping existing rail lines.

Because UMTA requires that an application for funds for conversion to public ownership be accompanied by a plan for re-equipment of the transit system, UMTA does not separate the funds used for such conversions from the funds used for purchase of new buses. Conversion to public ownership has produced a consistent pattern of increase in operating costs, decrease in the rate of decline of ridership or possibly reversal for a short period of the decline in ridership. The increase in cost comes partly because of the strengthening of the union's position through the Section 13(c) agreement—partly because the conversion replaces a private entity with a public body which is customarily not required to maximize net receipts or to minimize losses. The diminution in decline in ridership comes partly from an increase in the quality of service which the new buses produced, partly because public bodies frequently pursue policies of lower fares. For example, with an UMTA grant of $9 million the Golden Gate Transit District was formed to assume the suburban services of Greyhound Lines between San Francisco and Marin County, California in the expectation the deficit from the service would be borne from the tolls on the Golden Gate Bridge. Greyhound had lost about $800,000 per year in the service and had not been eager to continue its franchise. The district assumed the franchise without buying Greyhound's assets on January 1, 1972. In its first year the district increased ridership about 57% above Greyhound's level, mainly through providing more commodious equipment and re-routing buses closer to the financial district of San Francisco. Only minor changes were made in routes and fares. The deficits rose from $800,000 under Greyhound's operation to $2.7 million in a single year mainly because of increased drivers wages.[17] In Providence, Rhode Island, the conversion reversed the secular decline of ridership on the transit system to the extent of approximately two years decline.[18]

The majority of projects of the minority of funds in the capital grant program have been devoted to bus replacement. By January 31, 1973, UMTA had bought 12,725 buses for the American transit industry, mainly through two to one matching grants; about 80% of American transit buses were being purchased in this fashion. This program has proved extremely popular with the transit industry. Frank Hassler of the Transportation Systems Center of the Department of Transportation informally estimates that the bus replacement program has yielded a

[14] Project WVA–MTD–3.
[15] Project CAL–MTD–3.
[16] Project TRD–85.
[17] Interview with H. Donald White, General Manager, and Jerome Kuykendall, Assistant General Manager, Golden Gate Transit District, January 5, 1973.
[18] *Annual Reports of the Rhode Island Public Transit Authority*, 1969, 1970, 1971.

benefit-cost ratio of 1.7 to the recipients, which he considers markedly higher than the benefit-cost ratio of any other UMTA program.[19] The bus replacement program yields a stream of benefits to transit enterprises in the form of reduced maintenance expenditures simply because new vehicles require less maintenance than old. The consequences of this have been studied in detail by Capt. William B. Tye III, Assistant Professor of Economics and Management of the United States Air Force Academy, who wrote his dissertation on the subject. Tye studied the effect of UMTA grants on the practices of the Chicago Transit Authority and the Cleveland Transit System, both of which pursued the normal practice of the industry of using the newest buses in their fleets in base service or all day operation and downgrading them to "tripper" service in rush hours only as they became older and their operating costs increased. On the basis of Cleveland experience he found that operating, maintenance and unreliability costs of representative buses in 1960 were 11.23¢ per mile which grew at the rate of 4% per year as the vehicle aged. Taking the cost of capital as 5.3%, he computed the optimal times for replacement of buses at various rates of utilization, notably at rates of 50,000 miles per year and 22,000 miles per year, which corresponded roughly to base service and tripper use. He found that in absence of capital grants, the increase in operating costs caused optimal replacement of a bus after 15 years at 50,000 miles per year and after 24 years at 22,000 miles per year. Tye then computed the actual rate of utilization of buses of a given age in the Cleveland Transit System with the rate of utilization which the foregoing had led him to anticipate. He found the system underutilized its buses of a given age by about 24.5%, or alternatively stated, replaced buses too early, or was overcapitalized. This, he felt, was inconsistent with the argument implicit in the UMTA program that the transit industry is undercapitalized. The Chicago Transit Authority, he found, underutilized equipment to only about a tenth of the extent that Cleveland did, and thus replaced buses at approximately at optimal rate.

Tye then proceeded to compare the replacement practices of the two systems under the presumption that two-thirds of the replacement cost of buses was provided by an UMTA grant. The vehicle being operated in Cleveland at 50,000 miles per year which previously had an optimal life expectancy of 15 years woul dnow optimally be replaced after about six. The bus operating for 22,000 miles per year which previously had a life expectancy of 24 years would now be replaced at 13 years. In general, at rates of utilization under 40,000 miles per year the optimal life of a bus was cut approximately in half. Calculations for Chicago were similar. Tye then proceeded to compute the cost of producing 50.000 miles without grants and then with two-to-one matching grants. The Federal contribution lowered the cost to the Cleveland Transit System by about a fourth. Including the Federal contribution, the total cost, however, rose by about 8%. Tye concluded that approximately 23.8% of the Federal contribution in Cleveland and 22.5% in Chicago amounted to waste simply because of the substitution of depreciation for variable expenses. Tye stressed that the waste came exclusively from incentives to premature replacement of buses. He assumed no changes in maintenance methods but as he pointed out, the program also gives operators an incentive to neglect maintenance, to accelerate depreciation and to put capital into trivial peripheral items.[20]

The bus program, however, ought properly to be looked upon as a political offering to lightly populated areas incidental to a program which is mainly engaged in the building of rail systems. Some 64% of UMTA funds of all sorts currently go into rail projects. To date UMTA has financed four rail lines in Chicago, one of which is the Skokie Swift financed under the demonstration program, one in Cleveland and one in Boston. The experience of all these lines is consistent with that of the Skokie Swift.

The largest of the projects is the rapid transit line in the median strip of the Dan Ryan Expressway running straight south from the Chicago Loop for 9.5 miles, opened late in 1969. By 1972 the line handled an average of 108,600 passengers per day. In mid-1970, when the ridership was approximately 90,000 passengers per day, the CTA surveyed the passengers using the terminal station at 95th Street as to their former mode of travel. The CTA found that 37.7% had previously used buses for the entire trip to the Loop, 34.8% had previously made combination bus-rail trips mainly by transfer from bus to the existing

[19] Interview with Frank Hassler, August 2, 1973.

[20] William B. Tye III. "The Economic Costs of the Urban Mass Transportation Capital Grant Program" [Ph. D. diss., Harvard University, 1969]. His findings are summarized in "The Capital Grant as a Subsidy Device: The Case Study of Urban Mass Transportation," in U.S. Congress, Joint Economic Committee, *The Economics of Federal Subsidy Programs*, 1971, Part 6. "Transportation Subsidies," pp. 796–826.

CTA north-south rapid transit line; 8% were diverted from suburban trains that parallel mainline railroads, 8% were ex-drivers and 6% had not made the trip at all. Because the south terminus has a parking lot and the intermediate stations are simply interfaces with bus lines, the 8% figure presumably overstates the total diversion of drivers.[21] The fact remains that vehicle counts on the Dan Ryan Expressway showed on the accompanying table manifest a decline in 1970 in the line's first full year of operation approximately equal to one year's secular growth of traffic on the expressway. Vehicle counts on the Kennedy Expressway, in which the CTA opened a rapid transit line early in 1970, also show the secular growth in vehicle counts continued unabted after a year's decline. The same table shows the effect of opening the two lines on the ridership of the Chicago Transit Authority Systems. The annual ridership of buses of the CTA declined monotonically. The rail passengers on the CTA declined monotonically except for 1970 when, as a result of the opening of the two new lines the decline was reversed to the extent of approximately a year's decline. The decline then continued as before. The total ridership of the CTA declined monotonically throughout the period 1967 to 1972.

| Year | Revenue passengers of the Chicago transit authority | | | Average daily vehicle counts at peak points, Ryan Kennedy expressways | |
|---|---|---|---|---|---|
| | Bus | Rail | Total | Dan Ryan | Kennedy |
| 1967 | 389, 770, 830 | 120, 737, 566 | 510, 508, 396 | | |
| 1968 | 346, 976, 958 | 110, 792, 832 | 457, 769, 790 | 122, 300 | 103, 000 |
| 1969 | 317, 024, 210 | 103, 071, 290 | 420, 095, 500 | 126, 100 | 108, 200 |
| 1970 | 296, 176, 300 | 105, 598, 382 | 401, 874, 682 | 121, 500 | 104, 300 |
| 1971 | 282, 659, 196 | 103, 499, 016 | 386, 158, 185 | 144, 100 | 109, 200 |
| 1972 | 277, 152, 147 | 100, 468, 879 | 377, 621, 026 | 159, 000 | 117, 000 |

Sources: Chicago area transportation study, letters of Aug. 7, 1972, and Feb. 13, 1973; Mass transportation riding habits, Chicago Transit Authority (1973).

The experience in Boston and Cleveland is similar. The new Quincy line of existing Havard-Ashmont subway took somewhat less than a thousand vehicles a day off the southeast expressway, a freeway which regularly handles between 80,000 and 120,000 passengers per day.[22] The extension of the Cleveland Transit System's rapid transit line to Hopkins Airport is estimated by the Cuyahoga County Engineer to have taken approximately the equivalent of six months growth in traffic off I–71, the parallel freeway.[23]

The forgoing appears to be a consistent set of demonstrations that institution of rail systems is not a cost-effective way of seeking to secure the external benefits which are sought of such systems. Professor John Kain has recently argued that Atlanta, with a system of express buses allowed to operate at free-running speeds on existing freeways (through admitting automobiles with traffic lights on entrance ramps with the technology developed at Texas A&M), could generate more external benefits than are anticipated from the rail system planned for the city with less than 2% of investment required for the rail facilities.[24] As is well known, rail systems are extremely capital intensive, requiring between $5 million and $20 million per mile to construct. Beyond that however, Section 13(c) of UMTA's statutory authority makes them relatively expensive to operate.

The BART system was initiated with a local bond issue but subsequently it has secured UMTA grants so that now federal funds amount to some 17.7% of the investment in the $1.6 billion system. Injection of UMTA funds into BART has made it subject to Section 13(c). Former employees of Greyhound lines who were hired after the Section 13(c) agreement was made were engaged at wage rates as much as $2.00 per hour higher than BART's own original employees.

[21] "In Chicago Buses Help Fill the Trains," *Railway Age*, 13 July 1970, p. 44. The percentages reported total 94.5; the remainder presumably had used "other" means.

[22] Max Kaplovitz, "Annual Report, South Shore Transit Extension—Effect on Southeast Corridor Travel Patterns" [Boston: Department of Public Works, 1972], supplemented by interview with the author, 25 August 1972.

[23] Albert S. Porter, Cuyahoga County Engineer, 8 March 1973, letter to the author.

[24] John Kain, "The Unexplored Potential of Freeway Rapid Transit in Regional Transportation Planning: An Atlanta Case Study," in *Unorthodox Approaches to Urban Transportation: The Emerging Challenge to Conventional Planning*, ed. Andrew Hamer (Atlanta: Bureau of Business and Economic Research, Georgia State University, 1972), pp. 38–51.

This dual wage structure caused a strike of BART's operating and clerical employees which the unions won. They not only ended the dual wage structure but secured a variety of pension, medical and other fringe benefits all of which added to BART's operating expenses and thus to its anticipated deficit by more than $8 million. BART is now estimated by its finance director, instead of failing to cover its variable expenses by something in the order of $10 million, to incur an operating deficit of about $20 million per year.[25]

EVALUATION OF THE PROGRAM

To date the Urban Mass Transportation Assistance Program has not been successful. The failure can be demonstrated either by the experience of the transit industries since establishment of the program or examination of the production of the externalities which the program is intended to provide. Ridership on American transit enterprises has continued to decline since inauguration of the program. Ridership in 1963 at the inauguration of the program was about 8 billion rides per year and by 1972 the figure had sunk to 5.3 billion. The decline was distributed over the entire nation; Edmond L. Kanwit found that the decline in ridership was uniform in pattern between metropolitan areas and little related to UMTA's expenditures: "These losses have been both relative and absolute and at most only slightly slowed by federal, state, and local efforts to shore up transit.[26] Inevitably the industry's financial performance worsened steadily throughout the decade. The industry first reported a net deficit in 1963 and by 1972 the deficit was $513 million. Frequently it doubled annually in the interim.

Given the continued decline of transit, the UMTA program has been unable to generate the externalities sought of it. Most generally, cities of the concentrated, transit-oriented type which UMTA is intended to preserve and to generate continued to decline throughout the 1960's. Of the American cities of the transit-oriented type, all of them, New York, Chicago, Philadelphia, Cleveland, San Francisco, Boston, New Orleans, Pittsburgh and Newark, had absolute population declines between the 1960 and 1970 censuses. Cities of the Los Angeles-Houston type which UMTA is intended to inhibit from developing rose steadily relative to traditional cities. Los Angeles gained 300,000 population, Houston went from 938,000 to 1,213,000 and became the sixth largest American city. Of the major automobile-oriented cities, only Detroit lost population. The fastest-growing American city was San Jose, which more than doubled in the course of the decade in spite of an incidence of automobile ownership and dependence on the automobile for trips in excess of any other major city. In the older metropolitan cities, growth of population and economic activity was almost entirely in suburban areas of the character of Los Angeles, Houston and San Jose, rather than in the transit-oriented inner portions. Such other external benefits as have been sought from the UMTA program under the circumstances cannot have been realized. The immobility of the elderly, the young and other groups which cannot drive has persisted, the immobility of the urban poor has been dealt with by an increase in automobile ownership rather than by anything which UMTA has done; insofar as atmospheric pollution from motor vehicles has been reduced, it has been by emissions controls rather than by stimulation of transit.

The demonstration program under UMTA has failed to develop viable alternatives to existing modes of transportation. The public remains served by the same mix of automobiles, buses, rail vehicles and ferryboats as heretofor.

The failure of the UMTA program justifies us in concluding that the interpretation of the decline of the transit industry on which it was based, the belief that the industry was undercapitalized as argued in Fitch and similar sources, is incorrect. The failure of the UMTA system appears consistent with the interpretation of the decline of transit in Meyer Kain & Wohl and works which make the same general argument.

As stated at the outset, Meyer Kain & Wohl's volume and similar later writings demonstrate that transit is characterized either by a negative or insignificantly positive income elasticity of demand and a relatively low price elasticity of demand. Automobile transportation is characterized by a strongly positive income elasticity demand and also apparently by a relatively low price elasticity of demand. Under these circumstances the cross elasticity of demand as between

[25] *San Francisco Chronicle*, 19 September 1973, pp. 1, 16.

[26] Edmond L. Kanwit, "The Urban Mass Transportation Administration: Its Problems and Promises," in *Urban Transportation Policy: New Perspectives*, ed. David R. Miller (Lexington, Mass.: Lexington Books, 1972), pp. 77–123, especially p. 99.

the two must be relatively low. Consequently, making transit more capital intensive is unlikely to change the behavior of any large number of drivers. Drivers are likely to be changed in their behavior significantly only by measures which make driving more costly to them.[27] In general there is nothing in UMTA's statutory authority which enables it to do this. UMTA has no powers over the user charges levied on roads. The one set of UMTA projects which can be considered a success is operating buses on reserve lanes of freeways or allowing buses to operate at free moving speed on the freeways through regulating the admission of automobiles to the freeway. Either of these technologies places greater queueing costs on drivers relative to transit passengers. These measures do, in fact, make driving more costly to drivers and thus they affect drivers as instituting a rail transit system or substituting new buses for old do not.

Similarly, there is nothing in PMTA's statutory authority to change the economic organization of the transit industry. Quite the contrary; through Section 13(c) UMTA strengthens the union in the field and thus tends to solidify the present non-competitive organization of the industry. UMTA strengthens the union in the industry in addition by making the industry more capital intensive in a fashion complementary to the union and so lowering the elasticity of demand for transit employees. Thus UMTA not only fails to change the economic organization of the industry but in fact makes its operation more costly. Consequently, the UMTA program does nothing to relieve the transit industry's characteristic problem that only radial routes from a central business district generate enough traffic to warrant transit routes, but demand for such trips is typically declining absolutely. Indeed, by increasing operating costs, the UMTA program aggravates the problem.

Explaining declines of industries is an activity which is particularly characteristic of economic historians, but it is the sort of thing which economists of all sorts usually do well. Indeed, economists devote much of their time to predicting the future whereas what they do best is interpret the past. Interpretation of secular declines are frequently thought to be only of academic interest. In this case however, the Federal Government through accepting an erroneous interpretation of the decline of a major industry, has undertaken the program which, given its statutory authority, could not have been successful, which has wasted several billion dollars of capital and which has on the whole, aggravated the problem with which it was intended to deal.

Chairman MOORHEAD. We will now hear from Professor Wohl.

## STATEMENT OF MARTIN WOHL, PROFESSOR, CIVIL ENGINEERING, CARNEGIE MELLON UNIVERSITY

Mr. WOHL. I apologize for not having submitted a prepared statement. Unfortunately previous commitments meant that I simply didn't have the time to do it. I would be happy to submit some earlier work that deals with specific issues such as those talked about by Professor Hilton, an analysis of BART, the Cleveland Rapid Transit extension, and of that kind of proposal and its impact on the urban scene.

Given my current commitment situation, though, I decided to focus on the three objectives, as I understand them, of these hearings: One, to determine if such information is available to develop measures of productivity and performance; two, to suggest some form that these measures might take; and three, to analyze more carefully some of the alternatives available for improving urban transportation.

It seems fairly clear to me that the format of these hearings, and also the time limitations that are imposed on the participants here at this testimony, really make it impossible to deal with this topic in other than a very cursory and a very superficial fashion. Given these limitations, though, I will try and sketch out a few thoughts which hopefully will be helpful if not provocative.

[27] John R. Meyer, J. F. Kain and M. Wohl, *The Urban Transportation Problem* (Cambridge, Mass.: Harvard University Press, 1965), pp. 144–167.

Again, you have indicated an interest in measures of productivity and performance, and rightly so. And undoubtedly other testimony and other documents that you have or that will be provided you are going to offer what I would regard as a very confusing array of data which you and other committee members in turn may use to support any particular proposal that strikes your fancy or that of your constituents. For instance, should you be a proponent of rail rapid transit, whether you be a resident of San Francisco or a resident of Pittsburgh, it seems to me that you would tend to stress some facts with respect to rail rapid transit. For example, you will find experts who will give you all kinds of figures, such as: the rail rapid transit system consumes only one-third as much energy per passenger-mile as private automobiles in urban areas. They will tell you that rail rapid transit systems consume only two-thirds as much energy as buses in urban areas. They will tell you that rail systems use less land than do bus or auto systems in urban areas. They will tell you that rail rapid transit systems can carry more seated passengers per lane-hour than private automobile systems or traditional bus systems, and so on. And they will tell you that rail transit systems do today carry one-third more passengers per vehicle-mile than do traditional bus systems.

And there are a lot of other such data and examples that have been or tend to be bandied about. And we tend to use this data day in and day out.

There are other people who will tell you that large cars consume more gasoline than small ones. Naturally. They are heavier than small ones. On the other hand, they probably won't tell you that large cars, everything else being equal, will result in less severe injuries than small cars.

And they will tell you that rail transit is safer than private automobile travel, and so on.

My response to this kind of performance and productivity data—and, as I said, it is very confusing—is, so what? What do we do with it once we have it?

I would say that these kinds of data, at a minimum, are incomplete. They are usually—or I should say sometimes—inaccurate. And as commonly used they are misleading. We talk about one system being more efficient than some other, but only in a very limited sense.

To make the point, let me use what I regard as a rather trite, but nonetheless simple and I think appropriate example. It is quicker, it is cheaper, and it does require less labor per customer, to feed people at cafeterias rather than at sitdown restaurants. Everybody knows that. I would say, then, why are more and more people turning to the more expensive and to the less productive sitdown restaurants than the cafeteria? If you will, why is it that people are turning away from what people like to call the more efficient and the cheaper choice?

The obvious reason is simply that our usual measures of productivity and performance are inadequate, and they simply do not reflect the entire range of service features which really do affect people's choices.

If productivity and performance measures in urban transportation are limited to matters of energy, of cost, of passenger carrying ability, of safety and the like, little is to be gained from the exercise. It really will be a very hollow one.

And if we really are sincerely interested in improving urban transportation, then we cannot just talk about data on productivity and performance.

Of equal importance, we must ask: What is the value of the services that are being provided, or that could be provided? We must talk about the value of proposed improvements, and not just which is more efficient or the least costly. And so on.

Many examples and aspects are worthy of attention. And I can't really even begin on this. As I say, I could write a whole book on the subject, but let me explore just a few with you to make the point a little better.

The taxicab—and, of course, the jitney and so on, as Professor Hilton has talked about—when compared to other transit vehicles, suffers very badly, for example, when we look at the usual kinds of productivity measures. It consumes more energy, it requires more labor to move a given number of people, It is less safe, and so on, and so forth. But even so, the package of services that are offered and afforded by this public transit mode—and it is a public transit mode in every sense of the word—is sufficiently valuable to its users that they not only will but do pay a fare which ranges somewhere between three to four times more per trip. If you put it on a per passenger-mile basis, it is even higher. By the same token, Americans have testified, by going out and shelling out billions of dollars every year and keeping General Motors and Ford pretty happy over the years, that private automobiles are sufficiently valuable to them to merit paying the high purchase price, to merit paying high insurance premiums, to merit paying high operating and parking costs, and even to merit enduring the congestion and pollution which goes with it.

This is not to say that these and other such urban transportation services, such as taxis, are always going to be so valuable. And it is not to say that even better ones cannot be developed and provided. It is simply to say that our focus at hearings like this, within bureaucracies such as the Department of Transportation and the Office of Management and Budget, and even sometimes within universities, for that matter, invariably is much to narrow. Our knowledge is too incomplete. We tend to answer the important questions about the improvement of urban transportation on a crisis basis. We tend to answer them without having sufficient information and knowledge. And we tend to make most decisions about what to do about urban transportation as though there is no tomorrow. We have to do something today as though tomorrow's future Congressmen and future Secretaries of Transportation, and future Presidents aren't going to have to face these same kinds of decisions.

To place these remarks in better perspective, let me ask you to consider how Congress and the executive branch has sometimes—if not usually, I will say in small print—dealt with urban transport improvement issues. I will take just three pertinent issues: highway safety, a declining and financially ailing transit industry, and air pollution. In all three instances each issue was dealt with as a crisis, and it was dealt with improperly. I won't even qualify that. We did not approach these issues and these problems rationally; we did not approach them with an open mind, we did not gather sufficient information to make sensible decisions. Rather the Congress—supported,

to be sure, by bureaucrats, and supported quite ably by the press, I would add—simply assumed that something must be done. Together you—and I suppose I should say we—decided that action programs involving hundreds of millions of dollars a year, sometimes billions, were better than doing nothing. We basically decided it was better to do something; even though we didn't know a damned thing about what we were doing, it was better to do something instead of waiting until we had sufficient knowledge to make good decisions. Already billions annually are being committed just to safety add-ons, and just to emission controls.

But I would ask you, who is able to say here on the Hill, in the Department of Commerce, in the Transportation Systems Center, or anywhere, who is able to say—and that includes professors—exactly how much these safety add-ons and these emission controls really are costing the public in resources committed?

Of equal importance, who can say how much extra safety has resulted from energy-absorbing steering columns, from lap belts and shoulder harnesses, from head rests and side marker lights, et cetera?

Who can say how much less air pollution has resulted already from the emission add-ons, much less, how much will result from those that are supposed to come in 1976 or whenever?

But even more important, or at least of equal importance, who can say, or who has even tried to say, what is it worth to people to have this much extra safety, to have air pollution reduced by so many percent in terms of tons per square mile, and so on.

Similarly, billions are being committed annually to the construction of new transit lines, to the purchase of new rolling stock. And I really like Professor Hilton's comments on the fact that these grant-in-aid programs really are operating subsidies when you get right down to it. But even there, with these transit programs, and with a very long history of experience, and with a lot of today's data to draw on, isn't it funny that actual costs invariably run many times higher than the original estimates? BART is costing, in fact, about twice as much as originally estimated. Not too surprisingly, in the last 10 years the cost of Washington's Metro has more than tripled in terms of estimated construction costs. And so on.

But virtually nothing in every case is known about the value of these so-called improvements, the value to people. At best we can only talk about the costs, and usually they are understated.

In summary I would simply say that I think it is high time for Congress and for the executive branch to recognize that urban transportation problems aren't going to be solved—whatever that means—by mounting large-scale crash programs in reaction to some supposed crisis. Instead, what is needed is knowledge and objectivity. Without that, we not only will continue making what seem to be, and in many cases are, bad decisions now. And without getting this information and this knowledge we are not even going to be in a better position to make good decisions tomorrow and the next year and 5 years from now and 10 years from now, when the problems aren't going to be any different than they are now.

Thus, I would conclude by simply saying that my advice to you would be to press for the establishment of good research programs, to press for the establishment of good technical agencies, ones which can

really learn about the full consequences of alternative actions and programs, and ones which can give the Congress and other political units of government good technical advice, so that you in turn can make good political decisions.

Thank you.

Chairman MOORHEAD. Thank you very much, Professor. That is a very interesting presentation.

Mr. Quinby, please proceed.

## STATEMENT OF HENRY D. QUINBY, TRANSPORTATION ENGINEER AND PLANNER, PIEDMONT, CALIF.

Mr. QUINBY. Mr. Chairman, I am Henry D. Quinby, a transportation engineer and planner from Piedmont, Calif.

My fuller professional biography has been provided to this committee.

It has been requested that this oral testimony be kept to 10 minutes or so.

I submitted last week to the subcommittee a prepared statement, additional copies of which are available here today. That statement has 14 sections which are: Introduction, Scope of Testimony, Efficiency Measures, Performance Measures, Benefits Measures, Comparative Measures, Productivity Measures, Cost-Effectiveness Measures, Costs, Transit Operating Subsidies, Data Needs, Decisions Facing Legislators, Conclusions, Selected Bibliography.

My oral testimony is based on this prepared statement submitted at the request of the subcommittee. It is an expression solely of the author.

Perhaps there will be opportunities in the period following the prepared statements today to discuss points and examples that I am not able to cover in this brief oral testimony.

The scope of this testimony is directed principally to the movement of people in and about urban metropolitan regions for trip-lengths greater than can conveniently be covered on foot, and hence mainly by means of private motor vehicles and public transportation.

The literature to date on transportation productivity has dealt mainly with commercial carriers of goods and people. Efficiency or productivity measures for urban persons movement, collectively, comparatively, and internally by individual travel mode, present now a most significant challenge.

The challenge is to develop practical, consistent, and useful measures, and a coordinated strategy, most useful for legislators and other decisionmakers, to apply public resources toward effective improvement in the quality and efficiency of all urban transportation.

Various measures of transportation efficiency comprise the most basic aspect of this inquiry: Productivity, cost effectiveness, energy usage, environmental considerations, land and space usage, and both user and general public satisfactions are among the major kinds of transportation efficiency measures.

Performance measures in the present context relate primarily to the quality of output. Speed, capacity, and safety are primary performance measures in transportation. Others, less frontal, include accessibility, frequency, convenience, reliability, comfort, attractiveness.

In this statement performance measures are viewed as significant but, for the ultimate purposes of these hearings, generally subordinate to measures of efficiency. At present, for urban transportation there is a greater reservoir of available information about performance than there appears to be about some major kinds of efficiency.

A central focus of these hearings is productivity measures in urban transportation. Initial clarification of terms is helpful. Productivity is the ratio of useful output to human effort. In transportation, the numerator of this fraction is most often output of ton-miles or price-valued ton-miles or haulage of goods; and output of passengers, or better, passenger-miles or price-valued passenger-miles of travel, for persons. The denominator is inputs of effort in terms of numbers of employees, or better, employee hours or price-valued employee hours.

Urban passenger transportation presents profound problems for productivity measurement. For transit the problems are not as severe: Output in passengers—or, with help, passenger-mile—can be related to numbers of total direct employees or even employee-hours. For the automobile the problems are not severe in the numerator; passenger-vehicle-miles can be developed and, with help, person- or passenger-miles of urban travel.

It is mainly in the denominator of the productivity fraction for auto travel that major problems occur: How does one value the time of the auto driver? Different studies have derived significantly different values which are the subject of debate, especially for different trip purposes. How would those "unpaid" auto-driver hours be related, for example, to the ascertainable paid driver hours of buses and truck? What about employee hours spent in maintaining autos, in maintaining roads, inroad administration, operation, planning, policing, lighting, court adjudications, and related activities? Aside from auto maintenance, how would these other activities be split between interurban and urban and between goods and persons movement? If auto-driver time is to be considered and probably dollar-valued; what about auto-passenger time and, for that matter transit-passenger time?

Now, besides these aspects, what is to be made of at least the human labor involved in capital costs for roads and the split thereof between goods and persons, urban and interurban; capital costs for vehicles; and intermediate inputs of purchased energy, finished materials, and raw materials?

While such a productivity formulation for urban persons movement could be essayed, with demonstrable uncertainty as to practical result, other approaches appear more timely and potentially more effective. Within the requested brief compass of this statement, one such alternative for comparative and internal efficiency measurement is suggested for consideration.

This measure is more properly one of cost effectiveness than one of true or more productivity, although it could be considered as a measure of the total productivity of the cost-valued efforts used in it. Such a suggested measure is: Total annualized operating plus capital costs per passenger-mile of urban travel.

It is attractive because it relates reasonably to legislators' needs to apportion available public funds toward improvement in the quality and efficiency of urban transportation. At a pragmatic level it is relatively easy to develop both for road transit.

Other measures can be conceptualized and further work can refine efficiency measures of cost effectiveness. In the preenergy crisis year of 1972 for the Nation as a whole, this suggested measure appears to have been approximately 10 cents for auto, 12 cents for bus, and 14 cents for rail, subject importantly to comments detailed in my prepared statement.

It will be recognized that significant changes in usage and cost by mode would in turn result in significant changes in such cost-effectiveness values. These are discussed in the prepared statement.

It will also be recognized that such measures, even in the most sensitive categories of transportation efficiency, have their limitations. They offer opportunities significantly to improve both understanding of the problems and the effectiveness of governmental actions. But they are not likely to provide substantial substitutes for the judgments involved in apportioning public resources toward improvement in the quality at least of urban transportation.

Though more complex classifications could be made, it is both helpful and relevant to consider, as one approach for these purposes, a division of all practically identifiable urban persons transportation costs as between auto-operating, auto-capital, transit-operating, and transit-capital costs. Annual data for virtually all directly associable costs and many indirect costs of these four types are in general readily available for use in a cost-effectiveness measure of efficiency.

To approach improving the efficiency and quality of urban transportation, legislators and other decisionmakers may consider a sequence of activities, part of which may already engage their attention in different ways.

To put potential assistance to urban transportation in reasonable perspective, the scale of total national activities of all types and urban persons movement's portion of it, is first to be perceived. The sequence suggested for this perception of both is in terms of: Actual total output, expressed goals, needs for public aid of various kinds, resources available for such aid, and means for public aid delivery if and as required. When this overall scaling and planning has been attained, then allocation planning should occur with respect to the portion of total public resources found to be appropriately available for urban persons movement: Allocation by time and division into capital and operating components flow from such determinations.

Allocation by road, transit, and other modes may be based on weighted priorities as to kinds of efficiency as determined from expressed national goals by term of time. Performance measures, embracing projected technical improvements, are reflected in efficiency measures. Allocation of available public resources by level of government may be related to expressed national goals, to identified sources of resources, and to time, the operating-capital division, and travel mode.

While State, county, municipal, and special district levels of government participate in actual final public resource allocations, and in the input data for and planning thereof, it seems clear that the primary initiative for national-level scaling and allocation planning should take place in the Federal Government. These processes should be updated frequently and portions of them are seen as continuous.

The measures and processes developed for use in improving urban transportation should be practical and straightforward, with a logical balance of the major factors. Timely resolution and establishment of the appropriate measures and processes are essential, as are reasonably consistent applications. Flexible revisions within such an overall framework should occur as national goals and needs require.

Thank you.

Chairman MOORHEAD. Thank you very much, Mr. Quinby.

[The prepared statement of Mr. Quinby follows:]

PREPARED STATEMENT OF HENRY D. QUINBY

MEASURES OF EFFICIENCY AND INDICATIONS TOWARD GOVERNMENTAL IMPROVEMENTS IN URBAN TRANSPORTATION

I. INTRODUCTION

The Urban Affairs Subcommittee of the Joint Economic Committee of the United States Congress is currently holding hearings on ways of improving general measures of performance and productivity for urban transportation. I am Henry D. Quinby, a transportation engineer and planner from Piedmont, California, and member of the International Union of Public Transport, American Society of Civil Engineers, and Institute of Traffic Engineers. This testimony is provided at the request of the Urban Affairs Subcommittee and is an expression solely of the author.

II. SCOPE OF TESTIMONY

The scope of this testimony is directed principally to the movement of people in and about urban metropolitan regions for trip-lengths greater than can conveniently be covered on foot, and hence mainly by means of private motor vehicles and public transportation. Urban goods movement, almost all of which internally occurs in trucks of various types, in general requires no more road facilities than are required by the more demanding peaks of persons movement except in some special circumstances and with respect to certain aspects of road construction and maintenance. Urban goods movement is not the primary focus of this testimony nor, it is understood, of these current hearings.

The literature to date on transportation productivity has dealt mainly with commercial carriers of goods and people, in part at least because that problem appears relatively less difficult to handle and because productivity data, particularly input on human effort, are more widely available at least for some carriers. Efficiency or productivity measures for urban people-movement, collectively, comparatively, and internally by individual major travel mode, present now a most significant challenge.

The challenge is to develop practical, consistent, and useful measures and a coordinated strategy, most useful for legislators and other decisionmakers, to apply public resources toward effective improvement in the quality and efficiency of all urban transportation. Following sections of this statement treat this subject. This treatment is of course limited both by the length requested for this statement and by the depth of available sources of research, data, and practice.

III. EFFICIENCY MEASURES

Various measures of transportation efficiency comprise the most basic aspect of this inquiry: Productivity, cost-effectiveness, energy usage, environmental considerations, land and space usage, and both user and general public satisfaction are among the major kinds of transportation efficiency measures. Most of them can be and usually are related to units of transportation output. Productivity and cost-effectiveness are discussed separately and more fully below. Energy efficiency is now more familiar to us in the current form of crisis and has already been documented elsewhere. Environmental considerations include air, noise, visual, water, food, and other forms of pollution; considerable documentation already exists for the more important of these factors in urban transportation. Spatial and land requirements for transportation are generally known. Measures of satisfaction are more subjective and perhaps least capable of suc-

cessful definition among those cited, although recorded relationships to transportation usage by mode and to well-structured attitude surveys provide some varying degrees of indication.

### IV. PERFORMANCE MEASURES

Performance measures in the present context relate primarily to the quality of output. Speed, capacity, and safety are primary performance measures in transportation. Others, less frontal, include accessibility, frequency, convenience, reliability, comfort, attractiveness, etc. The systems, rather than incremental, aspect of transportation performance is usually of greatest interest in this context. Often "performance" is used as a term to denote aspects of efficiency discussed above. In this statement performance measures are viewed as indeed significant but, for the ultimate purposes of these hearings, generally subordinate to measures of efficiency. At present, for urban transportation, there is a greater reservoir of available information about performance than there appears to be about some major kinds of efficiency.

### V. BENEFITS MEASURES

In transportation, forms of benefit most often involve various kinds of time and dollar value, frequently expressed as savings between alternatives and frequently associated with forms of cost in a variety of formulae. Benefits, as costs, may be direct or indirect, quantifiable or non-quantifiable, in relation to transportation issues. Major aspects of benefit, as cost, are reflected or incorporated particularly in efficiency measures discussed herein. This does not preclude possible alternative treatments wherein benefits are perhaps more explicitly distinguished. A major kind of urban transportation benefit, time-saving, and other forms of perceived or asserted benefits, are subjects of pervasive differences of opinion as to their monetary value when, as so often happens, benefits and costs must be reduced to a common measurement such as monetary value.

### VI. COMPARATIVE MEASURES

The ability to compare efficiencies as between transportation modes is clearly desirable. Reduction of different units of measure to common values is often necessary for such comparative purposes. Dollar values are often appropriate for these objectives. There are here, as in other topics just covered, a wide literature and a number of techniques to accomplish such reduction of different units to common terms. The impact of inflation, often different with different data, can and should be accounted for in relating time-series data. It is important to note that the problems and techniques involved in developing efficiency measures for within individual travel modes or industries are likely to be somewhat different from those involved for comparisons between such modes or industries. Time-series data present an additional set of considerations.

### VII. PRODUCTIVITY MEASURES

A central, fascinating, and appropriate focus of these hearings is productivity measures in urban transportation. Initial clarification of terms is helpful. Productivity is the ratio of useful output to human effort. In transportation, the numerator of this fraction is most often output of ton-miles or price-valued ton-miles for haulage of goods; and output of passengers, or better, passenger-miles or price-valued passenger-miles of travel, for persons. The denominator is inputs of effort in terms of numbers of employees, or better, employee-hours or price-valued employee-hours (i.e., man-hours, preferably those worked rather than paid).

In manufacturing, the numerator is usually the main problem, because there are so many different kinds of output; they are often reduced to common terms by some calculation of dollar-value concept. The denominator, often man-hours, is usually relatively easier to obtain.

As noted earlier, all goods and almost all public persons transportation is conducted by commercial carrier, private or public, for which productivity data are, relatively, easy to obtain.

The primary subject of these hearings, urban passenger or persons transportation, presents profound problems for productivity measurement. For the transit, or public transportation component, the problems are not as severe: output in

passengers or, with help, passenger-miles can be related to numbers of total direct employees or even, with help, employee-hours, from available or developable industry statistics. For the road, or motor vehicle or automobile, component the problems are not severe in the numerator of the productivity fraction: passenger-vehicle-miles can be developed and, with help, person- or passenger-miles of urban travel. Though major problems would occur if any attempt were made differentially to value these passenger-miles of urban travel by, say, purpose of trip.

It is mainly in the denominator of the productivity fraction for auto travel that major problems occur: How does one value the time of the auto driver? Different studies have derived significantly different values which are the subject of debate, especially for different trip-purposes. How would those "unpaid" auto-driver-hours be related, for example, to the ascertainable paid (with benefits fringes) driver-hours of buses and trucks, when such comparisons are to be made? What about employee-hours spent in maintaining autos, in maintaining roads, in road administration, operation, planning, policing, lighting, court-adjudications, and related activities? Aside from auto maintenance, how would these other activities be split between interurban and urban and between goods- and persons-movement? If auto-driver time is to be considered and probably dollar-valued, what about auto-passenger time and, for that matter, transit passenger time?

Now besides these aspects, what is to be made of at least the human labor involved in other input components in the denominator of the total urban persons transportation 'productivity' fraction: (a) capital costs for fixed facilities such as roads and the split thereof between goods and persons, urban and interurban; (b) capital costs for vehicles which traditionally are written off (depreciation and interest) as expenses associated with operations, but which Federal agencies consider as capital items when providing grants for transit vehicles to transit agencies; and (c) intermediate inputs of purchased energy, finished materials, and raw materials?

All of these aspects involve human effort in or related to urban transportation. But properly to identify and allocate them in a true productivity formulation would involve issues of data-obtainment, calculation, and judgment on a scale which seems well beyond anything so far successfully attempted, much less generally agreed-upon as to procedure. In addition, other factors which affect productivity and are reflected explicitly or indirectly in resulting productivity measures include the impacts of technological developments, capital equipment, organization and management, working and living conditions, etc.

While such a productivity formulation for urban persons movement could be essayed, with demonstrable uncertainty as to practical result, other approaches appear more timely and potentially more effective. Within the requested brief compass of this statement, one such alternative for comparative and internal efficiency measurement in urban persons transportation is suggested for consideration.

## VIII. COST-EFFECTIVENESS MEASURES

This suggested efficiency measure is more properly one of cost-effectiveness than one of true or mere productivity as defined above, although it could be considered as a measure of the total productivity of the cost-valued efforts used in it. Such a measure suggested for further consideration is: total annualized operating plus capital costs per passenger-mile of urban travel.

It is attractive because it relates reasonably to legislators' needs as one practical measure to help them apportion available public funds toward improvement in the quality and efficiency of urban transportation. While at a pragmatic or rule-of-thumb level of detail it is relatively easy to develop both for road and transit, at this level at least this measure also does reflect prevailing institutional constraints built into the data and values used to construct it. Still, in the broad view, those constraints tend to mirror those collective, and changing, judgments of society, which affect both such constituent data and other kinds of measures as well.

Doubtlessly other measures can be conceptualized and further work can refine or modify efficiency measures of cost-effectiveness such as that just proposed for consideration as total annualized operating plus capital costs per passenger-mile of urban travel. In the pre-energy-crisis year of 1972 for the nation as a whole, this measure appears to have been approximately 10 cents for auto, 12 cents for bus, and 14 cents for rail, on the basis of preliminary calculations subject to further refinement and to comments below.

It will be recognized that significant changes in usage and/or cost by transportation mode would in turn result in significant changes in such cost-effective-

ness values. Energy shortages, energy rationing in one form or another, increases in operating and/or capital costs for auto, decreases in transit fares, greater efficiency in the transit industry, greater efficiency in the auto transportation industry such as with increased auto occupancy ratios through full-share-ride and car-pooling programs, increased environmental concerns, and changes in public attitudes toward transportation product and impact satisfactions, for example, can all affect either usage or cost or both, differently for each urban transport mode.

As further examples, the cost-effectiveness of transit relative to the auto became so great in World War II without governmental subsidies and with governmental price-wage controls that private fortunes were made on some transit systems which, after the War, returned to the now-long-familar pattern of diminishing financial returns. If rail rapid transit may not have been as cost-effective in 1972 as other urban travel modes, then systems like Boston and BART today can draw lessons in greater cost-effectiveness and productivity from rapid transit operations like PATCO and Cleveland.

It will also be recognized, however, that measures such as those discussed herein, even in the most sensitive categories of transportation efficiency, have their limitations. They offer opportunities significantly to improve both understanding of the problems and the effectiveness of governmental actions, but they are not likely to provide substantial substitutes for the judgments involved in apportioning public resources toward improvement in the quality at least of urban transportation.

## IX. COSTS

Though more complex classifications could be made, it is both helpful and relevant to consider, as one approach for these purposes, a division of all practically identifiable urban persons transportation costs as between (a) auto-operating, (b) auto-capital, (c) transit-operating, and (d) transit-capital costs. Annual data for virtually all directly associable costs and many indirect costs of these four types are in general readily available for use in a cost-effectiveness measure of efficiency such as proposed in Section VIII above, though with the institutional influences noted above for such data and with some generally manageable problems of data reliability.

Vehicle depreciation and interest costs are traditionally associated with operating expenses in both auto and transit accounting because they are incurred in large part with operations. They are so considered herein, although it is recognized that they involve rolling capital facilities of limited service lives and that governmental grants for transit vehicles are considered as capital grants. Operations per se include maintenance, administration, energy, accident, marketing, planning, and operational manning costs. Capital items in urban persons transportation tend largely to be such only in their initial purchases. As such items depreciate their gradual, or sometimes complete, renewal often occurs as a maintenance cost under operations, although less often so with undersirable conditions of longtime deferred maintenance when major capital replacements may eventually become necessary.

Thus, those auto and transit costs so viewed a purely capital costs are a very small proportion, typically in the range of ten per cent or less, of total annual urban persons transportation cost activity. The remainder and preponderant bulk represents auto and transit operations or is associated with such operations. Exceptions to this circumstance occur, it would appear, only in the initial capital service life of a major new facility such as BART or perhaps a turnpike, where debt service on the large initial capital investment dominates total project (although not necessarily total urban transportation) cash flow until renewals of the physical plant, most often through maintenance operations, gradually begin to become important.

It is instructive to note how currently on a national basis each of the four cost types cited above are most generally paid for: Auto operating costs as defined are met nearly exclusively by users privately, although in general governments act as a conduit for earmarked user taxes derived through operations to pay for that part of auto operations involving public administration of road maintenance, planning, and allied operating functions. Auto capital costs as defined (mainly for fixed facilities) are almost completely paid for by earmarked user taxes on operations as defined, with governments acting as the conduit for their collection, disbursement, and administration of capital projects construction which, in turn, is mostly done privately.

Transit operating costs currently are paid for to the extent of about 75 percent by users privately through farebox and concession revenue, with the remaining 25 per cent met, not from user sources, but externally by various forms of governmental subsidy. This proportion is now rather rapidly changing toward greater shares of external public subsidy, even though almost all such subsidy (other than Federal capital grants for transit vehicles, etc.) is still provided through State and local levels of government. Transit capital costs are now virtually wholly met by governmental subsidies from sources external to transit activity. Significant and apparently increasing shares of such external transit operations and capital subsidies come from auto, or more generally, road transportation sources. Other such sources include, importantly, sales and property taxes. Increasingly, other external kinds of sources for transit subsidies are being sought.

Also of interest in this context and Section X below is the relationship between transit and auto travel volumes, and hence very generally cost and revenues in urban areas. Nationwide, approximately 4.5 per cent of total urban persons movement occurred by means of transit, with the balance almost entirely by private motor vehicles, in the pre-energy-crisis year of 1972. This value, as also those measures cited in Section VIII and values indicated on page 10 above, would of course vary among individual urban regions, by travel corridor, by use, and by time of day. It is significantly higher in the New York region where nearly one-third of all transit ridership occurs in the present period.

Since the auto or road side of urban transportation is, at least in very large part, sustained by its own users through private operating expenditures and governmentally-conduited user charges therefrom, and since public programs have expanded for over a decade to finance transit capital costs, current attention is concentrated significantly on the constantly widening gap between transit operating costs and revenues, and forms of operating subsidy potentially appropriate therefor.

## X. TRANSIT OPERATING SUBSIDIES

The objective of these hearings and of this testimony is to facilitate better bases and understanding toward improving the quality and efficiency of urban transportation. While it is not the purpose of this testimony to suggest now, as one part of this general subject, specific aspects of need, justification, or procedures in meeting deficit portions of transit operating or capital costs, discussion in this section may be helpful in ongoing attempts to address this problem.

Previous discussion herein has pointed to the kinds of proportionality which exist between operating and capital costs and revenue sources needed to meet them, both for auto and transit. Although transit capital needs for example do vary in time and circumstance, such kinds of proportionality can serve as useful guides, and can be further developed, to help scale governmental involvements in transit activities as between operating and capital components.

Further consideration of transit operating subsidies should take into account a number of factors including the following: A broad set of goals, including but not limited to those related to urban transportation, should at least be identified and kept current by the level or levels of government considering the possibility of such subsidy. Within the framework of such goals, a clear need for transit operating subsidy should effectively be demonstrated. Such demonstration should include a finding that such subsidy is necessary to sustain and enhance the quality of total urban transportation within the set of established goals and that the scale of subsidy proposed is justified by appropriate measurs of efficiency as described above for different priority considerations.

Transit operations, both rail and bus, must generally become more efficient in trems of both cost-effectiveness and internal productivity. This objective applies more to some systems than it does to others but it is generally a matter of proper national concern. Operations subsidies should not encourage or perpetuate inefficiencies. Such subsidies' ability to improve efficiency has not been determined although additional monitoring imposed to control subsidy applications might sometimes result in such improvement.

It should be the intent that, as soon as reasonably possible, transit operation subsidies should be curtailed or eliminated, even though the near-term prospects of doing so might not seem auspicious. Appropriate measurers of comparative efficiency and internal productivity should be applied in initiating and con-

tinuing transit operations subsidies, and in intentionally curtailing and eliminating them as possible subsequently.

To achieve the above efficiency objectives and to help control the amounts of subsidy, better methods of continuous monitoring and evaluation of transit operations are needed than are normally applied today. One example is better knowledge of the actual relationship between passenger-miles of transit travel and seat-miles of transit service, both by time of day and by individual parts of routes and systems. Relatively inexpensive techniques are available to monitor this and other key characteristics of transit economy. Other data needs are discussed in the next section.

A further help toward greater transit efficiency would be better recognition of the times when and places where greater reliance should be placed on the various access modes to transit rather than on transit service itself. Park-ride (particularly curbside park-ride), kiss-ride, bicycle, car-pool, and related forms of access to transit lines, and sometimes in substitution for transit, can at times reduce or even eliminate the need for some segments of transit service, which are not actually or potentially cost-effective enough to maintain.

More efficient combinations of transit operating strategies, labor utilization, routing, scheduling, para-transit uses, etc. can also significantly facilitate this objective.

It should also be recognized that a governmental decision to supply transit operating subsidy should involve a reasonable measure of actual control so as to afford an efficient application of much-in-demand public funds. Such funds seldom if ever come from sources other than external to the transit operation itself. Prior discussion in this testimony is relevant to this point. Yet effective enough measures of subsidy application and control might involve the subsidizer so deeply in daily transit operations as partly at least to duplicate, and expensively, the normal functions of transit management and operation. Various formulae proposed for applications of transit operations subsidies pose issues between efficiency, equity, control, and effectiveness.

More refinement is needed in techniques to consider, gauge, apply, monitor, and contain transit operations subsidies. Since such subsidies have long and increasingly been practiced in some American and many foreign urban regions, sometimes under national or state-provincial sponsorship, there are opportunities to learn more from the most effective and efficient examples.

## XI. DATA NEEDS

In urban transit, there is evident need for greater uniformity and consistency in accounting and other record-keeping. Since they are in large part available at least from service scheduling activities, there is need for more vehicle-hour data, at least to the level of detail already published for vehicle-miles. Transit speeds, an important aspect of quality in output, could thus be more widely derived. Definitions of the several kinds of speed should be improved. The average length of transit passenger trip, and hence passenger-miles, need more comprehensively to be developed and made available, using in part monitoring techniques discussed above. Data on employee-hours worked versus hours paid should be better tabulated, and other measures of productivity input quality developed. On many transit systems the simple need just to get proper data on passenger trips should be met. Kinds and amounts of existing indirect and direct aids or subsidies to transit operations, such as may not be adequately reported now, should be more explicitly identified and reported.

In urban auto travel, more comprehensive data on vehicle occupancy rates are needed, both in time and space. Better and more comprehensive trip-length and passenger-mile data are desirable, again both in time and space. Particularly were true productivity measures to be attempted, with the potential hazards noted in Section VII above, values of driver and passengertime, perhaps varied with different trip purposes, need better to be developed and agreed upon. It would appear also that more data and agreement are needed in the splits of road costs (and, for productivity, of man-hours) of all types in urban areas as between goods- and persons-movement, and as between internal, external, and through movements of both kinds in such areas. More comprehensive and uniform speed data would also be useful.

This section is suggestively, but of course not exhaustive, of kinds of data needs to help improve measures of efficiency for urban transportation.

## XII. DECISIONS FACING LEGISLATORS

To approach improving the efficiency and quality of urban transportation, legislators and other decision-makers may consider a sequence of activities, part of which at least may already engage their attention in different ways.

To put potential assistance to urban transportation in reasonable perspective, the scale of total national activities of all types, and urban persons-movement's portion of it, is first to be perceived. The sequence suggested for this perception is in terms of: actual total output, expressed goals, needs (by term) for public aid of various kinds, resources available for such aid, and means for public aid delivery if and as required. When this overall scaling and planning have been attained, and as repeated periodically, then overall allocation planning should occur with respect to the portion of total public resources found to be appropriately available for urban persons movement: Allocation by time (e.g., short-, medium-, and long-term), and division into capital and operating components, flow from such determinations of availability.

Allocation planning further by road and transit, and by other modes such as bicycles as they are found significant, may be based on weighted priorities as to kinds of efficiency (discussed in Section III) as determined from expressed national goals by term of time. Performance measures, embracing projected technical improvements, are reflected as appropriate in efficiency measures. Allocation of available public resources by level of government may be related to expressed national goals, to identified sources of resources, and to previously-described kinds of allocation by time, operating-capital division, and travel mode.

It is clear that State, county, municipal, and special-district levels of government participate to various degrees of significance, depending on goals, policies, and objectives, in actual final public resource allocations, and in the input data for and planning thereof. But it seems equally clear that the primary initiative for and function of national-level scaling and allocation planning for urban persons movement should take place in the Federal Government. These processes should be updated frequently and portions of them at least are seen as continuous.

## XIII. CONCLUSIONS

These hearings will undoubtedly find a need for a reasonable amount of carefully directed further study in the subjects under relatively brief review in this testimony. The measures and processes developed for use in improving urban transportation should be practical and straightforward, with a logical balance of the major factors. Timely resolution and establishment of the appropriate measures and improvement processes are essential, as are reasonably consistent applications thereof. Flexible revisions within such an overall framework should occur as national goals and needs require.

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Chairman MOORHEAD. Mr. Quinby, I was interested in your statements under the cost effectiveness measures, where you come out with a cost effectiveness of 10 cents for the auto, 12 cents for the bus, and 14 cents for rail. Does that mean that on a cost effective basis the private passenger automobile is the most cost effective?

Mr. QUINBY. Yes, sir. Under the conditions of 1972, nationwide, this would appear generally to be true on the basis of a cost-effective measure as opposed, say, to an energy or a land or an environment or maybe productivity measure.

Chairman MOORHEAD. Professor Wohl, does that cost effectiveness approach the concept you mentioned earlier, your idea of value?

Mr. WOHL. No; that is the cost. To begin, to go back to my example; cafeterias are clearly more cost effective, if you don't give a hoot about the quality of the food and the service. But this just involves the cost. It is one side of the coin, what does it cost to provide different kinds of services. The other side of the coin is, what is the quality of the service being afforded by rail, bus, auto, and what is it worth to people? These are very difficult things to get at. Quite frankly, we really haven't done enough research to get at this.

Mr. Quinby talked, for example, about the value of time. There has been research, but not very good research. It is hard to research. We have tried to find out what is it worth to people to save time. What is it worth to people to have more frequent service. What is it worth to people to avoid waiting and walking and transferring, and so on. So we need to look both at the value of the service and the quality of service and the cost of providing it. So that is one input which is important.

Chairman MOORHEAD. When you talk about a research program, you are talking about not just hardware but attitudes of people and psychology: what makes people ride this form of transit as opposed to that. Is that correct, sir?

Mr. WOHL. That is correct. I am talking about what motivates people to make choices, what motivates them to travel when they do, by what mode they do, as frequently as they do, and why they did. If we change something—if, for example, we build a subway in Washington, D.C.—how many people are going to use it, and how valuable will they regard it, and what will happen to traffic congestion at the same time? We need research on cost. I hate to tell you how little we know about the cost of different urban transport services of different levels and of different usage levels, and so on. That is a subject I have been interested in for sometime. I have to confess that we really don't know enough. But you are quite correct. It goes far beyond hardware.

In fact, even with hardware, we really know little. Too much money is going there though, in my opinion, relative to being able to predict how many people are going to respond to different choices that they might be offered today and tomorrow. What would happen if you deregulate taxicabs in New York City, how many more taxicabs would there be, and how many more people would use them, and what would happen to the fare, and so on and so forth?

Chairman MOORHEAD. Incidentally, the ground rules are that any time any member of the panel can comment on any subject, particularly on what has just been said by another member of the panel, he should do so.

I see that Professor Hilton would like to make a comment.

Mr. HILTON. Yes; what Mr. Quinby has said about the cost effectiveness of moving people seems to me more consistent with what we know about relative costs of carriers than Mr. Wohl indicates. Unfortunately this cuts the ground out from under what I am about to say to some extent, because I am going to cite figures by him and his two collaborators in the Meyer-Kain-Wohl book, "The Urban Transportation Problem." That volume demonstrates that the automobile is usually the lowest cost means of moving people for traffic densities under 10,000 people per hour. Now, the great majority of trips in metropolitan areas are made under circumstances that the automobile is by far the most effective way of moving people. Most of the political discussion of the issue simply zeroes in on a very small number of routes between central business districts and dormitory areas, in which more capital intensive methods are—or more specifically, are thought to be—rival to it.

I cite one of the principal conclusions in the Meyer-Kain-Wohl volume, that rail systems are the least costly method of moving people only for traffic densities so high that they are found only in a limited number of places which have already long since been furnished with rail systems. So I think what my two fellow members of this panel have said is inconsistent with one another and consistent with what we do know about relative costs of moving people.

Chairman MOORHEAD. Do I understand, Professor Hilton, that it is your thesis that one of the reasons for the decline in public transportation ridership is because the patterns of living in our cities have shifted? We have moved further from the center of the city, from a dense center city population to what you call dormitory communities.

Mr. HILTON. That is right. The automobile is used in complementarity to single family housing. People manifest a very strong tendency to go to single family housing as their income rise. In economist's jargon, there is a normality in consumption of single family housing; that is, people want more of it as they get richer. This, in turn, produces a very strong normality in consumption of the automobile. People want more of it as their incomes rise. It is something extremely difficult to fight. Unfortunately the way in which the Government goes about trying to fight it is an almost entirely ineffective means. It is by making alternatives to driving more capital intensive. We have abundant evidence that it doesn't work very well.

Chairman MOORHEAD. I have a table before me, which I will place in the record, that shows that the number of seats per bus has increased from 1960 to 1969, but that the number of passengers per bus and pas-

sengers per employee has declined. Does this tend to reinforce your argument, Professor Hilton?

[The table referred to follows:]

SELECTED BUS PASSENGER DENSITY AND PRODUCTIVITY INDICATORS, 1960 AND 1969

| | 1960 | 1969 |
|---|---|---|
| Passengers per employee | 47.7 | 41.3 |
| Passengers per bus | 96.1 | 67.2 |
| Seats per bus | 37.1 | 44.2 |

Source: "Economic Characteristics of the Urban Public Transportation Industry", Institute for Defense Analysis, February 1972.

Mr. HILTON. Definitely; public policy embodied in the UMTA program has been such as to make the capital inputs into transit systems cheaper relative to the variable inputs. This you would expect to result in the use of larger buses. However, the industry has continued to decline. As of 1963, at about the time of the inauguration of the UMTA program, the industry was producing over 8 billion rides per year, and it fell to a low in 1972 of somewhat over 5 billion rides a year. So what you have just said is entirely consistent with the experience under the UMTA program.

Mr. WOHL. Mr. Chairman, may I add something on your earlier point?

Chairman MOORHEAD. Certainly.

Mr. WOHL. If you look at the 1970 and 1960 and 1950 census figures, one very interesting thing emerges. For instance, we like to talk about the decentralization that has taken place in urban regions, and we like to say, the problem with existing transit systems, even in very large cities such as New York and Chicago and Boston and Philadelphia, the problem is that people have left the central city. They have fled to the suburbs. The market is no longer there. In fact, that is not true in some fairly broad terms. You will find, if you look at the numbers, that central city populations in the 19 largest cities of the country have held virtually constant over the last 2 decades. They have dropped only a little. Employment has held fairly steady in absolute terms in the central city. Now, admittedly all the growth in populations, and the growth in employment, has been in outlying central city areas, and more specifically in the suburbs. But the transit market has not really left. Almost the same number of people are still living in central cities, in absolute terms. The downtown job market has roughly held steady in the larger cities. The trouble is that people don't want low-quality services, which is being afforded to them. They want a better service. They now have more money, so they say, well, you don't give me any choice but to buy an automobile.

There is another problem with transit in these cities. And as I said, the population has been holding. And that is that transit usually offers only one level of service, bad, only one.

Buy Washington's Metro bus or nothing.

One of the great beauties of the private automobile, and the highway system, is that at one end of the spectrum you can have a limousine, or you can take a cab and be driven, or you can drive alone. You can drive alone in a fancy car or in a little inexpensive car, or you can carpool with one person or two or three or four or five. So there is a range

of services, service and price packages available to you, with a highway and automobile and taxi and bus system, whereas transit usually offers just one deal. It does not recognize the fact that people are not homogenous. There are different people with different tastes and different preferences and abilities to afford. So you need a range of services to be afforded people. This has been another natural result of the monopoly character, if you will, of public transit systems.

Chairman MOORHEAD. What would you offer the people as public transit to give them a range of choices?

Mr. WOHL. One, I would start deregulating the transit industry in some ways. Professor Hilton is really more qualified than I to talk at length on this. But I see no reason why there shouldn't be shared cab riding, or if you will, jitneys. I see no reason why you need to limit entry of taxicabs and then create monopolies such as you have in New York City and Boston and other such cities, Chicago.

Then there is Dial-A-Bus and a lot of other kinds of services which can be tailored to different people in different circumstances, rather than just provide one deal.

One of the interesting things is, one kind of urban transportation, public transit service that is available, that does have more than one service level, is, of course, the commuter railroad. If you live on Long Island you can travel in a parlor car, and travel very well—at somebody else's expense admittedly—or you can travel in a coach. But at least there are two different services that are available to people rather than just one.

Mr. QUINBY. Mr. Chairman, I would just perhaps note a couple of points: That the dividing line between transit and auto is often a very indistinct one; that, for example, you do have gradations between rail rapid transit and buses with which we are familiar; buses come in various grades and qualities; and there are lots of experiments going on in terms of degrees of quality of those. You can, for example, go all the way from a BART type, almost luxury transit vehicle, down to an older-type New York City subway car. Similarly, there is a gradation, as Professor Wohl has mentioned, in Dial-A-Ride, various kinds of taxi services, et cetera—you can see it right here in Washington. Where the line divides between private and public transportation is a little hard to define. Here in Washington is one of the most nearly openentry taxi systems in North America. There are far more taxis per capita than almost anywhere else in the country.

So there is a responsiveness to these market changes; not as much in the batch-loading transit loading vehicle, perhaps, but there is a graduation. There are a lot of imaginative things going on in trying paratransit, Dial-A-Bus, social service bus transportation, trying to combine social and health services, transportation, schoolbuses, and local transit buses: All to see if there isn't some way perhaps to get a more efficient total operation, instead of having separate fleets of schoolbuses, separate social service bus system, and so forth; seeing if there aren't ways of efficiently combining these.

I agree with Mr. Wohl that the quality aspect is very important. We try to introduce that. It is often hard to put quantitative measures on things like quality. But in transportation, certainly one of them is speed, how fast it goes. For other things, it is sometimes rather difficult to quantify.

Chairman MOORHEAD. Gentlemen, is there any city in the world that has "solved" its transit problems, or has gotten the most value, to use Professor Wohl's term?

Mr. WOHL. What we mean by solved, Mr. Chairman, is an interesting question. We have learned that we can live with congestion in the private sector of the economy. We have learned to wait in restaurants, to wait in retail stores, and to wait checking out in supermarkets, the reason being that these private entrepreneurs have decided that the cost of eliminating congestion at checkout counters, at ticket booths for movie theaters, and so on, simply is too high relative to the value to the customer. They wouldn't pay the extra costs associated with reducing congestion to zero.

Indeed we have much the same kind of problem in urban transportation. I think that the cost of eliminating congestion would be much too high. I don't think people really would be willing to pay the costs.

So really what we are talking about is what level of congestion, if you will, what range of service choices is most valuable to people, given the costs, and so on.

I think Los Angeles is an interesting city to look at. Frankly, I think Washington, D.C., is a second interesting city to look at, in terms of the overall character of the urban transportation service. And now I am going beyond transit.

In Los Angeles it is interesting to see what has happened to the rental car market. Competition has forced the prices down. And there are many places to rent cars all over Los Angeles. One of the reasons it has happened is because of the very severe restrictions on the taxi system there. I think if those restrictions were off, that the rental car market would collapse to a large extent and you would find taxis all over Los Angeles, and a pretty darned good public transit service in that form, just as you have in many parts here in Washington, D.C.

But you do get a lot of good urban transportation service in Los Angeles and Washington, D.C., even though after you have lived there awhile you think it is terrible, and you wish it were better. Our aspirations unfortunately are moving ahead much more rapidly than service is really improving. But that is a very difficult question, and I wish I could answer it more succinctly for you.

I will let Mr. Quinby take a whack.

Mr. QUINBY. I shall try to answer and not just in quantitative efficiency terms. As one gets more transit riding, especially proportionately, in a city, generally that system becomes more efficient, it is more cost effective, it is more productive. And you will often find that in Eastern Europe, or in places in Western Europe, for example. In this country, on the other hand, it is the opposite way around: Almost all urban transportation, about 95 percent of it, is by private automobile. Because of this there are economies of scale which are noted throughout the literature. This tends to make the automobile cost-effective under the current American situation.

But there are other measures, of course, as we have been discussing here, besides cost and productivity. At different times different priorities seem to assume importance—pollution, energy, and so forth. But in terms just of costs or of productivity, it depends on the proportions of total urban travel which are by auto and by transit. Here in America it is now mostly auto. In other parts of the world it is the

other way around. There are some very efficient transit systems. For example, in World War II in the United States a number of private fortunes amounting to millions of dollars were made by individuals jumping into the transit market, along about 1940, 1941, and after the war started; they made a lot of money at a time when prices and wages were controlled and there was to my recollection no Government subsidy or programs such as UMTA now has for mass transportation. But once the war was over, and the crisis was over on rationing, then transit reverted to its familiar declining pattern.

So transit can come back, if the conditions are there. But you have to ask yourself, which conditions do you want? The conditions when transit thrived most in this country were, of course, prior to the automobile, and then again during a time of stringency in World War II.

Chairman MOORHEAD. Professor Hilton.

Mr. HILTON. I would have to answer your question whether any city has an entirely satisfactory urban transportation situation, no, and for a very good reason, because most of the things which we don't like about urban transportation—the congestion of vehicles, the low speed buses, the low quality of service of buses, polluted air—are consequences of a price for the use of roads which very closely approaches zero, and a price of air which is bero. As mentioned in my prepared statement, we pay for roads with an excise on gasoline simply because this is the cheapest way to charge for them. Gasoline is the only input into automobiles which is regularly metered.

But this is a price so low that people act as if the use of the roads were free to them. This results in an endless series of queuing operations: Queuing at traffic lights, queuing to get onto freeways, queuing in the rush hours congestion. I tell my students, it is no different from the distribution of tickets to the chamber music concerts here at the Library of Congress. As you are probably aware, the chamber music concert tickets are distributed for 25 cents each at 8 or 9 a.m. on Monday mornings for the following Friday. This has exactly what you would expect. The tickets are so cheap that people act as if they were free. So they queue up at the Campbell Music Co. to get the tickets. They queue on the telephone trying to reserve tickets. They have to queue Tuesday to get the tickets they have reserved. Then there is another queue of people waiting to get tickets which people have reserved by phone, but which they don't bother to come for. Then there is a final queue of people waiting for seats for which people have paid a quarter, but the quarter is so little that if for some reason they don't want to go they just act as if they are forgoing nothing. So you have the succession queues. Well, highway transport is a succession of the same thing.

The rail systems look good, simply because they don't get mired in these queues. The worst single trouble of transit, with the possible exception of the high level of labor costs, is that the vehicles are being mired in those queues continually. So the service is slow and irritating.

The analog of the queuing with respect to air is that we use vehicles which are most economical, based on the presumption that the air input—which, after all, is about 16 times as great in volume as the gasoline input—is free. Alternatively stated, we use highly polluting vehicles because the Government doesn't charge us for the pollution. Well, these things are true in all cities. I understand that Caracas

has voted funds for the development of a system of variable user charges, taxes on vehicles which are graduated by the hours of use, direction, and place of use. If we taxed pollutants or taxed vehicles on the basis of their known polluting characteristics, and if we taxed people on the basis of the social cost of their driving, we could get rid of the pollution and get rid of the queuing. Both the driving of automobiles would be more satisfactory, and the service which the buses would provide would be more satisfactory. It would replace the queuing cost with a set of direct prices. People tend to resist this, unfortunately.

Chairman MOORHEAD. I think you mentioned—was it Atlanta which has the system that an automobile has to get into a queue to get on the high-speed highway, whereas the bus can enter at will?

Mr. HILTON. It has been proposed for Atlanta by one of the authors of the Meyer-Kain-Wohl volume. This proposal is for the use of a system worked out at Texas A. & M. University whereby a television camera or a radar scanner ascertains the speed of vehicles on a freeway. A computer attached to this adjusts the frequency with which a traffic light on the ramp turns from red to green to admit a single vehicle. It adjusts the admission of vehicles to maintain a 50- or 55-mile-per-hour free running speed on the freeway. There is an extremely cheap method of maintaining free running speeds on freeways. Alternatively stated, it imposes use of the queuing costs on drivers of automobiles before they get on the freeway so that they queue off the freeway instead of on it. Then, as you said, buses have separate on-ramps where they can enter without any queuing at all. This is a less capital intensive way of doing approximately the same thing that the Shirley Highway system does with separate lanes for buses. It mixes the buses and the automobiles on the freeway, providing a higher level of service for all of them, not just the buses, by imposing the queuing on the automobile drivers before they get out of the freeway.

As Professor Kain pointed out, Atlanta, with its existing freeway system, could provide more benefits with this system than it could with its projected rail system for less than 2 percent of the capital cost. When we say that rail systems are not cost-effective ways of doing what is wanted of them, we are not talking about 3 to 2 relations, we are talking about 50 to 1 relations. They aren't as cost effective as the alternatives available by a 50 to 1 ratio. I am taking the comparison between the system of speeding up the vehicles on the freeway that I have just described, the system worked out at Texas A. & M., as an alternative to a rail system.

Chairman MOORHEAD. Mr. Quinby.

Mr. QUINBY. Mr. Chairman, each project to improve public transportation of course has to be examined on its own individual merits. At the risk of introducing a provocative note in the discussion here, there have been a number of general studies which attempt to determine which is best for various combinations of length of trip, volume, and so on: Rail, bus, and auto, particularly rail versus bus and transit. I think there is a danger in attempting to do this on a generalized basis, as opposed to an individual case.

Take Atlanta, for example. Atlanta has approaching its center in the north-south axis, which is the main corridor, one six-lane freeway which is highly congested; its interchanges were designed quite long ago under different design conditions than some more modern highways. If you were going to use the Atlanta freeway system as the main

means of getting people not only to and from the center of Atlanta, because that is only part—and this focus on downtown tends to be overdone: There are so many cross-hauling trips around a region on this freeway, besides just these going downtown—you would end up rationing people. They wouldn't be able to get around very well at all, because of the limitations of the freeway system.

For example, in Atlanta—or, for example, in Pittsburgh—the number of major roads available are limited, and you would end up having to price pretty high if you were going to rely solely on that approach, assuming that there is a demand greater than the roads can carry. As I say, I think that is a provocative point, and I would expect to hear some retort.

Mr. HILTON. I think he is correct. Atlanta's freeway system is a relatively early one. They are relatively narrow freeways. It is fairly comprehensive. It is a very lightly populated city for a major city. But that is true of cities which, like Atlanta, grew to very large size fairly recently. As we all know, it is becoming a major metropolitan area of a very large part of the United States. It has had a rapid inflow from the rest of the country, as Chicago and Los Angeles did in earlier periods.

But I think Mr. Quinby's main point about the necessity of differentiating between the geographical characteristics of areas is a very good one. The enthusiasm for building rail systems has always seemed to me a projection of the problems of New York into places which have none of New York's characteristics. What solved New York's problems, however, imperfectly, is very unlikely to solve Atlanta's, or Los Angeles'. The metropolitan areas which are growing most rapidly are, as you would expect, the most automobile-oriented ones. The most rapidly growing city in the country is San Jose, which has dependence on the automobile considerably in excess of that of Los Angeles or other older established cities which we think of as automobile-oriented. Such cities invariably have relatively low population densities and dependence on strip developments for retailing and other functions which central business district provided in the older established cities.

Incidentally, the only central cities which grew between the 1960 and 1970 census' of the larger cities, were the automobile-oriented cities, Los Angeles, Houston, and the smaller ones. All of the ones which we normally think of as transit oriented declined. The only one we normally think of as automobile-oriented which absolutely declined was Detroit, which is not really surprising.

Chairman MOORHEAD. Gentlemen, we have a quorum call in the House. What I would suggest, if you are willing, is to recess for 5 minutes and then I think we can finish in 15 minutes.

One other question I would like to ask you is to put yourselves in the position of a local transit official about to make a major transportation decision. What information do you feel that he should have to make a sound decision, and is such information available? If not, why not, and what can be done about it?

And I want to talk a little bit about jitney problems, and about the comparative costs of our systems and that of our neighbors in Canada.

The subcommittee will be in recess for approximately 5 minutes.

[A short recess was taken.]

Chairman MOORHEAD. The subcommittee will please come to order.

The first question I would like to direct to any member of the panel concerns a table which I have before me, without objection, I will make a part of the record. The table indicates that the cost per passenger trip in Toronto is 19 cents, and in Montreal is 23 cents, whereas none of the major American cities is anywhere near that cost. Chicago is 52 cents a passenger, and Cleveland, 32 cents, and so forth. Is there any explanation for Canada having lower cost figures than we do?

[The table referred to follows:]

SELECTED RAIL RAPID TRANSIT OPERATING STATISTICS, BY PROPERTY, 1970

| Property | Revenue per passenger | Cost per passenger | Revenue passengers: Per car-mile (number) | Revenue passengers: Per car (thousands) | Adjusted cost per car-mile [1] | Car-mile per car (thousands) |
|---|---|---|---|---|---|---|
| New York | $0.31 | $0.36 | 3.49 | 181.6 | $1.24 | 52.0 |
| Chicago | .47 | .52 | 2.05 | 84.6 | 1.23 | 41.3 |
| MBTA | .31 | .41 | 7.39 | 140.5 | 3.59 | 21.0 |
| SEPTA | .32 | .33 | 4.24 | 127.0 | 1.75 | 30.2 |
| PATH | .31 | .49 | 4.21 | 154.6 | 2.04 | 36.7 |
| Cleveland | .24 | .32 | 3.09 | 120.6 | 1.37 | 39.0 |
| Lindenwold | .48 | .50 | 2.36 | 115.4 | 1.49 | 48.9 |
| Shaker Heights | .40 | .39 | 3.94 | 87.8 | 2.13 | 22.2 |
| Newark | .29 | .27 | 6.10 | 141.9 | 1.98 | 23.3 |
| Toronto | .25 | .19 | 4.34 | 294.9 | 1.12 | 68.0 |
| Montreal | .28 | .23 | 3.59 | 178.5 | 1.17 | 49.8 |

[1] Operating costs adjusted for wage rate differentials among the properties.

Source: "Economic Characteristics of the Urban Public Transportation Industry," Institute for Defense Analysis, February 1972.

Mr. WOHL. Mr. Chairman, what are in those costs, may I ask? Are these operating costs?

Chairman MOORHEAD. I understand these are total costs, capital and operating costs.

Mr. QUINBY. Mr. Chairman, do you have the source of that document?

Chairman MOORHEAD. We have it.

Mr. HILTON. These are for the entire Toronto and Montreal transit systems, not just the rail portion?

Chairman MOORHEAD. It is limited to rail rapid transit.

Mr. QUINBY. May I attempt to answer that, Mr. Chairman, being familiar with the Toronto and Montreal systems. First of all, they do have somewhat lower labor costs up there than we have here.

Second of all, in Montreal the ratio of population per motor vehicle, I believe, is in the general vicinity of about 6 to 1 or 5 to 1, as opposed to here on the order of about 2 to 1.

Now, in Toronto it is true that the population-motor vehicle relationship is closer to the U.S. cities, but there seems to be a tendency there for people to use transit to a greater extent and more selectively than occurs here in this country. This is partly due to a very long history in Toronto of relatively very good transit service. It might possibly be due also to the different nature of the country.

It is a little harder to explain Toronto. Montreal is fairly easy to explain in terms of labor costs, population density, and the relationship of population to motor vehicles.

Chairman MOORHEAD. Professor Hilton.

Mr. HILTON. Montreal is an extremely densely populated city. Like New York, it is on an island which constricts its spread. Mount Royal is also a geographical barrier. It tends to channel the dominant pattern of traffic into rather a J pattern around the southeast of the mountain. Both of the major Canadian cities are more similar to American cities in the late 19th and early 20th centuries. Their immigration has mainly been from Europe instead of from southern agriculture. Their residential areas, therefore, still have a tie with central business districts in almost all respects, such as the inner city residential areas of American cities no longer have.

In the case of Toronto, the city, as is well known, is the financial center of its country. It is a city with a water barrier in one direction, and with a large amount of central office employment, with no massive ghetto such as is characteristic of American cities. All of this results in its having a relatively high demand for transit relative to American cities. It also has an odd geographical property that it has no diagonal streets whatsoever, and as a result, any trip by transit to the downtown area requires a right angle change of vehicles, except for a limited number of trips on single radial streets at right angles to one another.

All of this results in the city generating a relatively high demand for transit.

This is also connected with the fact that Mr. Quinby mentions, that there is a tradition of a relatively high standard of service. So it is not a highly unprofitable system. It doesn't surprise me that under the circumstances its average cost of moving a passenger is relatively low.

Mr. WOHL. A point I would make on this, Mr. Chairman, is that there are two things embedded in that figure. First of all, you must recognize that these are just operating costs, and they do not include any of the capital costs.

And secondly, if you talk about the operating costs per passenger, per revenue passenger, you are talking about the usage on the one hand and then the cost on the other. Now, there is another column on that table which shows the operating costs per passenger car mile; if you look at those figures, you will see some fairly interesting things. Most of them are not too surprising. For the newer systems you would expect to have a lower operating cost per car mile. Indeed you generally do.

Cleveland has generally been the lowest cost of the rail transit systems in this country, of the reasonably large cities.

The older a system becomes the more costly it gets. If you look at Boston, I suspect you will find that it is just out of the ball park. Without seeing the numbers, I am willing to bet that Boston is much higher in terms of operating costs per car mile, perhaps twice as high as the next highest.

Then if you look at the usage which Professor Hilton was talking about, and put together the operating costs per car mile with the number of passengers per car mile, and put the two things together, then you end up with the kind of statistics you have. I think it is more useful to separate the usage, the characteristics of the people, the density of the area, and so on, from the native costs.

Chairman MOORHEAD. Have any of you got any thoughts to offer to the subcommittee on the subject of reduced fare or zero fares?

Mr. WOHL. Yes. We have begun to learn a few things over the last few years. There have been a number of so-called demand studies, studies which are concerned with looking at the sensitivity of people to service improvements and fare changes. By and large what these studies tell us is that public transit users tend to be price inelastic—meaning, for example, that a 10 percent reduction in fare will increase percentage wise the usage even less. And indeed, if you look at Atlanta, which recently, or a couple of years ago, dropped its fare from 40 cents to 15 cents, I believe, lo and behold, we found a very low elasticity, something in the range of −0.2. In other words, for a 10-percent decrease in fare you only get a 2-percent increase in ridership.

The data says, furthermore, that as prices go down more and more, people are even more price inelastic. The studies that have been done to find out, for example, what would happen if Atlanta went to free transit, as opposed to a 15 cent fare, have concluded that there would be very, very little increase in ridership.

This is one part of the coin.

Another thing we have learned at the same time is that riders are much more sensitive to service reductions or service improvement. The elasticities are very much higher indeed. If you really want to affect ridership, then improve service. Don't monkey around with the fare. You really can't get people to respond by decreasing fares even to zero. You can do much better by improving service.

The last point I would mention on this—and I am sure Professor Hilton wants to bring in some other data—the last point I want to bring in are the income redistribution effects. We like to think that transit is the vehicle of the poor and the handicapped and the elderly, and so on. We like to think that socially it is a very good thing to reduce fares, and in fact to make it zero. The trouble is that the kind of systems and improvements that we are talking about and undertaking today, things like Washington's Metro, Atlanta's new rail rapid transit system, BART, and so on, these are principally systems which are going to help the very well to do and not the poor.

If you really want to help the poor, well, then, give them money directly and don't subsidize a transit system, if you want an efficient welfare device, a device for transferring money from the rich to the poor.

Chairman MOORHEAD. Professor Hilton.

Mr. HILTON. As usual, I think Professor Wohl is correct. What he has said about the effectiveness of reducing transit fares is consistent with essentially universal observation.

I would add a bit of documentation that what he said about the reduction in fares, as compared with the effectiveness of increasing the quality of service, is consistent with the conclusions of a book "Free Transit," by Jerome Kraft and a co-author, published by or through Charles River Associates, which I would recommend to the attention of policymakers in this area.

There is a further matter which I did mention in my prepared statement, that such elasticity of demand with respect to price as there is highly concentrated among off-hours users. So an effort to increase transit ridership by reducing the fare will mainly influence the off-hours ridership. They are usually of lower income and have

more discretion as to making the trip or not relative to peak hour riders.

There is a dissertation at Columbia by E. W. Segelhorst, professor of economics at California State University, Long Beach, in which he demonstrates that the elasticity of demand of off-hours riders on New York City's main-line railroad commutation services is between 2 and 10 times as high as that of peak hour riders.

So if one is trying to reduce traffic congestion, or atmospheric pollution, by attracting peak hour riders from their automobiles to transit with a fare reduction, it is almost completely ineffective. What it will do is stimulate some housewives or some retired persons to make trips into town which they wouldn't otherwise do.

I also think Professor Wohl is quite correct in his evaluation of the equity considerations of building rail systems. I think this is particularly clear in the case of Bay Area transit. In December 1971 it was estimated by Prof. Leonard Marewitz, of the University of California at Berkeley, that the Bay Area Rapid Transit upon completion would in 1975 move people at an average cost of approximately $1.97 and an average fare of approximately 64 cents. The difference would be made up by a variety of Federal, State, and local subsidies.

Unfortunately the nature of these subsidies is such as to make this a highly inegaletarian enterprise. The Bay Area Rapid Transit was originally financed from the proceeds of a local bond issue voted in November 1962. It was hoped to pay for the right of way, the electrical distribution system, the tracks, and so on, from this bond issue, and to pay for the variable expenses, plus the interest on the rolling stock out of the fare boxes. The system will, as completed, apparently cost about $1.6 billion, which is approximately double the amount of the bond issue. The cars are very largely provided from Federal funds, which is to stay in the UMTA program. It is confronted with a prospective inability to cover its variable expenses to the extent of $18 to $20 million per year.

Some of the shortfall in capital cost has been provided out of a sales tax. Now, the original tax which secured the bond issue was a real estate tax, which is probably regressive. But certainly the sales tax is. Now, the sales tax was intended to be a temporary measure. But to meet the prospective deficit of this system, it is likely to be made permanent. If so, the system is certainly to be highly regressive, because its comparative advantage is for moving people from dormitory areas to the central business district of San Francisco. The demand for that trip is highly concentrated among people in high income brackets. The area which will be paying the tax, especially Oakland, is characterized by massive ghetto areas. The people who live in such areas pursue such diffused home to work trips that BART is not likely to be useful to them.

So in addition to the other objections made to such systems, they almost certainly are unegalitarian.

Chairman MOORHEAD. Mr. Quinby.

Mr. QUINBY. Mr. Chairman, I would concur that we don't know enough, in answer to your original question about reducing fares and the effects of that on patronage, operation, and the economy of transit systems. I also agree with Professors Hilton and Wohl that there is a great deal of such inelasticity. What is unfortunate is that we have

very little data on what has happened with the fare cuts which have started to occur around this country in the past 5 years or so.

There is a lot of evidence as to what happens when the fare increases. It has been tabulated for decades. But unfortunately we do not have good comparative records of what has happened in Cincinnati, Sacramento, San Diego, Atlanta, and a dozen or more other cities which have had recent major fare cuts, and why.

Now, the experience is quite variable. In Atlanta, with a cut in basic, adult fare by 62½ percent, ridership for those affected by that fare cut has gone up about 25 percent, mainly in offpeak, as Professor Hilton mentioned. In San Diego, on the other hand, with a cut in basic fare from 40 cents to around 25 cents, the ridership had nearly doubled. In Cincinnati it is going up somewhat differently again. A lot depends upon the service provided. And here, to address Professor Wohl's point, it costs money to provide service. This is one of the toughest things in transit. It doesn't really make much difference whether it is a bus or rail, it costs an awful lot of money to put some kind of vehicle out on the road and provide a chauffered ride. You had better have the demand concentration in time and space to make it worthwhile. Even when you go from a batch vehicle like a bus, to a taxi or dial-a-ride, you have this problem. Dial-a-ride, for example, very often will run operating ratios—of expenses to revenues—on the order of 3-to-1, to 5-to-1, to 10-to-1 on some of these programs and grants.

When you reduce fares, there are often improvements in operating efficiency. For example, when you have got a high transit fare, more people ride through the maximum load point. The maximum load point has a lot to do in determining the amount of services which have to be put on the road. With a lower fare such as New Orleans had for years, 10 cents, you'd see people getting on and off the vehicle on shorter rides. I happened to be on the Desire busline that used to be the "Streetcar Named Desire" about 2 years ago, and I was watching this; 10- or 15-cent fare, people getting on and off every few blocks, a lot more efficiency, because they aren't all crowded through the maximum loan point.

Just a couple of points about BART. Most recent studies have shown that a large part of the BART ridership is not oriented to downtown Oakland or downtown San Francisco. Again, there is a great deal of cross-hauling going on. The variables that are cited for the cost per ride are based upon the patronage that has been estimated. The patronage estimates are generally quite conservative. It remains yet to be seen what will happen when full service is put into effect. That has not happened yet.

One of the most disturbing features about some of these rapid transit systems is their rather poor productivity in terms of rides per employee. But where BART may have difficulties in that respect, PATCO—that is the system in Philadelphia and New Jersey—appears to be operating now so that its operating expenses are met by revenues.

Cleveland also is a relatively efficient operation in that respect.

Chairman MOORHEAD. Professor Hilton.

Mr. HILTON. This reverts to another point in my prepared statement.

I said that changing the mix of alternatives by making them more capital intensive does not affect the behavior of any large number of drivers. This is consistent with saying that lowering transit fares doesn't, either. There is another study about to be released by the Rand Corp., a study of the relative cost effectiveness of the means of dealing with atmospheric pollution in San Diego. One of the conclusions in this is that except for small marginal changes, which is to say that when one is talking about the changes of over 5 percent of drivers, that disincentives to driving are about three times as cost effective as incentives to use transit. This seems to be consistent with what you have said.

Chairman MOORHEAD. Let me see if I can summarize what I think your testimony is.

For the ordinary American cities, and by that I do not mean New York City, you see as the optimum a primary reliance on the bus as the vehicle, with some plus incentives such as the Shirley Highway line, or the advantage of easy access to the freeway, some plus advantages for the bus, coupled with some form of deterrent to the private automobile, either the queue or financial cost?

Mr. HILTON. Of course the financial disincentive is more effective. The queuing essentially, the queuing at the on ramp before getting on the freeway is a method through the use of an engineering device to simulate some but not all of the benefits which one would get out of price rationing of roads generally or of freeways specifically.

Chairman MOORHEAD. These exclusive bus lines, would they continue into central business districts?

Mr. HILTON. Yes; I said that the system of regulating admission to the freeways is really a more effective system. But if you want the maximum benefit out of such an arrangement, you would need reserve lines as here or reserved on and off ramps as in Seattle.

Chairman MOORHEAD. You would supplement this bus system with a return to the jitney concept?

Mr. HILTON. The jitney concept, yes; owner operation of the vehicles. The transit authorities which operate transit in virtually all major cities ought to be liquidated and the buses sold off one by one for individual operation without restriction to route and without restrictions as to fare. The transit service would presumably be provided mainly by ghetto and barrio residents for whom this would be an excellent employment opportunity. It would make use of a talent which virtually all of them have, driving a vehicle, and it would have fairly small capital requirements, especially since most of it would be provided in vehicles which, as I indicated, would be less capital intensive than the regular buses.

Chairman MOORHEAD. Would there be any requirement for driving tests, insurance, and so forth?

Mr. HILTON. Certainly liability insurance but there ought to be free entry into the industry for anyone who would meet these requirements. The greater are these requirements, the less benefit one will get out of a jitney system. The usual objection which occurs to people immediately is that there would be very considerable crime hazards. To some extent this is an information problem and analogous to a large number of other ones. Jitney operators would compete for a reputation for assurance of safety. This would be one of the principal aspects in

the going concern value of their firms. One would know when he saw an orange jitney with lavender stripes pass him approximately 8:30 every morning that that was a trustworthy jitney operator. So one would have a choice between familiar operators who are secure and unfamiliar ones who are less secure. People, here, once again, would presumably have individual preferences, some would operate for one and some for another.

Also jitney operators would vary in the quality of service they provided for a very bare minimal service in a jalopy to a fairly luxurious one, if there was a market for luxury service.

This reverts to a point Professor Wohl made much earlier.

Chairman MOORHEAD. Do you have a comment on this bus and jitney system, Professor Wohl?

Mr. WOHL. I would like to make sort of a general comment, Mr. Chairman, if I may, which ties together some of this. I don't want to speak for all three of us, but it seems to me that there is a message coming out here that really is important.

One, we have stressed that price reductions really are not the way to substantially increase ridership and usage of transit systems. That is one thing.

A second point I would make is, I think we are much too overconcerned with the labor productivity angle. The great sin that has happened is that we increase the size of these buses. We increase the size to spread the driver cost, and we reduce the frequency of service. So you have to wait longer, and you don't have as many choices of times to catch buses to get to work close to when you want to get there, and so on.

It seems to me that that is just the wrong direction to be working in. If we need any evidence that that is the wrong direction, all we need to do is look at taxicabs. Taxicabs have the highest labor component per rider or per seat of any of the transit vehicles. Yet they do pay for themselves. They have an average fare or payment by the rider that is roughly three times higher than the next most costly transit service. Yet they pay for themselves lock, stock, and barrel. There has to be a reason. There is a message there. And people are saying, we want good services. All right, so it is expensive. So we need to go to smaller buses running more frequently.

And secondly, Professor Hilton is saying, and I think rightly so, either by using ramp control to keep flow rates at reasonable levels on freeways and thus eliminate congestion on freeways, or by exclusive lanes, or private rights of way, you can provide very high level transit service with buses. You can beat the rail door to door, or anywhere from anywhere, in terms of time.

Furthermore, as you are working with a smaller vehicle you have much more frequent service, and therefore people don't have to wait as long.

Another point I would make is that fixed rail systems are very inflexible. It is very difficult to get that rail train off the track and then to circulate through home areas and pick up people without an extra transfer and waiting. With a rail system invariably the only people who really are going to use it in modern-day urban America are people who own a second car to drive down and park at the transit station and leave it there all day while they go to work. That means that poor

people are eliminated. Buses can get off of private rights of way, and can get off of exclusive lanes, and off of freeways, and can circulate and pick up people and provide a collection function, thus eliminating the need to have a second car to get to the transit station.

But we really have to move in the direction of better service and be more concerned with the fact that people are very service sensitive. That is how you are going to get them out of cars. It is by providing good service, and not by reducing the price.

Chairman MOORHEAD. Professor Hilton.

Mr. HILTON. I keep quoting Meyer, Kain, and Wohl——

Chairman MOORHEAD. I haven't heard an objection yet.

Mr. WOHL. Unfortunately, Mr. Chairman, I don't get any royalties from that book.

Mr. HILTON. In the data which that book presents on the costs of moving people in various fashions, park and ride systems, which is to say, parking lots, and then the rail system together—and the Bay Area Rapid Transit is an example of that—that book demonstrates that such systems are the most expensive way of moving people by a fairly wide margin for all traffic volumes.

A further observation I would make about such systems is, as we pointed out, that this industry is confronted with relatively low price elasticity of demand. What this means is that if the enterprise is unprofitable, one reduces the unprofitability by raising the fare and reducing the level of output.

Now, the Bay Area Rapid Transit is confronted apparently by the same demand conditions and cost conditions as the rest of the industry. And therefore to reduce this projected $10 to $20 million a year deficit, it has the incentive to raise its fares and to institute parking charges at its parking lots. Part of the original plan was to have free parking. And it does. The lots in general are used to saturation, with an excess demand even now, though the system is not operating across the bay as yet, owing to the malfunctioning of its control mechanism.

So to minimize its losses, this system, which is looked upon as a great matter of local pride, at least by many people in the Bay Area, may have a declining rate of utilization from the outset. So whatever external benefits it produces are likely to dwindle simply because of the prospective declining rate of utilization.

Mr. QUINBY. Mr. Chairman, I would have to comment on a declining rate of utilization on BART. It is actually going up, it is not going down. Every indication is that as the area grows it will go up even more.

The reason BART was built was largely because of the highly corridorized nature of the Bay Area, with the mountains, the waterways, and so forth. That tends to channelize the transportation and cause travel to flow in certain corridor patterns which are much more concentrated that occur in other metropolitan areas.

On the subject of jitneys, I think we have to be rather careful. There has been quite a strong recent tendency to talk in this direction of public transportation, if you will. We see it in the Institute for Defense Analysis report of October 1973, we have seen it in the Meyer, Kain, and Wohl book, and we have seen it in other documents and testimony. The danger is whether a system like that will provide sufficiently

reliable and dependable transportation to meet particular needs and peaks.

Another problem too is closely related to that one: That is whether the service will be there when you want it for all the various kinds of trips.

Now, many of our taxi operations today—the ones here in Washington, D.C., for example—are not meeting the full peak demands. These are being met by the transit system. Were one to substitute widely and abandon the buses and rail transit vehicles, and rely totally on this type of jitney thing, I think we might be graduating toward chaos. We would see this chaos not only in trying to ride vehicles when and where we wanted them to go, but we would see it in our traffic operations on the streets.

One has only to look at the South American cities, Mexico, and other places, to see the extent to which the authorities there are doing everything within their power to curtail and maybe even eliminate these jitneys, por puestos, and other vehicles of this type.

One also finds when one travels on these jitneys down there that they don't provide the kind of ubiquitous service to the extent to which has been hoped. In Caracas, for example, one finds that these jitneys are operating mainly along certain skim-the-cream corridors where they can get a lot of business. But if you want to go somewhere else, often you can't find them. This is something that I think we went through in this country back in the 1920's when the jitneys were introduced. This is not to say that the idea doesn't have some merit. I think you have to look at the size of the urban region you are talking about, and also the dispersion of its trips.

There are in this country today something on the order of 35 trillion unoccupied seat-miles in automobiles. Why not put some of these to use? Fort Collins has finally started to do it. Fort Collins, Colo., is a metropolitan area of 65,000 people. It is a university town. It has no bus service. The city authorities there simply put up something like 30 or 40 "bus stops," but instead of having signs saying "bus stop", they have a green sign with a white thumb—I sometimes get it mixed up and say it is a white sign with a green thumb. They have done this; it is an officially sponsored program. Almost overnight 1,500 people began using this type of carpooling system. This has real potential, and it has potential also in the areas other than smaller ones, like Fort Collins. But we must, I think, also put some premium on the reliability and dependability of mass transportation, and the ability of mass transit to carry the peaks.

I know this can generate a vigorous discussion with Mr. Wohl and Mr. Hilton, because there is a real issue as to how far you go to cater or to handle these peaks. I have heard them argue rather eloquently—and we have now entered into other areas of this discussion—how far you go in committing both capital and operating resources to handle these peaks. But as there are peaks—and before they might possibly comment on this subject—I would say that in every other aspect of human activity, we recognize that people do like to move and do things in certain ways and times, whether it is electric utilities or water or whatever. We do have to make some allowances for these peaks; it is really built into our way of life.

There are ways of flattening peaks to some extent, but they are still there, and they are always going to be there, especially getting people to centers of daytime activity where they must transact business.

Therefore I would say that there is still a role or a proper blend of all these travel modes. One has to be a bit careful about, say, abandoning all the buses and saying that we can do it all with just automobiles or a form of jitney transportation or something like that—perhaps they wouldn't go that far, but that seems to be the tenor of it.

Chairman MOORHEAD. Professor Hilton.

Mr. HILTON. Actually I think the adaptation to peak-hour demand is one of the most attractive aspects of a jitney system relative to existing systems. Jitney transportation would encompass what Mr. Quinby has just mentioned, filling up the seats in rush-hour automobiles. While the jitneys were legal in 1914 and 1915, a few years earlier than Mr. Quinby mentioned, about 60 percent of the operators at any given time were part-time operators, and 40 percent were full-time operaators. The 60 percent were divided between people who drove their cars in jitney service for an hour or two before work and an hour or two after work, and more important, a large number of people who simply lettered an old shirt on cardboard with their place of work on one side and their home on the other and posted one in the morning and one in the evening, and handled passengers as passenger carriers between the two.

What this meant was that the metropolitan area was completely crisscrossed with an infinity of home-to-work routes. This would permit one to take a trip which would be difficult to the point of inconceivability with some other form of public transportation.

As Mr. Quinby points out, the capital currently idle which could be used for such trips is simply enormous. The antijitney statutes prohibit filling up the empty seats in one's automobile at the price. As a result, the positive income elasticity, which is to say the tendency to use more automotive transportation with increases in income, manifests itself in declining rate of occupancy of automobiles. If people were free to fill up these seats at a price, you would have a form of transportation which adopted itself to peakloads better than any other.

And there is a further matter. The peakload problem is not only a consequence of the nature of highway user charges but also of the antijitney legislation. There are too many automobile trips in rush hours, and people wouldn't make them if they could just climb in somebody else's seat with a stranger with whom they are making the transaction, in the ordinary economic nexus of a market transaction between strangers.

But apart from that, the nature of road pricing, as I mentioned previously, tends to produce excessive peaks. People don't have a pecuniary incentive to avoid traveling in rush hours, all they have is a disincentive that comes as a result of the queuing they get into. But public policy in several respects tends to encourage them to do exactly that. It builds duplicating freeways, for example. It built the Junipero Serra Freeway parallel to the Bay Shore Freeway south from San Francisco. A second freeway wouldn't be required except for the absence of peakload changes on the Bay Shore. It built the Bay Area Rapid Transit with vehicles which cost over $300,000 apiece with a

high target level of comfort. It is designed to provide them that one trip around 8 to 9 o'clock in the morning and another around 5 to 5:30 in the afternoon.

Rush hours have in fact been contracting rather than extending. They have gone from 2 hours long to about 40 minutes long in most major cities. Public policy tends to accelerate this. It doesn't give people a pecuniary disincentive for violating their preferences as to the hours of travel.

Chairman MOORHEAD. What information does a local transportation official need but can't get, and what can be done about it? Can you handle that briefly, or is this one of those questions that I should ask you to submit a 2-page statement on? We are going to have some local officials coming before us, and they may ask us this question. And maybe we can be of some help to them.

Mr. QUINBY. I think this depends on the nature of the specific project involved or the specific system or region involved. In my prepared statement I have devoted section XI to data needs. We have an awful lot of data. There are probably very few human activities in this country that have greater depth of recorded data and what occurs in transportation, and most particularly urban transportation. In some respects we are satiated with it. There are other aspects where there are glaring gaps and deficiencies, and I have tried to put those in my prepared statement, and begin to identify some of them. But a public official, wanting to get an answer to a particular problem, I still submit ought to look at cost-effective measures because he is dealing with the dispensing of public money. And this isn't the only thing by any means. He ought to introduce as much quality and service into it, as Professor Wohl suggests, as he possibly can. He is going to have a hard time coming up with a productivity measure relating passenger-miles to units of human effort, man-hours, if you will; he is going to have a great deal of trouble doing that, particularly in urban transportation. But each project and each situation does have to be looked at on its own merits.

There are certain other data needs which we see. They are discussed at some length in my prepared statement.

To help him, I still think that if he focuses on cost-effectiveness and introduces as much quality as he can into it, this will be one useful measure. And then as particular urgencies may occur with respect to environment, land, energy, customer satisfaction, and the general public's satisfaction, he must introduce other things into the equations, too. But he is basically making the decision on the allocation of resources, expressed in terms of funds or dollars.

Chairman MOORHEAD. Professor Wohl.

Mr. WOHL. Like you said, Mr. Chairman, we could spend at least a year answering this question, and in fact in a couple of courses I teach that is just about the amount of time I spend on the subject with my students.

I agree that each local area has to look at its conditions, its topography, its people, their characteristics, income, and other kinds of data as well. There is no question about that. But the trouble is that we usually start out by assuming that we have to do something. Then, if you will, we look for the most cost-effective way of doing what it is we have got to do. Earlier I was arguing that I think that this

is incorrect. I think that we have got to ask whether or not we should do something. By that I mean that we would have to look at the value of this or that system. These are very, very expensive systems that we are talking about, long-lived systems that have virtually no flexibility, once they are built. We are in a very changing, very mobile society. Therefore we need more than that. We need to know how valuable is this or that kind of service.

One of the interesting things is that over time we are throwing away our ability to get information on the value of services; that is to say, increasingly we are throwing away the price mechanism, and therefore a chance to find out what things are worth to people. I regret this, because we have to be more definite with Congressmen and the like and with policymakers in terms of answering the kind of questions that they want answered. But we need studies to find out what people will pay for a quicker trip, what they will pay to have more frequent service, what they will pay to have less pollution, less congestion, and so on. We have a lot of data, but we do not have good data for answering those kinds of questions. We are not collecting it on the one hand, and we are not analyzing it on the other hand. Were I faced with public officials and they said, well, should we build Skybus in Pittsburgh now, I would say, you really don't have the information now to answer the question. I would say, you have to decide whether it is worth waiting another couple of years to try and get that information. My answer would probably be, yes. Because you are talking about systems that are going to last 30, 40, 50 years, and saving 2 years is not really going to help people all that much relative to the possibility of a very large mistake.

That really is not a very helpful answer, I don't suppose, but it expresses some of my honest views.

Chairman MOORHEAD. Professor Hilton.

Mr. HILTON. The one thing in all of this on which I think I have differed with Professor Wohl is that I do think our data on these matters are very good, partly what is in Meyer, Kain, and Wohl on relative costs, and partly, since the book is 9 years old, in what later scholars have discovered in conceptualizing people's behavior, in evaluation of time, in the so-called modal-split models, which is to say, models of people's choice between methods of moving. I think we do have enough information that we can provide to the urban officials the sort you want—the sort of information which they want. It leads rather unambiguously to a conclusion which I think you would get from most of the academics who specialize in this sort of thing.

I teach a course in urban transportation at UCLA, and as you would expect, I have counterparts in other urban universities, the University of Wisconsin, Milwaukee, and Georgia State University in Atlanta, for example. I think what we teach our students is pretty consistent with what the three of us have pointed out here. We know what the income elasticities and the price elasticities of demand for the services are. We know how people behave in response to price and nonprice stimuli. We know the costs of building and operating rail systems versus the alternatives. I think we can provide information which demonstrates in rather devastating fashion that these are misguided public investments.

I think it is unfortunate for an urban official to get into the position that Mayor Bradley of Los Angeles has gotten himself into. He is in my opinion an able, conscientious, and intelligent public official. I doubt that anyone except Mrs. Bradley was happier when he was elected than I. But he made his principal claim building a rapid transit system. His advisers, of whom I am not one, have shown him in a fashion which I think is consistent with the testimony that we have given you today, that this is not a cost effective method of dealing with Los Angeles problems. It would involve an investment of $6.8 billion and lose approximately $40 million per year. It would be a larger system, expensive perhaps 50 percent beyond the Washington Metro, and would lose more money. The Washington Metro will have interest payments alone which are about four times the magnitude of the gross revenues of the bus systems in the Washington metropolitan area. But such a system would serve Washington better than it would serve Los Angeles. Mayor Bradley is in a position where, if he changes his views and says that he has been convinced that a rail system is not appropriate for the city, he is going back on one of the principal planks—no, the principal plank on which he ran for office, which would be very embarrassing for him or any other public officeholder.

There are many other people who are in the same situation.

We have at present—and I think for a rather limited time—a situation in which there is a great deal of commitment on the part of urban mayors, and a lot of people who are simply involved in political debate, to rail systems. But you have not a unanimity but something approaching that on the part of the academic observers that these systems are extremely costly, and are unable to provide the external benefits which are sought of them. I think it is only a matter of time before what the academicians are saying becomes common knowledge. The disaffection politically from rail transit has rather clearly begun to set in in the San Francisco Bay area. The journalist there, Dick Nolan, has been extremely effective in demonstrating the cost ineffectiveness of the BART system. This is going to create a problem, when the disaffection is nationwide, in that you will have some extremely expensive systems which no one any longer feels can demonstrate any substantial external benefits, which are uncompleted, and which will be looked upon simply as embarrassments. I think this is impending. I used to think it would be true by 1980. I would now say, probably by 1977. Consequently, the marginal significance of preventing such systems from taking shape within the next few years seems to me relatively high.

One of several reasons I am so grateful to you for the opportunity for all of us to testify today is that it permits a presentation of what I conceive to be academic orthodoxy on these matters in a fashion that will help disseminate the knowledge within the political system. I hope it will be of use not only to your committee but to society in general.

Chairman MOORHEAD. Mr. Quinby.

Mr. QUINBY. Mr. Chairman, I would just like to end on one note. We have tended here to dwell much on rail systems versus bus. I think the larger issue of that is still collective versus individual transportation. Very important in this whole subject of urban persons movement is the operating versus capital costs. The operating aspect over-

whelms the whole thing, much more so than the capital. Investment in capital in one of these facilities, when it is analyzed with all of the operating costs too, particularly if human time is allowed in it, makes the capital component relatively small, not completely insignificant, but relatively small.

Chairman MOORHEAD. Thank you.

I thank all three of you for taking the time to speak here today. I am sorry we are so late, but we seem to keep going. I think your testimony will be of great help to us.

This subcommittee and this full committee have an advantage over other committees, because we don't have to come up with a final product, a piece of legislation. As Professor Wohl said, sometimes the Congress has acted just because we had to get some legislation out, rather than taking a more studious approach. I think this subcommittee will be able to take that kind of an approach and really inform not only other Members of the Congress but also other elected officials of a considered and thought-out analysis of the problems. That is our objective. You have certainly helped us to do this. Thank you very much.

The subcommittee stands adjourned, subject to the call of the Chair.

[Whereupon, at 1:30 p.m., the subcommittee adjourned, subject to the call of the Chair.]

# PRODUCTIVITY IN URBAN TRANSPORTATION

MONDAY, APRIL 29, 1974

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON URBAN AFFAIRS
OF THE JOINT ECONOMIC COMMITTEE,
*Washington, D.C.*

The subcommittee met, pursuant to notice, at 10 a.m., in room S–407, the Capitol Building, Hon. William S. Moorhead (chairman of the subcommittee) presiding.

Present: Representatives Moorhead and Pepper.

Also present: John R. Stark, executive director; Ralph Schlosstein, economist; and Michael J. Runde, administrative assistant.

## OPENING STATEMENT OF CHAIRMAN MOORHEAD

Chairman MOORHEAD. The Subcommittee on Urban Affairs will please come to order. Today the subcommittee holds its second day in a series of hearings designed to suggest methods for improving the effectiveness of our urban transportation systems. This morning we will hear testimony from the leaders of three major metropolitan regions of our country.

Previous witnesses have already suggested that attracting more riders to urban public transportation is going to be a most difficult task. However, improvements in urban transportation service are necessary to make the recent upturn in ridership more than a temporary result of the gasoline shortage. Just what these improvements should be is a question of considerable debate which will be examined here.

The testimony this morning will focus on recent transportation developments in the urban areas that our witnesses represent. We will discuss with them the objectives of their transportation systems, how successful they are in meeting these objectives, and what alternatives they feel have been most successful in attracting new riders to their systems. Hopefully, the discussion here will help other local leaders select programs capable of improving the attractiveness of their public transportation systems.

We are fortunate to have with us today the leaders of three of the most progressive urban areas in the country.

Our first witness will be Hon. John B. Orr, Jr., mayor of Miami-Dade County, Fla. Dade County has recently experienced a lengthy debate concerning the future of public transit in the region, finally choosing to build a rail rapid transit system.

Our second witness is Hon. John Boland, chairman of the Metropolitan Council of the Minneapolis-St. Paul region. His region has

experienced a similar discussion, opting for a future transit system which would include a much improved bus system.

Our third witness will be Hon. Maynard H. Jackson, mayor of Atlanta. Mayor Jackson represents a city which has been one of the leaders in improving urban transportation services. Atlanta was one of the first cities to offer a reduced fair transit service and also is planning a major rail rapid transit system.

We certainly appreciate you gentlemen taking time out from your busy schedules to share with us the interesting experiences in your communities, with the thought that we will be able to adopt eventually a Federal program which is responsive to the needs of your communities.

Please proceed, Mayor Orr.

## STATEMENT OF HON. JOHN B. ORR, JR., MAYOR, MIAMI-DADE COUNTY, FLA.

Mayor ORR. Chairman Moorhead, let me say, first, I am honored to be here, first, to represent our community and, second, hopefully to be able to bring to the Congress, along with my colleagues here, some idea of the problems that the major urban areas are experiencing, most particularly in the field of transportation.

I want to say by way of apology first, that the fact that I am wearing a Garo Ypremian Miami Dolphins tie with no intent to insult my friend John Boland. I understand they have a football team in that area.

Mayor BOLAND. We will be back.

Mayor ORR. Or Mayor Jackson here, I hear there is one there in Atlanta also.

Chairman MOORHEAD. One of my most valued constituents is named Art Rooney, and the Pittsburgh Steelers are also a football team and until they meet the Dolphins are considered to be top.

Mayor ORR. Yes.

Let me say I have a prepared statement,, Chairman Moorhead, that I do not wish to bore you with the reading of. It has been submitted to your very capable staff and I think we will just prolong the hearing by my reading it.

First, let me say this, that Dade County is an area consisting of about 2,200 square miles in which reside now approximately 1½ million people. Transportation is a critical problem with us now if we are going to put a halt to the sort of urban sprawl that has infected some of the other major urban areas in our country and made them almost impossible to reside in.

Dade County has opted for a general transportation system. The core of that system is supposed to be a fixed guideway system of some 53 or 55 miles, and the people of our county something over a year ago voted to impose upon themselves a general obligation bond issue in the amount of $132 million as a local contribution in front to start the system.

We have selected our preliminary engineers, a fine international corporation, that is at its work. We are holding to a timetable, they are reporting to us every month on their progress. We expect that their report to us will be ready in something less than a year from this day.

It is significant, I think, that at the same time our people voted to impose this $132 million as a start toward rapid transit hoping to take advantage of the then Federal program which suggested that two-thirds would be available in Federal funds, and we considered this $132 million to be a one-sixth contribution toward the cost, counting on our State government to provide the other one-sixth. So that we think that ultimately this system, when completed, will cost in the neighborhood of $800 million.

But significantly, at the same time the people did that—incidentally, they passed a $550 million bond issue 2 years ago, the largest single general obligation bond issue passed in the United States last year, all sorts of other problems were included, vast countywide sewer system, a new and updated solid waste disposal, some $87 million to improve our park system, $38 million to improve our countrywide library system, but significantly, there was included something just over a $100 million for the improvement of arterial streets designed primarily to serve as feeder lines utilized by buses to tie into this rapid transit system.

We believe that this totally integrated public transportation system and, incidentally, we are also looking into new means of utilizing water transportation, some of these hydrofoils and other methods, and some feasibility tests are in process now, and we think it would be a mistake for our county to put all of our eggs into any one of these transportation baskets. But that we should provide a highly integrated system.

Now, we moved toward that and we moved toward avoiding some of the problems, say, that have occurred in San Francisco where they have just constructed the first fixed guideway system that has been built in this country in 50 years.

San Francisco had a big problem because they had four or five transportation systems all controlled by different entities that they tried to weld together, and they have spent millions of dollars just on a transfer system, you know, and how to divide the money between the various interests.

We have moved to establish, and have established, a transportation department within our county government which will have authority over all public forms of transportation within our county, bus systems, taxicabs, possible use of jitneys, water transportation facilities, and the fixed guideway system. So that we believe that our opportunity to operate efficiently and our opportunity to serve the primary interests of transportation; that is, to give us a mobile community, relatively clean air, the opportunity to have a county that is not covered with concrete, is greater through this sort of system.

Now, Mr. Chairman, there is one thing I want to report to you, and it is my guess that my colleagues here can corroborate this. There is a tremendous resistance among the citizens against further covering of the green lands of our country and our countryside with concrete.

We have had the most riotous public hearings whenever there has been a proposal to build a new expressway through, and the idea that we can, that any urban area can handle this problem exclusively through the use of building more roads for buses and providing a better means for private automobiles to get from one point to another is, we think, archaic, and we think that we have to find, especially in

view of the fuel crisis, and especially in view of the resultant pollution, we have to find more economic ways to move people than one at a time in one auto.

Now, I do not believe that imaginative means have been conceived yet or certainly utilized to persuade people to ride these, and the doubters are always saying, "Well, only this minor percentage or that is willing to use public transportation."

That is because we really have not made an effort to induce them to do that.

We are doing it in Dade County. We are planning to have stations where a man or woman, on his or her way to work, can have a place to drop off his drycleaning, his laundry, to pick up a little breakfast, to pick up the paper, to handle a number of the chores, the daily chores, that frequently cause a number of other trips by auto during the day; a place where on the way home from work one could pick up the laundry and do all of those little chores that cause a lot of other car trips, so that we think that there are many inducements that have not yet been tried.

We are planning, Mr. Chairman, the location of a fine new county art museum in a rapid transit station. We have another appropriation, incidentally, and we would not be charging this against the transportation system, but we would be providing it with separate funds, to have a fine new art museum and a museum of history and we would utilize the rapid transit station as a part of that. There are all kinds of things that we can do that have not yet been tried that will enable us to induce more people to ride them.

You know, the doubters, when they talk to you about public transportation, about fixed guideway, they point to the New York subways, and you do not have to do that, you know. You can go to Montreal and see the lovely murals in the stations and the quiet ride on the comfortable cars, and you can do the same thing in Toronto. As a matter of fact, you can do it at BART. Boston has made substatial improvements, so you do not have to think of fixed guideways, you know, in terms of what the New York subways have done.

Incidentally, you know, of course, that it takes four times as much land to move two-thirds as many people by roadway as it does by fixed guideway. So that we can get a much more efficient and economic use of land. We can move people faster and cleaner with less noise and air pollution through the use of this fixed guideway as the central part of the system.

Basically, we are going to try to provide the kind of a system that will utilize all of the latest techniques, that will use all of the means, wherever that particular means will be the most efficient way of serving.

I guess that is about all I have at this time. I would be pleased to respond to any questions that you may have or participate in any discussion with my colleagues.

Thank you.

Chairman MOORHEAD. Thank you, Mayor Orr.

[The prepared statement of Mayor Orr follows:]

PREPARED STATEMENT OF HON. JOHN B. ORR, JR.

Urbanized Dade County is an American city, built this century, of 1.3 million, with relatively low density development spread in a long thin pattern along the coastal coral ridges. Though there is a downtown, the Central Business District

of Miami, it provides only 8% of the jobs. There are 12 other main employment centers scattered throughout the urbanized area.

The County has completed its urban freeways. These roads are badly overcrowded. In 1972, there were at least 50 miles of arterial streets and freeways carrying 150% of their designed capacity, and at least 100 other miles of arterials carrying 115% of capacity. Since 1972, vehicle registration and gasoline consumption, and therefore miles driven, have increased 18%, and almost no new roads have been opened. This overcrowding reduces speed and increases accidents. In rush hours, the average automobile speed is 11–12 m.p.h.

The bus system is publicly owned and has been gradually improving service. But buses currently do not provide adequate transportation. The running times are slow—their average speed is 11 m.p.h.—and service between many points is not available.

We have a transportation "problem" in Dade County. Mobility is limited, inefficient, slow and expensive. The large elderly population, many of whom cannot drive, and the poor and the young who do not have cars, are severely restricted in their mobility. Our transportation facilities consume too much space—40% of the Central Business District—consume too much fuel, and cause rising levels of air and noise pollution.

In trying to solve our transportation problem, we set out the following objectives for public transportation:

1. TRANSPORTATION

We want to enable all residents and visitors to travel to all points in the urban area safely, with a reasonable expenditure of time and money. We are especially concerned about mobility for the elderly, the infirm, the young, the poor and visitors.

2. ENVIRONMENT

We intend to reduce air and noise pollution caused by transportation and to minimize the amount of land surface devoted to transportation. We intend to keep our air within the federal ambient air quality standards.

3. ENERGY

We want to reduce fuel consumption while improving mobility. During the gasoline shortage in the winter of 1974, our area had a 38% shortfall. We are especially dependent on imported oil and oil products. We would like, at the least, for the increase in fuel consumption to lag behind population growth. We aim for an absolute reduction in fuel consumption.

4. DEVELOPMENT

We intend for public transportation to influence development patterns toward the following goals:

a. Urban sprawl should be contained and shaped into efficient service units.

b. Vacant land between fragmented residential areas should be developed and population densities surrounding urban cores should be increased.

c. Declining urban areas should be revitalized, the spread of blight should be stopped, and slums and decay should be eliminated. (In this regard, it would be well to remember that surveys showed two of the main causes of the Watts riot were the physical isolation of the area and the absence of public transportation.)

d. We intend for improved public transportation to facilitate the dispersal of racial and ethnic ghettoes.

5. ECONOMIC OPPORTUNITIES

Improved public transportation should make more jobs accessible to more people.

6. INCOME REDISTRIBUTION

Today it is the poor who ride the buses. The improvement of transit will increase the value of this good to these riders. Since we will finance these improvements by ad valorem property taxes and by federal income taxes, and will not raise the fare, there will be a redistribution of income.

We aim for and project a six-fold increase over current public transportation ridership.

We have specific standards for the near term improvement of bus service:

a. Provision of bus service countywide, with bus route spacing determined by population density and auto ownership levels;

b. Seat availability to all express service patrons, and to all local route patrons except during peak hours;

c. Guaranteed bus service at least every hour on all routes; and local bus service at least every 20 minutes during the peak period;

d. Assurance that a high percentage of buses operate on time—at least 90% on most routes;

e. Operation of unprofitable routes, subject to specific patronage criteria;

f. Maintenance of the current 30¢ bus fare;

g. Evaluation of Dade County transit performance against other systems nationwide on a periodic basis.

In measuring solutions to our transportation problem by our objectives, we determined that we cannot put additional reliance on the automobile. Even assuming a massive switch to smaller cars, and economical non-polluting engines, reliance on the automobile would fail to meet our objectives in the following particulars:

a. We would need more roads and therefore more land. Small cars reduce congestion to some degree, but no increase in traffic could be accommodated on existing roads.

b. Noise pollution would be increased.

c. Fuel efficiency, though improved, could not approach the levels that public transit can attain.

d. The transportation needs of the elderly, the infirm, the poor and the young will not be met.

We decided upon a system with the following components:

a. A 53.7 mile rapid transit system operating on an exclusive guideway with 54 stations serving the major travel desires of county residents.

b. A system of trunk line bus routes operating on expressways and arterial streets to serve areas of the county not directly served by rapid transit.

c. A network of feeder bus routes complementing the trunk line bus routes and serving rapid transit stations.

d. "Mini-systems" within major traffic generating areas providing increased circulation and distribution to nearby rapid transit stations.

We chose this form of public transportation by a cost/benefit approach that considered speed, capacity, safety, noise and air pollution, comfort, fuel consumption and usefulness to the infirm and elderly.

### 1. COST

*(a) Guideway vs. freeways*

Fixed guideways are cheaper than freeways. Four lane urban freeways in Dade County cost $15 million per mile. A tracked system would cost $12 million per mile including stations. We are looking at a new technology employing overhead cables that can be put in place for $1 million per mile, exclusive of stations.

*(b) Guideways vs. buses*

If an exclusive guideway were built for buses, it would need to be 40′ wide, compared to 22′ for rail. The capital costs would be comparable.

The rail cars cost more than buses. Our 380 vehicles will cost $225,000 each, and will seat about 70. A new bus today costs $38,000 and seats about 50. The rail car will be depreciated over 20 years while the bus has an economic life of only 10. Nevertheless, the rail car costs $160 per seat per year while the bus costs $85.

While capital costs are higher, operating costs will be lower for a fixed guideway system.

An automated rail system will cost only 41% of what buses cost to operate—46¢ per vehicle mile compared to $1.11 for buses. The rail vehicles are substantially larger than buses. The reason for this is the labor intensiveness of buses. When you add capacity, you add drivers to the same extent. Labor costs are 61¢ of the bus costs of $1.11 per mile. With rail, labor costs are 56% of rail operations, 26¢ of 46¢.

### 2. CAPACITY

A four lane freeway can carry 10,000 persons per hour, assuming a normal mix of buses and cars. A fixed guideway system can transport 15,000 persons per hour. We project a need for a capacity of 13,500 persons per hour at several points.

3. SPEED

The average speed of a rail system can be 23 m.p.h., with no reduction in rush hour. The average speed for all buses now is 11 m.p.h. This is reduced somewhat in rush hours. Bus speeds can be improved on some routes by making express lanes and bus-only lanes, but the opportunities are limited. Without exclusive guideways, buses must use city streets to pick up and discharge passengers. The average automobile speed is 23 m.p.h., but in rush hour this is lowered to the 11–12 m.p.h. level of buses.

Currently, the bus trip the length of Miami Beach takes one hour. Guideway transit can schedule 18 minutes. There is little opportunity for improving bus schedules on this route. Miami Beach to downtown Miami now takes 45 minutes by bus. The transit will take less than 20.

4. SERVICE

Fixed guideway cars are smoother in ride and are roomier. They are easier for the infirm because there are no steps.

5. POLLUTION

With present technology, buses cause far more air pollution and the multiple sources make abatement difficult. An electric system produces pollution at only one source, so reduction is simplified. Bus pollution is emitted where people are, while electric generation emissions are generally away from concentrations of people.

Buses can never be as quiet as the rail cars. With a rail or cable system, the source of noise is removed from the pedestrians and residences.

Cars will always produce more noise polution, even if engines can be made clean.

6. LAND USE

Freeways use four times as much land as a fixed guideway. The new cable technology can utilize existing right of way requiring very little new land. Guideways for buses need to be wider than for rail.

7. SAFETY

The national experience is that rail transit has half of the accidential injury rate of bus transit. Cars are the most dangerous form of transportation.

8. FUEL CONSUMPTION

All public transportation is far more economical than the private car. We did not see a substantive difference between bus and rail. Electric power can be based on a variety of fuels.

We are aware of the conventional wisdom that fixed guideway systems can only work where there are highly concentrated Central Business Districts and high density residential development. We are convinced that only a fixed guideway system can achieve the speed, service and environmental characteristics necessary for success in our area according to our objectives.

RESPOSE TO SPECIFIC QUESTIONS SUBMITTED BY REPRESENTATIVE WILLIAM S. MOORHEAD, CHAIRMAN, URBAN AFFAIRS SUBCOMMITTEE, NOT COVERED IN THE PREPARED STATEMENT

The Metro Transit Authority operates buses on 15.3 million route miles per year, carrying 54.6 million passengers. Ridership was up 3.3% in FY 1971–72 over the prior year. This was the first increase since a fare rise in 1968.

The subsidy for FY 1973–74 is $4,025,000, an increase of 27% over the $3,170,000 in FY 1972–73. The sources for the subsidy are as follows:

| | |
|---|---|
| 7th cent gas tax | $2, 950, 000 |
| Federal revenue sharing | 1, 000, 000 |
| Minibus (general operating fund) | 75, 000 |
| Total | 4, 025, 000 |

Since it is intended to hold the 30¢ fare and since that fare does not cover operating costs, increases in service will probably entail increased subsidies.

At the present time, a high percentage of public transit riders are the poor, the elderly, the young and visitors. Ten percent of bus riders are non-residents. We intend to improve transportation services for these rider groups and to attract riders from new groups.

Chairman MOORHEAD. I think we would be more productive if we have the testimony of all three of the members of the panel and then follow with questions and a discussion period. We would now like to hear from Mr. Boland.

We are pleased to have you with us, and I will say that I am particularly interested in your region. I come from a community where we have in one county 128 separate municipal governments, that do not always work entirely hand in hand.

## STATEMENT OF HON. JOHN BOLAND, CHAIRMAN, METROPOLITAN COUNCIL OF THE TWIN CITIES AREA, MINNEAPOLIS-ST. PAUL, MINN.

Mr. BOLAND. Thank you, Mr. Chairman. I appreciate the invitation to be here, and I would like to assure Mayor Orr particularly that perhaps Mr. Yepremian can be back to making ties full time after the next Super Bowl.

I did mail, and I apologize to the chairman of the subcommittee and the subcommittee itself and probably more importantly to the staff, copies of my long prepared statement on Thursday. Unfortunately, I chose the U.S. mails to do that and it is not here yet.

I do have some summary comments, Mr. Chairman. If you would like, I will make those and perhaps we can praticipate in specific discussion points later.

I would point out, of course, that my views obviously are tempered by the experiences of the Metropolitan Council of the Twin Cities Area of Minnesota. We are a metropolitan area of nearly 2 million people in about 3,000 square miles and over 300 governmental and special service units.

I should like to add my endorsement of the subcommittee's objectives in seeking the most effective use of transportation expenditures. We have seen an over-emphasis, at many levels, on the automobile as a nearly exclusive answer to urban transportation needs. This has led to massive transportation expenditures for streets, highways, and other auto-related facilities and in part withdrawn these resources from other modes of urban transportation, especially transit. There is a need for some time into the future for a major national effort to redress this imbalance and return transit to a more prominent and viable role in meting out metropolitan transportation needs.

Furthermore, we can no longer accept some of the impacts of excessive and increasing automobile use including air and noise pollution, land consumption and community disruption. A key objective is to focus transportation expenditures on moving people, not vehicles. A second key objective is to structure transportation and urban development so as to reduce total travel demand by single occupancy private vehicles.

Transportation objectives in the Twin Cities area cannot be divorced from the Metropolitan Council's overall objectives and require-

ments for our quality of life. Our major objectives are for primarily land use controls and development framework. We are going through that at the Metropolitan Council right now. The basic discussion is on how we would like our seven counties to develop. The transit system obviously is a subsystem to that decision.

Now, we, therefore, need an urban transportation system dictated by and supportive of a growth policy which provides reasonable access to opportunities for all residents.

Maximum feasible protection of the environment is also obviously a major important factor in this thing.

We have in the Twin Cities tried a number of transportation alternatives, we have made some specific decisions, and the last session of the legislature particularly gave us the go-ahead to experiment in new technology such as personalized rapid transit or PRT. That is to experiment as much as study it.

We have in the prepared statement a list of eight transportation alternatives which I go into in depth. I will simply list them, Mr. Chairman, at this time and if you would like more information later perhaps we could do it at that time. One, we have expanded bus service, basically a short-range program, which is now being implemented again through the assistance of the Minnesota Legislature the last time.

Two, we tried a reduction in bus fares with senior citizens free rides particularly in offpeak hours and we are about to begin a reduction of fare zones at this time, although that is so new it has not had a chance to get monitored.

Three, we have freeway metering with express bus service which has also just begun, I think April 9 was the first day, where cars are allowed onto the freeway only at specific intervals, and buses have the right to get on and off these ways, particularly 35W, which is the most heavily traveled of the freeways.

Four, carpools. The Minnesota Highway Department, which we have been working very closely with, has been given a specific grant from the legislature to experiment with computerizing carpools in the metropolitan area.

The fifth one which, perhaps, was unique but is kind of interesting, is van pooling, which private business has done particularly in Minnesota Mining in the Twin Cities area. That has been extremely successful and in fact, at this point there is a waiting list of 1,400 employees in the major complexes of Minnesota Mining to get into the process. If you want more information I would be happy to provide it.

Six, buses on busways. We have a policy adopted by the Metropolitan Council, development guides, whereby any freeway construction in the metropolitan area must include busways.

And, seven, the automated fixed guideway transit system which we have not yet come to a solution at. This is where the legislature has given us the wherewithal to study so-called PRT systems and who defines it depends on what ultimate decision you come to since that seems to be a very general phrase. Denver has a program that they began as perhaps you are aware.

And, eight, continuing obviously, a street and highway construction up to a minimum.

High capital long-range regional transportation alternatives entail a variety of risks and these are of two kinds. The first risk is that we may over spend on alternatives that will not be utilized. Major new rail rapid transit systems, expensive new technologies such as PRT, or large-scale bus systems with high operating losses are not guaranteed to divert auto users. This is especially true if the average American can still afford to own and operate a car or if we continue, as is likely, to express our preference for low density urban environments.

Chairman MOORHEAD. Mr. Boland, would you suspend for just a moment, please? We want to welcome to the subcommittee Congressman Claude Pepper, who is probably known to Mayor Orr.

Representative PEPPER. Yes, indeed.

Mr. BOLAND. The Vikings are rapidly losing ground, I can see that.

Representative PEPPER. I am sorry I was late, Mr. Chairman.

Chairman MOORHEAD. There has been some discussion between the Vikings and the Dolphins and, the Steelers came in very poorly.

Representative PEPPER. I know which side the mayor is on. I am sorry, Mr. Mayor, I was a little late in getting here. We are very proud of our distinguished mayor, Mr. Chairman, and I am grateful to have an opportunity to hear his testimony. Thank you for having him.

Chairman MOORHEAD. We are now hearing from Mr. Boland, who is the chairman of the Metropolitan Council of the Twin Cities, Minneapolis-St. Paul area, and yet to testify is Mayor Jackson of Atlanta. If you want to intervene at any point, please do so.

Mr. BOLAND. Thank you, Mr. Chairman.

Chairman MOORHEAD. Excuse me for the interruption.

Mr. BOLAND. Always glad to be interrupted by another Dolphin fan.

I will conclude very rapidly, Mr. Chairman. The second risk is that we may not provide new modes soon enough. Our public transportation systems are not complete enough nor do they have the capacity to handle travel demand that would occur when energy shortages or pollution suddenly require a major reduction in automobile travel. Designing and building expanded transit system to handle significant portions of total urban travel take 10 or more years as witnessed by the San Francisco BART System or the Washington, D.C., Metro. Furthermore, unless put underground, such systems cannot be built without extensive damage to, or planned restructuring of, existing urban areas.

The criteria by which we judge the effectiveness of our transportation expenditures do not relate to transportation systems or technologies alone.

Mr. Chairman, that is the point that I would like to stress very much. We in the Twin Cities area, as I have indicated earlier, are trying to build our transportation system so that it is consistent with our growth policy, and any expenditure of effort and time on our part must be taken into consideration with that growth policy.

With that, Mr. Chairman, I will conclude my remarks and be happy to discuss anything further.

Chairman MOORHEAD. We thank you very much, Mr. Boland, for an excellent statement.

I might say that, without objection, all of the prepared statements will be reproduced in full in the transcript.

[The prepared statement of Mr. Boland follows:]

PREPARED STATEMENT OF HON. JOHN BOLAND

I am pleased to be here today to relate some of my views on improving the effectiveness of urban transportation expenditures. My views will be tempered by the experiences of the Metropolitan Council of the Twin Cities Area in dealing with problems and challenges for a metropolitan area in Minnesota of nearly two million people and about 3000 square miles.

The post World War II period has seen an over-emphasis, at many levels, on the automobile as a nearly exclusive answer to urban transportation needs. There is a need for some time into the future for a major national effort to redress this imbalance and return transit to a more prominent and viable role in meeting our metropolitan transportation needs. For our part, we at the Council, along with others in our area, have engaged in planning and demonstration efforts that have dealt with various alternatives.

Our own experiences recently include over four years of effort in planning and testing of both short- and long-range highway and transit alternatives. These have demonstrated, for our region at least, that there are no simple nor single answers. In fact we expect that in the long run, we will have to evolve a balanced system using a variety of approaches.

## I. THE CURRENT TRANSPORTATION SYSTEM

The Minneapolis, St. Paul metropolitan area is a seven-county region of some 3000 square miles within which there are 189 separate cities and towns and an estimated 2,005,000 residents. Approximately 500 square miles of our area is in urban development and over 11,000 miles of streets and highways form the basic transportation system for the area. There are 454 miles of freeways and expressways in this system and approximately 3,100 miles of other arterial and collector routes.

Public transportation is provided exclusively by bus and the other alternative is by taxi-cab. Between three and four percent of all person trips in the region are carried on public transportation. Daily bus passengers are approximately 200,000 and daily cab passengers around 15,000. Bus service is provided by the Metropolitan Transit Commission (MTC) and six independent companies. The MTC in 1973 carried 98% of all bus passengers with 710 daily buses over 931 miles of bus routes, including 284 miles of express service. The MTC also provides a Q.T. (Quick Transit) distribution service in the two Central Business districts of Minneapolis and St. Paul. This service is provided with small (17–20 passenger) buses circulating on the downtown streets. The transit system carried about 5% of rush-hour trips in 1970.

In addition, there are a few large employers offering van-pools to their employees for home to work travel. There are perhaps 70 to 80 vans of up to 12 passenger capacity carrying about 800–1000 persons each day. In at least one case (that of the Minnesota Mining and Manufacturing Company, 3M), this program is quite successful and appears capable of capturing up to one-fourth of the private auto trips made to their employment locations.

The remainder of daily travel in our region is made by private auto, truck or motorcycle. These modes carry about 96 percent of the daily person trips. There are approximately 870,000 vehicles registered in the region. Total daily travel in 1970 was 5,095,000 person trips accounting for 23,829,000 vehicle miles. Fifty-nine percent of those trips are made by auto drivers, and 31 percent by auto passengers. The average daily auto occupancy is 1.5 persons per car but only 1.2 per car in the rush hour.

The Metropolitan Council, MTC and Minnesota Highway Department are jointly carrying out a freeway-bus demonstration project. Known as the I–35W metered freeway project, and funded under the 1969 Urban Corridor Demonstration Act, we are providing a combination of express bus service and restricted auto access through ramp metering. The facility involved in I–35W for 15 miles from south of the Minnesota River to downtown Minneapolis. Traffic monitoring with a computer is being tested to meter access by cars while allowing free access to express buses on exclusive ramps. Full operation began on April 9th and 65 express buses operate each weekday, primarily in the peak hours.

## II. TRANSPORTATION EXPENDITURES

In the decade of the sixties, Twin City area public transportation expenditures were, to all intents, made exclusively for streets and highways. During

that period, all levels of government spent 950 million dollars on capital improvements, building over 155 miles of interstate routes and many more miles of expressways and other arterials. Less than $10,000,000 in capital expenditures for transit was made during this time. Since 1970, we have spent the following:

1970–1973 Capital expenditures for Streets and Highways—$346,000,000 (Metro Council Estimate).

1970–1973 Capital expenditures for Public Bus Transit—$24,000,000.

1970–1973 Capital expenditures for combined bus-highway project (I–35W)—$5,250,000.

A major portion of the bus capital improvement program, $10,400,000, went for purchase of the privately held Twin City Lines Inc. and assets. Since acquisition, the MTC has undertaken a bus expansion and replacement program, a bus shelter program and expansion of service coverage. 331 buses, including 16 smaller QT buses, have already been added. 296 buses are on order, and the fleet size will be approximately 1000 buses by late 1974.

### III. URBAN TRANSPORTATION ALTERNATIVES

Travel in the Twin Cities area at present is dominated by the single occupancy automobile. In 1970, 65 percent of all vehicles operated in our area had only the driver as occupant. Although no one expects the car to be replaced, we hope to reduce this excessive reliance on the car and offer other means of mobility. Hopefully, there will be alternatives attractive enough to cause drivers to change to transit or other modes. At least there must be better public service to those unable to drive and those who prefer not to drive. To this end, we have undertaken or studied the following alternatives:

1. Expanded bus service. Basically a short-range program now partly implemented.
2. Reduction in bus fares.
3. Freeway metering with express bus services.
4. Car Pools.
5. Van Pools.
6. Buses on busways.
7. Automated fixed guideway transit.
8. Continuation of street and highway construction.

Each of these alternatives is described below. An evaluation of their impacts in terms of benefits observed and costs incurred follows in the next section. Not all of the programs are public programs but all included do focus on either a balanced total transportation system or offering an alternative to single occupancy autos.

#### *A. Expanded Bus Service*

The Metropolitan Transit Commission was created in 1967 to develop a plan for a complete integrated mass transit system in the metropolitan area. In 1970, the Metropolitan Transit Commission acquired the holdings of the Twin City Lines Inc. transit company and since then has also acquired or is acquiring four smaller independent companies. The MTC initiated a short-range program with two objectives in mind. The first was to stabilize and reverse the historical decline in transit patronage. The second was to achieve a 9% increase in ridership within a three-year period with a series of short-range improvements. Increases in patronage since the low ridership point of 1970 have achieved those objectives. Among specific actions were:

Expansion of the total bus fleet from 632 to 731 buses. With replacement there are now over 320 new air-conditioned vehicles.

Provision of 55 heated shelters (100 more are on order).

Expansion of bus route miles from 521 to 931 miles.

Initiation of 284 miles of Express service.

Establishment of Downtown circulation service with smaller buses which carry 25,000 passengers weekly. Fares are 10¢ a ride.

Retention of the same basic fare (30¢) which existed in 1970.

Expansion of advertising and public information programs. For example, six new telephone operators now answer 3,500 daily queries against only 1,850 per month in 1970.

Provision of crosstown service in suburban corridors using smaller buses.

#### *B. Fare Reduction*

In addition to the improved equipment and extension of service, MTC has experimented with other devices for increasing transit patronage in the metro-

politan area. These include a program of free rides for senior citizens in the off-peak hours. In 1972 when free fares were first instituted, 8.6 percent of riders on the system were senior citizens, a total of 391,000 a month. By January 1974, 13.4 percent of bus riders were senior citizens or 592,000 a month.

A recent fare restructuring to lower the cost of transit trips across municipal boundaries has recently been instituted but is too new to report any statistical results.

*C. Freeway Metering With Express Bus Service*

A combined bus improvement and freeway congestion reduction alternate is being tested on 15 miles of the heavily traveled I–35W route approaching downtown Minneapolis from the south. The intent of this project is to utilize the freeway for improved express bus service since this is the only route in the corridor over which buses can operate at speeds competitive with the auto. To assure that freeway congestion does not delay the buses, we have built by-pass on-ramps for the use of buses only. At the same ramp locations, there are traffic signals to meter the automobile access ramps. These meters are under central computer control and restrict the flow of automobiles onto the freeway, depending upon the buildup of traffic on the freeway itself. 65 express buses now operate on this route. The buses pick up passengers on local streets.

The importance of this project is that it affords a relatively low capital means of providing bus service that is rapid and uses the existing investment in our freeway system. The alternative is heavy capital investment in exclusive transit guideways.

*D. Car Pooling*

Car pooling programs, including computer matching of origins and destinations of workers, have been instituted by the Minnesota Highway Department and other States agencies for State employees, and by the University of Minnesota for students, faculty and staff.

Car pooling has rather dramatic potential payoffs. Increasing auto occupancy from 1.2 persons per car (the current rush-hour rate in the metropolitan area) to 1.5 persons per car would produce a 20% reduction in peak-hour vehicles on the highways. Changes are likely to be somewhat slow in occurring, however. In the University of Minnesota program, 2,373 staff, students and faculty out of 54,000, responded to an application form for ride matching. From this there were about 300 estimated car pools formed representing nearly 900 persons.

The Minnesota Highway Department has conducted two car pooling programs within the last year. In the first, about 125,000 people were contacted through their employers. Of these, approximately 25,000 were matched as potential car poolers based upon proximity of origins and destimations and compatible working hours. In the second program over 700,000 questionnaires were distributed with telephone bills. The Highway Department received nearly 16,000 responses of which about 5800 have been matched, based as before, as proximity and compatible working hours. In neither case is the actual number of car pools formed known.

*E. Van Pooling*

One of the more notable experiments carried out by private industry in the metropolitan area has been the van pooling program of the 3M Company. Focusing on their major employment complexes on the east site of St. Paul, the 3M Company has instituted a program using company-owned twelve-passenger econoline-type vans. An employee-driver is responsible for the van and passenger lists are made up with the assistance of the Company. For a set monthly fee, based upon the distance of the trip, the employee obtains door-to-door service from his home to the 3M complex. The vans receive preferential parking space at 3M. Average occupancy of the vehicles is 11.3 persons, including the driver. The program, including depreciation and maintenance of vehicles, is self-sustaining if only 9 persons per van are carried. As an incentive to the driver to maintain good service and recruit a full complement of passengers, the fares for the 10th and 11th passengers are kept by the drivers. The average cost per rider is $24 a month. Currently, 56 vans carry a daily total of 630 people and there is a waiting list of 1400 employees interested in the service. Vans are being acquired as rapidly as possible. Among the direct benefits was a cost saving of $2,500,000 on a parking structure due to the decrease in number of spaces required. Other companies are also interested. Both General Mills (12 vans) and Farmers Union Oil in South St. Paul have programs and the Honeywell Company is studying the feasibility of initiating such a program.

*F. Bus on Busway*

One of the long-range alternatives studied by the Council and MTC proposed a 95-mile system of exclusive guideways to be used by buses. These guideways would be used to provide congestion free routes in major traffic corridors within the area. The buses would be used as dual mode vehicles leaving the guideways to pick up and deliver passengers in close proximity to their origins or destinations on existing surface streets. This alternative requires heavy capital investment in the guideways but offers transfer-free service with no problems of risk with unproven vehicle technology. Such guideways would have to use existing freeway side slopes or railroad rights of way to avoid disrupting existing communities.

*G. Automated Fixed Guidways*

Another of the long-range alternatives studied by the Council and MTC proposed a 57-mile system of exclusive guideways to be used by electrically driven automated vehicles of 40 passenger capacity. The guideways are proposed for the same general major traffic corridors as the busways. The automated vehicle could be placed in subways or on elevated structures but would not be free to leave the guideway. Automation holds the promise of lower labor costs, and electric power the promise of an energy source not derived from petroleum. This proposal is the highest capital cost alternate considered to this date. Unless put underground, the system would also have to use existing rights of way to minimize community disruption.

*H. Continued Expansion of Streets and Highways*

In its total transportation planning, the Council recognizes the need to continue development of critical highways links not yet complete. New development in the outlying portions of the region will require these facilities. At the same time, we have dropped over 50 miles of previously proposed freeways in the more intensively built-up portions of our region partly on environmental grounds and partly because we expect transit to offer a viable alternate. Within the I-494/I–694 beltway, which encircles our central cities and the first ring of developed suburbs, there will be only the completion of routes where right of way now exists including some missing interstate segments. Our emphasis will be on reservation of outlying corridors and on making the best use of existing facilities through improvements to safety and capacity on the existing system.

## IV. EFFECT OF ALTERNATIVES

Each of the above alternatives may be evaluated in terms of its effect on use of mode, costs and ease of implementation.

*A. Ridership and Change of Mode*

One of the measures of effectiveness of the Bus Service Expansion program has been the turnaround in declining transit patronage. From a low point in 1970 of 162,000 persons per day, MTC is now carrying around 200,000 persons per day. This translates from some 50,556,000 public transportation passenger trips on an annual basis up to 58,848,000 annually in 1973.

Ridership on an annual basis is summarized below:

TOTAL ANNUAL RIDERSHIP

| Year | All riders | Senior citizens |
|---|---|---|
| 1969 | 51,603,507 | (1) |
| 1970 | 50,556,756 | (1) |
| 1971 | 50,937,148 | (1) |
| 1972 | 54,848,184 | 7,019,225 |
| 1973 | 58,675,036 | 8,437,545 |

[1] Not available.

It is important to note that the strong ridership increases experienced in 1972 and 1973 do reflect the impact of overall improvements which really began to take hold after 1971. It also appears that increased ridership by senior citizens contributed about 1,418,000 of the 3,827,000 new riders between 1972 and 1973. This is 37% of the year's total and reflects the impact of the free fare program, and the need of senior citizens for mobility.

The express service on I–35W has also had encouraging results in that over 7,000 persons daily now use the service primarily for home to work travel to the Minneapolis CBD. Importantly, approximately half of these riders are former drivers of their own cars. Trip times on the express bus are competitive with amount of travel times in the same corridor, due to savings in time in parking and walking to destination.

Change of mode from driver to rider in the car pool programs has had mixed results. The University of Minnesota program and the Highway Department area-wide program reached very small segments of the total traveling public initially contacted. The Highway Department program for State employees matched a much greater portion of potential car pool users and there is some evidence that many car pools do travel to the State capital complex. On the whole to date, only modest results have been obtained. This is probably due to the great dispersal of origins and destinations in our area.

The Van-Pool program, at least for 3M, has had perhaps the largest impact on drivers' changing mode. When a waiting list of 1,400 employees is added to the 630 already using the vans, a potential of 20 to 25% of 3M employees will have changed mode.

To date, both of the exclusive guideway alternatives have been assumed not to substantially effect the regional travel patterns of drivers. These two alternatives both assume a region-wide patronage on the order of five to six percent of total daily person travel. This would be achieved by the guideways operating in total with all other transit in the region including local buses and express buses also proposed with the guideways.

*B. Costs*

Obviously, in a time of rising overall costs (buses cost 67½ cents a mile to operate in 1970 and 97½ cents a mile to operate in 1973) our bus improvements are reflected in growing subsidies. The fiscal year deficits for MTC are given below:

| | |
|---|---|
| 1971 (9 mos.) | $380, 746 |
| 1972 | 2, 507, 291 |
| 1973 | 5, 216, 468 |
| 1974 (projected) | 9, 451, 500 |

Selectively, these deficits, where rider response is inadequate, have led to dropping programs. The downtown St. Paul QT service, carrying only 5,000 riders a week, is to be dropped because of excessive deficits. 10¢ fares within the downtown on regular routes will be substituted. A similar fate befell a crosstown service in the suburb of Brooklyn Center and, as noted, the response to another crosstown program in St. Louis Park is endangering that service. It appears even yet that the best potential for transit patronage is on routes focused on the CBD's until such time as some better means of serving dispersed suburban trips can be devised. We do plan several Dial-a-Ride demonstrations in the future to try to solve that problem.

The same general picture exists for express bus service on freeways. The I–35W program is a low-capital cost program ($6 million) relative to the service obtained or to providing any exclusive transit guideways. For this reason we would expect to expand the program. However, operating costs still exceed revenues due to the heavy peak-hour orientation of the service. Such service can probably be best justified where potential ridership is high.

Car pools and van-pools are very attractive low-cost alterates. They require practically no public subsidy. The total cost to the Minnesota Highway Department to carry out the regional car pool matching effort is less than $125,000. No public costs whatever have been realized yet for Van-Pooling. Such programs, however, work best where employees are concentrated in large numbers and in spite of individual successes have not really reached a large segment of the traveling public.

The exclusive guideway proposals for long-term transit are, of course, relatively expensive, especially in capital costs but possibly also in operating subsidies. Between 500 million and 1.2 billion would be required to carry out the currently proposed alternates in capital costs alone. The all bus proposal would require subsidy for operation indefinitely and it is possible that the automated system in combination with the rest of the system would also.

*C. Ease of Implementation*

Difficulties in implementation come down to whether new transportation route alignments are necessary or not. If we can devise alternates that use our exist-

ing extensive network of streets, expressways and freeways (express bus on existing routes, car pools, van pools, etc.), we can easily implement new transportation alternatives as long as we are free of congestion. Any proposal for new alignments with major facilities either above or below ground are much more difficult to accomplish.

## V. REGIONAL TRANSPORTATION OBJECTIVES

### *A. Setting Objectives*

The Twin City Area has developed objectives and criteria for public transportation systems as guidelines for transportation investments. These are incorporated in the Transportation Chapter of our Metropolitan Development Guide. The Metropolitan Development Guide contains the Council's adopted regional policies, plans and programs for overall development of the Twin Cities Area. The Guide is used in the Council's efforts to coordinate and guide the course of physical, social and economic growth and change in our region.

A word about how the Transportation Chapter of the Metropolitan Development Guide came to be. Transportation planning on a regional basis has been a continuing process in the Twin Cities Area since the post-World War II period. Our latest major effort began in 1969, when the Metropolitan Council, the Minnesota Highway Department, the Metropolitan Transit Commission and the counties and municipalities gathered data, and conducted research and studies directed toward reaching decisions on the future of transportation investment in the Metropolitan area. In 1972 the Metropolitan Council set about the task of bringing together and analyzing this work. A schedule for decision making with specific benchmarks for developing policies and plan elements was set up early in 1972 and carried through to the adoption of the Transportation Development Guide Chapter late in 1972. During the process, the Metropolitan Council listened to the officials, consultants, advocates of various transit technologies and its staff, in looking broadly at the present and future problems and possibilities for metropolitan transportation.

### *B. Key Transportation Assumptions*

A set of key characteristics of the transportation situation became apparent from all this effort. We found that there was not currently a "crisis" in the efficiency of our present metropolitan transportation system. However, there are real and approaching problems regarding congestion, neighborhood disruption, safety, and particularly, lack of adequate transit service and financing. We also found that metropolitan residents are in many cases opposed to the construction of major new transportation facilities through developed areas and that the experience of metropolitan areas having conventional fixed guideway transit systems did not indicate that such systems eliminated or significantly reduced congestion on the highway system. We did find that such facilities do serve as an alternative for those wishing to avoid congested driving conditions. It was also apparent that in the Twin Cities we have travel patterns that are dispersed into a large number of movement corridors, due largely to our relatively low residential densities and the existence of two central business districts.

The expected growth of the metropolitan area will require additional transportation facilities. However, our transportation plan does not view meeting demand as the only policy consideration. Following the completion of short-range plans, including certain highway facilities already programmed, construction of major new highway facilities within our interstate beltway is to cease. This means that we are dropping from consideration approximately 50 miles of previously proposed freeways within that area. We are placing emphasis on the reservation of rights-of-way for long-range needs in our developed areas and emphasizing priorities on highway investment in the improvement of capacity, safety and environmental characteristics of the existing system.

We also reached a key set of conclusions regarding transit and set about to develop objectives and criteria related to these. We feel that transit service improvements should be made in an evolutionary way that preserves and increases present transit service patronage, that minimizes the risk in public investment, and that is flexible and adaptable to improved technology. We also hope that such a strategy will offer transit options as competitive as possible to the auto. We further feel that ongoing transit service improvement programs should be accelerated to the degree financially possible, including extension of express bus service throughout most of the urbanized area and into the larger outlying communities by 1975. We found that present efforts to upgrade bus

service are necessary regardless of the ultimate long-range transit system and therefore are seeking priority for providing the best possible bus system.

*C. Overall Objectives*

In summary, then, our objectives for the public transportation system, as well as for the overall regional transportation system, are intended to utilize transportation services and facilities to attain the following major objectives:

1. Develop a balanced transportation system that serves the regional development plan.

Transportation facilities and services should serve the total region plan both in providing needed access and in shaping growth. Public programs of all types create a large total demand upon public revenues. Transportation decisions must be made with this in mind.

Our expectations and desires for overall development patterns and current and future lifestyles must dictate transportation system development. Therefore, the total urban development plan is the most important component in making effective use of urban transportation expenditures.

2. Provide reasonable accessibility to local and metropolitan opportunities for area residents.

Metropolitan area residents now enjoy a high degree of mobility by automobile. There are few points within the metropolitan area that cannot be reached in 30 or 40 minutes driving time from any other point. This is true even for most work-hour trips. However, this quality of service is not available to nondrivers or captive transit users. Reasonable mobility for this group requires a restructuring of the transit network to tie more areas together and an increase in service to provide more frequent opportunity to travel.

3. Encourage transportation facilities that reduce pollution levels.

The impact of highways and highway travel on air, noise and water pollution is a growing concern. The Council will support transportation programs which reduce the total particulate and gaseous emissions from autos, trucks and other vehicles. Increased use of transit, by reducing the number of automobiles on the highway, can contribute to this objective. We would also feel that an across-the-board attack on the polluting characteristics of internal-combustion engines is necessary to meet this as well, especially if our transit system does not become the means by which we move large numbers of person trips.

4. Increase the safety and efficiency of the existing road and highway system.

The Twin Cities area already has a major investment in a regional system of transportation routes. Presently most routes provide the necessary capacity for congestion-free travel. For some time in the future that capacity will remain. This network also provides the backbone of our transit potential because it already links up most areas of origin and destination for all types of travel. Investments that protect and utilize this existing system will contribute to making maximum efficiency of transportation expenditures.

5. Protect future options for use of new technologies particularly in the field of transit.

Timing is a key factor. Major investments in transportation improvements are long-term commitments which the urban area will have to live with for decades and whose impacts in terms of development, environment and relative personal opportunity often follow the project itself. Due to recent and continuing progress in technology as well as to the time necessary to implement large-scale projects, it is not possible even in the near term (five to ten years) to currently consider all the alternatives that may really exist for the most effective use of resources. This has led us to adopt an investment strategy aimed at evolutionary improvements especially for transit. This is intended to preserve and increase present use of the transit system, minimize our long-term public investment risk, and allow the flexibility to adapt to improved future alternatives. This has also lead us to call for integrated highway and transit programs which make fullest use of existing as well as future transportation expenditures.

Therefore, a long-term investment strategy not restrictive of our options in a timing sense is a key component in making effective use of transportation expenditures.

## VI. ALTERNATIVE APPROACHES TO MEETING REGIONAL OBJECTIVES

The alternatives which we expect to pursue in meeting our objectives will combine transportation facilities considerations and land-use development considerations. All the exact details are not yet complete nor can we say entirely what the impact of new technologies will be. The Council is currently working

on a Regional Development Framework plan which will set the overall development objectives. We will also, in conjunction with MTC, be conducting a study of Small Vehicle Automated Transit Systems in the next six months. This study will refine our long-range plans for transit and lead to further decisions on the types of technologies we may be able to use. As we have said, we expect a variety of solutions and remain interested in any low-capital alternates. In board outline, we expect the following alternates will emerge.

Limit major transit and highway expenditures to areas that we want developed. We expect to provide good transit service and road capacity in such areas.

Reduce overall travel by shortening distances between urban functions. Greater proximity of jobs, retail medical, education and cultural facilities can be achieved by structuring growth at the subregional scale. Major activity centers focusing such development are emerging and will continue to be encouraged.

Focus transit services on the emerging major activity centers and on express service linking centers to one another and to residential areas.

Make maximum use of existing roads, by improvements to traffic safety and capacity, by use for transit and other high occupancy vehicles and where necessary by restricting use by single occupancy vehicles.

Complete the currently committed skeleton freeway system but not necessarily providing all capacity to meet total projected vehicle demand.

Design safe non-polluting highways that protect against air, water and noise pollution through use of such devices as metering, acoustic barriers, and appropriate storm water drainage systems.

Make maximum use of low-capital approaches to moving people and not just vehicles.

### VII. CRITERIA FOR ATTAINMENT OF OBJECTIVES

Attainment of objectives requires a means of specific measurement against a set of criteria in order to monitor progress and assess the value gained from transportation expenditures. Which criteria are selected depends on the scope of the inquiry at hand.

An individual corridor proposal or specific project will have a different set of criteria from a regional plan. Setting of criteria is also an undertaking of some magnitude itself especially if inputs from a variety of other public and private agencies are anticipated. The Council has not yet completed this work, although we have general criteria from our Development Guide and specific criteria from a number of sub-area studies. There are 55 such criteria for an interstate alignment study corridor lying in the Western Suburbs of Minneapolis for instance. 108 items for measurement have been established for the research and evaluation phases of the I–35W corridor demonstration project as another example.

We feel, therefore, that this is an area in which we will be able to develop appropriate means of measuring progress. Assuming that we wish to measure achievement on the broad objectives outlined above, we would expect the following general types of criteria to be useful to system-wide evaluations at the regional or sub-regional level. Specific means of measuring each of the below-listed items might vary and for any one criteria there could be a number of detailed ways of measurement. Sixteen general criteria are listed below for evaluating the effectiveness of urban transportation expenditures or other actions to obtain our objectives, suggested means of measurement are included.

| CRITERIA | MEASUREMENT |
|---|---|
| 1. Moving the same or more persons with fewer vehicles. | Vehicle Occupancy.<br>Vehicle miles as ratio to person miles. |
| 2. Moving the same or more persons with less energy. | Energy consumed per person mile. |
| 3. Moving the same or more persons with less pollution. | Volume of pollutants per vehicle mile or person mile. |
| 4. Moving the same or more persons in less time. | Averaging trip time. |
| 5. Moving the same or more persons over shorter distances. | Averaging trip length. |

| | |
|---|---|
| 6. Moving the same or more persons at less cost. | Cost per trip.<br>Cost per vehicle mile.<br>Cost per person mile. |
| 7. Lowering the number of total vehicle trips per person or household. | Trips per person.<br>Vehicle trips per person or household. |
| 8. Obtain multimode transportation options in all major corridors. | Ratio bus routes or miles to total routes or miles by corridor. |
| 9. Reduction in total number of vehicles or multicar ownership. | Cars per capita or household. |
| 10. Reduction in average transportation costs. | Cost per trip per vehicle or per household. |
| 11. Achievement of greater coordination of total public improvement expenditures. | Conjunction of capital improvements in time and place. |
| 12. Obtaining better corridor levels of service. | Corridor trip times.<br>Persons per lane.<br>Volume to capacity.<br>Number of multi-occupant vehicles per lane. |
| 13. Reducing accidents. | Accidents per million miles by type. |
| 14. Increase in total use of the transit system including all types of high occupancy vehicles. | Increased transit patronage.<br>Number of car pools.<br>Number of van pools.<br>Number of buses. |
| 15. Stabilize or reduce total transportation exepnditures including operating subsidies. | Level and rate of expenditures.<br>Level and rate of transportation taxes. |
| 16. Obtain greater mobility for nonouto drivers. | Trips per household or per capita for non-auto households—low income and elderly. |

Chairman MOORHEAD. Mayor Jackson, we are ready for you now.

## STATEMENT OF HON. MAYNARD H. JACKSON, MAYOR, ATLANTA, GA.

Mayor JACKSON. Thank you, sir. I come today to represent what I believe is a very great city, a city which is striving to become a greater city. I think our citizens have the vision, the capacity and initiative to make whatever changes are necessary to achieve that posture, but I also believe that our strength lies in our capacity and our willingness to admit that we are imperfect. One of our imperfections is an inadequate transportation system which, however, we have taken steps to correct. And with Federal help I believe we are going to have a mass rapid transit system worthy of our city and of our people.

The questions which this subcommittee has under study, in my opinion, Mr. Chairman and members of the subcommittee, are absolutely vital to the future of America's central cities and their suburbs.

Despite the recent attention to declining birth rates, the fact is that we still have enormous population growth within our urban areas and accompanying increases in the flow of traffic between our suburban and center city areas. Atlanta's metropolitan area, by way of example, has a population at present of 1.6 million. We are projected to reach as high as 5 million by the end of this century. Now, the congestion which would result from that growth without an effective system of mass transportation is frightening.

However, Atlanta saw the perils, Mr. Chairman, that could confront us and, along with the two dominant counties in which Atlanta lies, Fulton and De Kalb, moved to create the Metropolitan Atlanta

Rapid Transit Authority, MARTA, as a vehicle for developing and operating a total system. By way of explanation, MARTA is a State-constituted authority which has jurisdiction in all of the areas that voted positively in the referendum under consideration. There were four counties in which the referendum was being held, two said no and two said yes. Fulton and De Kalb said yes.

A lot has been done since the creation of MARTA, particularly with respect to improving the bus system. The major design, construction and financing problems lie ahead. Based on Atlanta's experience with MARTA we make the following observations:

No. 1, the most significant factor in the development of a mass transit system is the gaining of public support for such a system. No matter how sound the arguments are, the decision to move ahead is a political decision. There must be visible advantages which the public can understand and see as being in their personal interests. Atlanta's first referendum in the late 1960's to create MARTA failed because there was no visible advantage to the people. Atlanta's second referendum, however, in 1971, succeeded because of a commitment, among others, to reduce immediately the transit fare from 40 cents, plus a nickel for a transfer to 15 cents and to keep it at 15 cents until 1979. That was a specific act which every voter could understand and which was acceptable. Parenthetically, by the way, that decision is probably also a major factor in the steady increase in riders which MARTA has experienced, that increase being around 27 percent.

No. 2, the design of a mass transit system cannot be accomplished without major attention to community values and concerns. The old engineering rule that the best solution is the shortest and cheapest way between two points is simply not viable in our society today. In this context, I hear myself mirroring the concerns expressed by Mayor Orr. We believe we have too many other values which must be considered. In Atlanta, the overwhelming concern is for the preservation of our neighborhoods. We do not want to become a launching pad for commuters. We want to be more than an area to which people commute when they want to work and play and from which they leave when that is done. So we are extraordinarily proud of the beauty and attractiveness of Atlanta's residential areas. We are determined that no mass transit system, and no highways, especially, will destroy them. Already, in fact, several changes in station location and routes have been made, not for engineering or financial reasons, but strictly to preserve the quality of life which Atlantans value so highly.

No. 3, the development of a mass transit system generates enormous opportunities and enormous dangers in other facets of community development. The land surrounding new transit stations is subject to intense speculation. Without strong planning and zoning controls a city could develop in most undesirable ways. In Atlanta we have chosen to adopt a nodal concept. This envisions the station as the hub of three development rings. The first is an area of intense development with commercial buildings and high-rise apartments. The second is buffering, less intensive, low-rise, and garden-type housing. The third is conventional, single family and condominimum types of development each having increasing green spaces.

Maximum separation of pedestrian and vehicular traffic is a critical feature of this thinking.

No. 4, mass transit can be used to help a community achieve other economic goals. Areas of the city which formerly have been isolated can be opened up to economic development. Job opportunities in suburban areas may be made more accessible to inner city residents if planning for reverse-flow traffic is carefully done.

We in Atlanta are planning to take full advantage of the opportunity to influence economic growth through transit planning. There are, of course, important job-creating features to a project as enormous as MARTA. We anticipate that some 3,000 construction jobs will emerge as a result of MARTA, to say nothing of the jobs that will be stimulated in other developments related to MARTA. In Atlanta we are particularly interested, Mr. Chairman, in using this opportunity to train and place many low-skilled, low-income residents of the city who currently do not have access to the job market.

No. 5, mass transit planning is geared almost entirely to the movement of people. Little or no attention has been paid to the movement of goods and services or to the movement of waste. Yet, these two create substantial congestion. We believe future efforts ought to give much more serious attention to integrating planning for people movement with that for other types of movement.

In summary, Mr. Chairman, I believe that the development of mass transit systems must take place in the context of total community development. Furthermore, it must be done with a sense of financial stability which makes it possible to deliver what is promised to the public. One of the greatest problems is the lack of assurance that the programs the Federal Government encourages and seemingly supports in terms of financial resources will come to pass. This committee would perform a tremendous service if it could devise ways of stabilizing Federal financial support.

Primarily, in Atlanta's case, we found ourselves caught up in a Federal movement of encouraging urban areas to move quickly and with substantial local commitment in the solution of the transportation problem we face. Having received not only the go-ahead, but actually the aggressive encouragement of the Federal Government, Atlanta got out there first. We stuck our necks out, and now we are looking at a potential transportation act which could have a very negative effect on us, the effect being somewhat consonant with the idea of our being out on the limb and the Federal Government being behind us sawing it off.

That is very serious to Atlanta. Our commitment is substantial. We voted a tax on ourselves, Mr. Chairman, and we voted an extra 1-cent sales tax on ourselves to help pay for this system which we anticipate now will cost $1.8 billion. We believe mass rapid transit is one of the most important factors in city viability. In Atlanta it ranks with police and fire protection as a necessary service.

So by voting this tax, a 1-percent addition to the 3-percent sales tax, we now currently produce revenue amounting to $50 million a year. It provides for an operation subsidy and for the local share of capital construction costs. We are sure you realize how difficult it is to rally public support for a referendum that imposes additional taxes, so you can recognize just from this example the importance of mass rapid transit to our people and to our city's continued growth.

Mr. Chairman, I will not repeat all of the facts you have before you except to emphasize a few points. We plan to build 62 miles of

rapid rail and busways which will extend from the heart of the city in four major directions, approximately 10 miles to a perimeter highway which is a Federal highway. A 45-minute automobile trip will be reduced to a 15-minute rapid rail trip, and during the rush hours the trains are going to run every 9 seconds.

We are going to develop a transit center in the heart of Atlanta, Ga., which will have an elaborate pedestrian mall, planned in conjunction with the subway line.

We also plan a comprehensive feeder bus system that will not only bring people to and from the transit stations but offer greatly improved service for those whose trip needs will not be served by the rail system.

Now we believe that we are able to see a city in the future which will be tied together and unified by its rapid transit system. Because a city can provide rapid transit service, because citizens will have flexibility and mobility, because citizens can see the city continuing to grow; we see our city becoming one of the greatest urban centers, not only in the Southeast, but in this entire country. But we are not going to build that with rhetoric, Mr. Chairman, and we are only going to build it with the help of the Federal Government.

So we have very strong feelings that by increasing the present number of buses from 500 to over 800, having crosstown bus routes that are brandnew, improving the present bus system, and providing rapid busways, we will not only begin to see the other advantages come to bear but also we will see an actual change. This is a very important point. We suggest, Mr. Chairman, in addition to the increase in ridership, a change in the profile of the rider.

For example, in Atlanta, since going to 15-cent busfare and since improving service on our bus system, since giving people something they like, we are now attracting a class of riders that never rode buses before; middle-class automobile owners. These people are now choosing to ride MARTA buses because of the economical fare, the convenience, and the dependability of our bus service.

This ridership increase and change in rider profile were identified by a recent ridership survey. That survey reveals one important fact. Many more people from all income levels will ride the transit system if it serves them properly. It points up the fact that low fares, good service, and new equipment will, in fact, provide increased ridership.

Mr. Chairman, I appreciate the chance to testify before this subcommittee. Other facts are included in the testimony submitted, and we urge your respectful consideration and urge your assistance to a city which we believe is deserving of all the Federal attention it can get.

One final thing I would like to add, and that is about the nature of Atlanta. There are many cities in this country, Mr. Chairman, that are failing and do not have a chance within the foreseeable future to correct their problems. I suggest to you that they need help, but I would ask you, as part of your concerns not to give all of the help to those that are desperately in need but also let us have a few success stories. Let us help those cities that are successful, a city like Atlanta which had in its general operating fund $6½ million cash carryover at the end of last year, which is typical of our city. And that is only one of several operating funds we have, all of which have surpluses. A city like Atlanta can provide to you an urban laboratory where we can guarantee you success.

Thank you very much.

Chairman MOORHEAD. Thank you, Mayor Jackson.

[The prepared statement of Mayor Jackson follows:]

PREPARED STATEMENT OF HON. MAYNARD H. JACKSON

Mr. Chairman, gentlemen, my name is Maynard H. Jackson. I am the mayor of the city of Atlanta. Being an Atlantan is something special. We are a great city that plans to become a greater city. Our citizens have the vision, the capacity and the initiative to reach that objective; we also have the wisdom to admit that we are not perfect and an inadequate transportation system is among our imperfections, but we have taken steps to correct that imperfection and, with Federal help, we will have a rapid transit system worthy of our city.

The questions which this committee has under study are absolutely vital to the future of America's central cities and their suburbs. Despite the recent attention to declining birth rates, the fact is that we still have enormous population growth within our urban areas and accompanying increases in the flow of traffic between our suburban and center city areas. Atlanta's metropolitan area has a population of 1.6 million at present, but is projected to reach as high as 5 million by the end of the century. The congestion which would result from that growth—absent an effective system of mass transportation—is frightening.

Atlanta saw the perils that could confront us and, along with Fulton and De Kalb counties, moved to create the Metropolitan Atlanta Rapid Transit Authority (MARTA) as a vehicle for developing and operating a total system. Much has been done since the creation of MARTA—particularly with respect to improving the bus system. But major design, construction and financing problems lie ahead. It is based on Atlanta's experience with MARTA that I make the following observations.

1. The most significant factor in the development of a mass transit system is the gaining of public support for such a system. No matter how sound the arguments for a system; no matter how excellent its technical studies are; the decision to move ahead is a political decision. There must be visible advantages which the public can understand and see as being in their personal interests. Atlanta's first referendum attempt to create MARTA failed because there was no such visible advantage. Atlanta's second referendum effort succeeded because of a commitment to reduce immediately the transit fare from 40 cents, plus a nickel for a transfer, to 15 cents and to keep it there until 1970. That was a specific act which every voter could understand and appreciate. Parenthetically, that decision is probably also the major factor in the steady increase in riders which MARTA has experienced.

2. The design of a mass transit system cannot be accomplished without major attention to community values and concerns. The old engineering rule that the best solution is the shortest and cheapest way between two points is simply not viable in our society today. We have too many other values which must be considered. In Atlanta the overwhelming concern is for the preservation of our neighborhoods. We are extraordinarily proud of the beauty and attractiveness of Atlanta's residential areas. We are determined that no mass transit system will destroy them. Already, several changes in station location and routes have been made—not for engineering or financial reasons—but to preserve the quality of life which Atlantans value so highly.

3. The development of a mass transit system generates enormous opportunities and enormous dangers in other facets of community development. The land surrounding new transit stations is subject to intense speculation. Without strong planning and zoning controls the city could develop in most undesirable ways. In Atlanta we have chosen to adopt a "nodal" concept. This envisions the station as the hub of three development rings. The first is an area of intense development with commercial buildings and high-rise apartments. The second is buffering, less intensive, low-rise and garden-type housing. The third is conventional single family and condominium-types of development. Maximum separation of pedestrian and vehicular traffic is a critical feature of this thinking.

4. Mass transit can be used to help a community achieve other economic goals. Areas of the city which formerly have been isolated can be opened up to economic development. Job opportunities in suburban areas may be made more accessible to inner-city residents if planning for reverse-flow traffic is carefully

done. We in Atlanta are planning to take full advantage of the opportunity to influence economic growth through transit planning. There are, of course, important job creation features to a project so enormous as MARTA. We anticipate some 3,000 construction jobs will emerge because of MARTA, to say nothing of those which will be stimulated in other developments related to MARTA. In Atlanta we are particularly interested in using this opportunity to train and place many low-skilled, low-income residents of the city who currently do not access to the job market.

5. Mass transit planning is geared almost entirely to the movement of people. Little or no attention has been paid to the movement of goods and services or the movement of waste. Yet these, too, create substantial congestion. I believe that future efforts ought to give much more serious attention to integrating planning for people with that for other types of governmnet.

In summary, I believe that the development of mass transit systems must take place in the context of total community development. Furthermore, it must be done with a sense of financial stability which makes it possible to deliver what is promised to the public. One of our greatest problems is the lack of assurance that what the Federal Government encourages and seemingly commits in terms of financial resources will in fact come to pass. This committee would perform a great service if it could devise ways of stabilizing Federal financial support.

Mass rapid transit is one of the most important factors in city viability. In Atlanta, it ranks with police and fire protection as a necessary service. In 1971, the voters of the two counties that make up this city chose to tax themselves to provide the local funds for an improved mass rapid transit system. The tax, a one percent addition to the three percent state sales tax, currently produces revenue amounting to $50 million a year. It provides for an operation subsidy and for the local share of capital construction costs. I am sure all of you realize how difficult it is to rally public support for a referendum that imposes an additional tax; so you can recognize just from this example the importance of mass rapid transit to our people and their recognition of its importance to our city's continued growth.

We expect MARTA, the Metropolitan Atlanta Rapid Transit Authority, to help us achieve many objectives on the way to our goal of making our city greater. The first of these is to provide low-fare, efficient, comfortable and safe public transportation for all of the citizens of our community. Those of you who have visited our city know how frustrating the freeways can be during the rush hour. MARTA's goal and ours is to relieve that frustration. We plan to build some 62 miles of rapid rail and busways which will extend from the heart of the city in four major directions approximately 10 miles to the perimeter highway. A 45-minute automobile trip will be reduced to a 15-minute rapid rail trip, and during the rush hours the trains are going to run every 90 seconds. The area known as five points, in the heart of downtown Atlanta, will be the cross roads of our system. This transit center will be connected to an elaborate pedestrian mall being planned in conjunction with the subway line through the heart of the central business district. This transit center will have the capacity to serve 55,000 people an hour, and by 1995, we expect to serve at least that many. As riders emerge from this transit center and other downtown stations, they will be able to walk quickly to their destinations unimpeded by the flow of downtown traffic.

We see, in addition to this 62 mile rapid rail core, a comprehensive feeder bus system which will not only bring people to and from the transit stations, but will also offer greatly improved service to those people whose trip needs will not be served by the rail system. When the system is completed, more than 80 percent of the population of Atlanta will be within a short walk of some mode of public transportation. This kind of available, dependable public transportation means mobility for citizens. It means the opportunity to go to cultural and entertainment centers, as well as to be able to have the opportunity to shop away from the home neighborhood. And we intend to use our comprehensive planning efforts to insure that it will mean increasingly greater job flexibility. This means equal rights for all of our citizens—the right to move around in the city for work, for pleasure, for education, for entertainment or for the many other reasons that motivate Americans to keep on the move.

Since the referendum in 1971, more than $1.5 billion have been programmed by private sources for construction in Atlanta. This construction, much of which is occurring in downtown Atlanta, reflects the confidence the community has in the city's viability—viability that is based on a modern mass transit system in

Atlanta. In addition to the basic objective of a transportation system to move people, we see it as a catalyst for community growth, especially at points at which more intense development is clearly desirable. Foremost among these is a strong central business district with increasing job opportunities.

But through the transit station development plans, growth will also be guided to form nodes at important stations along the transit lines. This combination of concentrated growth and high volume public transportation will help to relieve transportation pressures in other parts of the city.

Thus we see a city that is tied together and unified by its rapid transit system. Because that city can provide rapid transit service, because citizens will have flexibility and mobility, because citizens can see the city continuing to grow, we see our city becoming one of the greatest urban centers, not only in the southeast, but in the entire United States. But we are not going to build that city with rhetoric. We are going to build it with action.

The actions we have already taken, as far as public transportation is concerned, are as follows: we lowered the fare to 15 cents, the lowest for any major metropolitan area in the United States.

We are putting 500 new buses into service, increasing the size of our fleet from 500 or more than 850. At the same time, we are culling out old buses so that the average age of our buses will be less than three years on July 1974. MARTA has made a number of service improvements within the last two years. MARTA has already added some new routes and we look forward to continuous expansion to meet the travel needs of all of our people. Additionally, we are in the process of installing bus stop shelters, two-way radio systems for safety and security, and are providing for additional bus maintenance and storage facilities so we can better serve the metropolitan region.

When our transit system went public in 1972, we set forth a number of goals in our short-range improvement program. Those goals are there for everyone to see and we are reaching each of those goals on or before schedule. But just providing new buses or adding new routes is not the way to measure success in public transportation. The way to measure success is ridership. Our ridership, which was declining in a pattern which conformed to that existing in other metropolitan areas, jumped dramatically in the last two years from 57 million passengers a year to more than 70 million passengers annually. Just as important as that increasing number is the fact that the rider profile has changed. We are now attracting a number of riders who are middle-class automobile owners. These people are now choosing to ride MARTA buses because of the economical fare, the convenience and the dependability of our bus service. This ridership increase and change in profile were identified by a recent ridership survey. That survey reveals one important fact: Many more people from all income levels will ride the transit system if it serves them properly. It points up the fact that low fares, good service and new equipment will provide increased ridership.

But the bus system is only part of our public transportation requirement and we are starting to work on our rail system as well. Much of the design work is completed and we are beginning to buy rights-of-way. I want to emphasize here that our transit system is one that has been planned long and carefully. It represents an agreement among the highway department, rapid transit interests, local governments and the Atlanta regional commission, and is a part of our regional plan. This regional transportation plan integrates the transit system with the highways. It integrates the bus system with the rapid rail system and we are working to insure that it will deal with all aspects of community transportation needs.

For example, we know that in 1983, the transit system is going to carry some 7% of the total trips in a 6-county area, but we also know that 45% of the trips in the central business district will use public transit. The same calculations find 17% of the work trips to be by public transit.

In 1995, we see almost 10% of all trips carried by public transit and some 22% of the work trips—this is with a 1995 population of approximately 3 million people. Our planners tell me that the number of passengers that will be traveling on public transit in 1983 will be in excess of 150 million annually, and by 1995 the figure will be in excess of 300 million, more than four times the current annual ridership. Just as the profile of the rider changed between 1971 and 1973, we envision the profile continuing to be more inclusive with the advent of new service.

I think our experience has proved that rapid transit will be used by all segments of the population if it is provided to all segments of the population.

Our experience has proved that public transportation is an acceptable alternative to the automobile if it is provided as a public service. As we add service, as we add routes, we add riders. We know we will continue to add riders if we receive adequate Federal funds to complete the system.

Up to this point, we have concerned ourselves with transportation for cities, but it is important to realize that there are many other factors which will determine the degree of our continued success in dealing effectively with our transportation problems. There are three basic areas in which Federal actions can make significant contributions.

*Area No. one:* The Federal Government should make increased transportation planning money available directly to the cities. This will insure that the input of cities into regional transportation plans is based on a thorough understanding of their own needs as well as those of the region.

*Area No. two:* The 1962 highway act established the "3 C" planning process as a requirement for Federal funding of transportation projects in urban areas. The "3 C" mandate called for *comprehensive, continuing* planning carried on *cooperatively* among state agencies, regiona lbodies and local jurisdictions within metropolitan areas. Since its institution, administration of this requirement has been steadily refined. Continued improvement and heightened sensitivity will strengthen the city's ability to exercise its proper role in meeting transportation needs.

*Area No. three:* Finally, the Congress and appropriate Federal agencies can increase thir efforts to coordinate programs which bear on the success of transportation plans at the local and metropolitan levels.

For example, Federal regulations should encourage increased coordination of housing programs, water and sever grants, and environmental protection measures with transportation programs. This mutual reinforcement will maximize the opportunity to achieve local development goals.

What I have come here to say today is that we have a good transportation system in Atlanta. We are responding to the needs of the community. We intend to continue that response and we intend to continue to improve. And we can do that as long as we receive adequate Federal support for both transportation facilities and planning.

We now have the best bus transit system in the United States. I get many letters from out-of-towners complimenting our bus system, but as I said in the beginning of my statement, we Atlantans consider our city something special. And we want our city's public transit system to be something special.

Thank you.

Chairman MOORHEAD. Mayor Jackson, I am going to yield to Senator Pepper because he has to leave, but I wanted to get clearly on the record which Federal law has put you out on the limb which we are now sawing off. Is that the UTAP bill?

Mayor JACKSON. That is right. It is the administration's act, as I recall. The total kitty that would be put forward would be less than the amount that we thought UMTA was suggesting Atlanta would have available to it; Atlanta alone. We think it would be woefully inadequate for the Twin Cities, for Miami-Dade County and especially for Atlanta.

Chairman MOORHEAD. Congressman Pepper.

Representative PEPPER. Mr. Chairman, I want to thank you very much for the privilege you have accorded me so graciously this morning of sitting with you to hear these distinguished community leaders. They have extraordinary knowledge of the needs of their respective communities which I think is typical of the country.

I would just like to ask, if I may, Mr. Chairman, the opinion of these distinguished gentlemen as to how you think the cost of these necessary programs that you so well outlined should be distributed among the Federal Government and the State governments.

First, Mayor Orr.

Mayor ORR. When Dade County started its plan it anticipated that the act currently in existence would provide two-thirds Federal contribution. We were hopeful that then the local communities, that is to say, the State and the country, our county government, would make up the other third divided equally between us.

The fear that I had, as has been expressed by Mayor Jackson, in that apparently there has been a turnaround in the Federal position with respect to this, and that the Federal participation would be severely limited, we have heard as low as 30 percent Federal participation. We proceeded under the act as it existed, we went to our people making that representation to them, and gained their support.

There is another thing in terms of financing that I think should be considered. Somehow or the other I have detected, having come up here a number of times during my term of office on a variety of subjects, that it has been the general attitude of the Federal Government that to solve local problems the best conduit would be the State government, assuming somehow or the other that the State governments would be more likely to reflect local needs better than the Congress.

Now that simply has not been my experience. I do not know how it is in Georgia or in Minnesota—I think I know how it is in Georgia, as a matter of fact. but I know in Florida, as you do, Senator, we have virtually a no-party State; that, let me say this, almost weekly since I have been in office I have been contacted either by my old friend and mentor to whom I owe so much, Congressman Pepper or Congressman Dante Fascell.

Representative PEPPER. We have been intimate friends and law partners at one time.

Mayor ORR. Representative Fascell and Representative Lehman are in constant touch with me on local problems. I have not heard from the Governor, who is a friend of mine, since I have been in office. We have a member of the State legislature from the area who thinks he invented roads and rather thinks that any distribution ought to be made through him. One of the differences—I served in the State legislature and one of the differences—I find in the two jobs is that we are so immediately available to the public will, you know, they are down right at us every day. I appear weekly on a number of these radio call-in shows and television call-in shows, and the subject about which I am questioned most on every occasion is rapid transit, and I think that while it might be a little more troublesome at the Federal level to consider direct appropriations to the major urban areas in the country, and there are not that many more of them than there are States, is a concept that ought to be carefully examined, particularly by this committee.

It seems to me that in a way this is the "think" committee of the Congress, and that you want to take a hard look at a new means of distributing Federal funds. It may be through that then we will not be faced with these questions of impoundments where the will of Congress has been frustrated on so many occasions.

We have got to come to the understanding, too, and this is a problem they have had out at BART, you cannot operate a public transportation system out of the farebox. Public transportation is a public function

and we all must do as Atlanta has done and as Dade County is now doing, subsidize this operation.

The year before last, with a really inadequate bus system, our county government contributed some $3 million to make up the deficit in the operation of the buses. This year it is $4 million. Next year it will be something more than that, but we are going to need help not only in terms of construction of these facilities but also in the operation of them, and I know that Congress is paying some close attention to that.

I must say, too, in terms of the kind of things we are doing in Dade County to utilize every conceivable means—we have a contraflow system on our major highways so that U.S. Highway 1 coming into our county from the south, and I–95 from the north will have contraflow lanes for buses and car pools, that is to say, there will be a lane ordinarily used for traffic going in the opposite direction, during the rush hour, which will be devoted to buses and car pools as a means of encouraging their use and speeding the time of commuting.

But I really strongly encourage you to look into a new means of getting these Federal funds to the point where the job has got to be done, so that they are not constantly being siphoned off subject to considerations other than the main point.

Chairman MOORHEAD. I think the point you have just made, and for a second time, of how the Federal funds should flow to the cities, whether they go through the State capitals or directly, is so significant that I would like to have comments of Mayor Jackson and Mr. Boland on that.

Mayor JACKSON. I would be very pleased to comment, Mr. Chairman. I want to state very strongly that I urge this committee to move toward a position and, in turn, urge Congress to move toward a position that the transportation needs of the major urban areas are clearly different from those of the nonurban areas, which dominate the State legislatures of this country. The power historically in Georgia has rested with those who could build highways, and I suspect our story is not unique.

How that relates to Atlanta can be best explained by a specific story of a linking highway that was planned for Atlanta, Interstate 485. It is the issue among neighborhood organizations on the question of transportation planning. This linking road, which some people feel is a key to the building of our rapid transit system, but in fact it is not, had gone so far as to clear 90 percent of the right-of-way at a great cost.

By that time they found out they had not complied with the requirements for a preliminary environmental impact statement and, therefore, they were stopped. Ultimately, the city council, which was then called the board of aldermen, voted against the road and we find ourselves today in the following position. The mayor and the city council are opposed to building Interstate 485. The Governor is for building Interstate 485 as is the Department of Transportation. The result is the highway is not going to be built as long as the prime city, the prime local government, is opposed to it. Yet the funds are there. They cannot be used for nonhighway or other transportation purposes unless the State and the city agree. The result is the funds are there rotting away, totally useless to anyone, and we run the risk of even losing them.

I would suggest to you, Mr. Chairman, that the cities strongly need the leadership of this committee in a new direction, a direction which is entirely consistent with the concept of more emphasis on city hall, consistent with the emphasis we get every time we open the door to our offices. There is an immediacy to being a mayor which I believe is completely unparalleled by any other elected position.

We want to be able, therefore, to respond to the immediacy of the problems with immediate money, immediate resources. I would urge that serious consideration be given to direct funding of the major urban areas for transportation funds.

Now, one final thing, if I may. I am not anti highways but I am anti destroying neighborhoods, especially those in our city. We have a white flight problem in Atlanta. The irony of my position is it befalls my lot as the first black mayor to fight to make sure the whites do not leave our city. We cannot, on the one hand, one day say do not leave Atlanta and the next day lay a highway through somebody's bathroom. So what I am suggesting is that we have to be consistent in our posture. It is very important that we have the capacity to do the proper planning with an eye toward this possible eventuality.

It is possible, Mr. Chairman, that by the year 2000, the major urban centers represented at this table will not even allow cars downtown. They will have to have alternative means of transporting people and, therefore, we need to have the resources available to us now for that kind of long-range planning.

Thank you.

Chairman MOORHEAD. Thank you, Mayor.

Mr. BOLAND. Mr. Chairman, if I could respond also to both Congressman Pepper's and your comments. I obviously will echo what Mayor Orr and Mayor Jackson have said, and if I could just reflect for a minute what has happened in the Twin Cities with regard to our relationship struggling with the concept of funding and with fact of who does what at this level, I have been in charge of the council for 8 months and this is the third time I have been to Washington basically for the same reason, to find out what our posture is going to be or where we are at on our funding.

We have before us the final decision to make on long-range transit planning. A major ingredient obviously in that is how much Federal participation there will be, what percentage. We cannot do it by ourselves. I do not mean to imply that we are not concerned or interested. This is reflected in the fact that the last session of the legislature doubled the mill levy for the Metropolitan Transit Commission so they can go ahead to purchase 300 new buses and shelters and set up new routes and so on. I think our commitment is there.

I should also point out, I think there is no question, as Mayor Jackson and Mayor Orr have already indicated, that no longer is fee basis alone the only we can finance transit. The Metropolitan Transit Commission has kept our fee at 30 cents per zone since 1970. As I indicated to you earlier, they have given senior citizens free riding at nonpeak hours; which has been a very successful program, but we have got to pick up now somewhere almost $10 million a year deficits for the Transit Commission, the legislature has gone ahead and done, and that is just on the bus program as it now stands.

One final comment. Mr. Chairman, it seems to me consistent if with the guidelines of new federalism, if that is the case, and if that is

the structure, that the local unit, in our instance the Metropolitan Transit Commission, be given the permission and direct funding to go ahead and basically build our needs, with obviously some restrictions from the Federal Government, but we would like to know, if anything, also where we are at, and that before we go ahead and vote for a long-range transit system as Atlanta has already done. We have not done that. Obviously, the decision will be made by the legislature in 1975 but we certainly would like some assurance from UMTA people and from the Federal Government specifically as to where we stand in that.

Thank you very much, Mr. Chairman.

Chairman MOORHEAD. I take it the panel would rather have a smaller amount of Federal aid that you knew was coming regularly than gambling on an up and down situation. Is that what you are saying, Mr. Boland?

Mr. BOLAND. Mr. Chairman, we will obviously take as much as we can get.

Chairman MOORHEAD. I understand.

Mr. BOLAND. But I certainly appreciate, would certainly appreciate the fact what it is, because we have heard where it goes from 80–20 split down to 30 and it is difficult to sell that program to the legislature or to the voters assuming we are going to get 80 percent, which was what the assumption was in the last session of the legislature and, in fact, one of the major ingredients why it does not float because after we talked with other people at the Federal level that assumption began to disintegrate and it became an argument for those in the rural area who were opposed to voting for a State subsidy or transit, that became an argument that they could use, because if the transit advocates were saying 80 percent for sure, they were saying, "We checked and it was not for sure," and it became a hassle at that level, and we never were able to pin that down. Yes, I guess I would say in direct response to your question if we only knew specifically what percentage, it certainly would help.

Chairman MOORHEAD. I noticed in Mayor Jackson's prepared statement he refers to stabilizing Federal support. Is that not what you and Mr. Boland are both saying?

Mayor JACKSON. Yes, sir, but we do not want to be in the posture of suggesting we should stabilize on the low side. [Laughter.]

Chairman MOORHEAD. I understand. You want as much as you can get.

Mayor JACKSON. We want to know where we stand.

Chairman MOORHEAD. Exactly where you stand, hopefully, as high as possible but almost more important is to know so you can plan, isn't that correct?

Mayor JACKSON. Yes, sir.

I want to clarify one other thing, if I may, so far as Atlanta is concerned. My response to your last question does stand as far as things in the future are concerned. We believe that we already had a commitment to a level of funding in Atlanta, Ga., and we are now seeing some backing away from that commitment. It is a serious concern to us now, and we need all the help we can get.

Representative PEPPER. How much do you gentlemen think you can depend upon or what share of costs of these projects do you think you can depend upon, from your respective States?

Mayor JACKSON. We originally projected $1.3 billion for our system and we were told an 80–20 split was about what we could look forward to.

Representative PEPPER. About what?

Mayor JACKSON. Our 20 percent, and theirs 80 percent, 20–80.

Representative PEPPER. And the other from the Federal Government.

Mayor Orr, what do you think our legislature will do?

Mayor ORR. Well, it is very difficult to predict what our legislature will do but we feel that if the split could be, as Mayor Jackson has stated, the 80–20 split, that the local government could take up the 20 percent by itself without concerning itself with State participation.

The great book I think every politician ought to read, written by a fellow named Frank Trippett, written 4 or 5 years ago, entitled "The States United, They Fell," and the principal theme of which is that it is probably the most decadent vestige of our whole governmental system and the least responsive to the will of the people generally, and it has been my experience throughout my political lifetime that the Members of the House of Representatives particularly are in constant touch with local problems, and where a Governor of our State, there not being any really sophisticated political organization, he ordinarily looks to his patronage chairman in the county, maybe a banker, someone who has not been on the political firing line, and we think that the will of the people is most likely to be done if there are direct appropriations from the Congress to the major urban areas.

Mr. BOLAND. Mr. Chairman. if I could also respond to the Congressman's question, I am struck by the similarity of Mayor Jackson's comment as to what it would cost as to our estimate, almost identical, and we were also, as indicated earlier, laboring under the impression that out of that $1.2 billion in our case, 80–20 was the split, 80 yours 20 ours, I would assume there would be some mobility on the commitment of the legislature and local transit authority, and so maybe 25, I do not know, it is difficult to analyze, but that seemed to be a ball park figure that everybody could live with.

Chairman MOORHEAD. Thank you for being here, Congressman PEPPER. We appreciate that.

Representative PEPPER. Thank you very much, Mr. Chairman for the privilege.

Chairman MOORHEAD. Mayor Jackson, of all of the statements that were made this morning I think one that you made deserves to be repeated, and I would like to have the panel discuss this. You said "In Atlanta the overwhelming concern is for the preservation of our neighborhoods."

Mayor JACKSON. Yes, sir.

Chairman MOORHEAD. I believe that we in the Congress, and in the United States, have failed to give adequate consideration to the fact that transportation modes cannot only destroy neighborhoods but can create them. I mean that this planning should be, as you say, the first order of priority.

Mayor JACKSON. Mr. Chairman, we have in Atlanta a setup in a building outside of City Hall with a special planning unit that deals only with the impact of proposed MARTA stations. We have been at work now for about a year and a half. I talked about the nodal

concept, the tritiered concept, Mr. Chairman. I think there is something rather broad here that really ought to be given serious consideration and I am very grateful for your putting your finger on that. It is an old question of what really a city is going to become. Are we simply going to be a place to which people want to come when they want to work and play or is it a place they want to live? My idea of Atlanta, and I am a fifth generation Georgian, is that Atlanta needs to be, in fact, Atlanta's uniqueness lies in its capacity to have a city of neighborhoods, trees and playgrounds and schools and all that goes along with it. We need to maintain those things which attract people. Contingent on this is the question of crime, because where you have concrete canyons from which people flee at 5 o'clock your crime rate increases as well. When you have people who stay there, who go to church and synagogue and temple there, who go to their schools there, shop there and otherwise, they have a chance to reverse the spiraling crime rate.

You also have a sense of a community, and I believe we have all seen cities where the community has been destroyed. We are not trying to go back necessarily to the old townhall concept. It is probably long gone and maybe good riddance. I am not sure what we can get, Mr. Chairman, within the context of large sprawling, throbbing, pulsating growing urban areas, a sense of civic pride is certainly attainable. We do not believe we can do this unless we maintain the neighborhoods where people live: It has got to be Atlanta's priority and it is.

Chairman MOOREHEAD. Mayor Orr, I can see you champing at the bit to get into this.

Mayor ORR. Yes, I totally agree. We in Dade County are attempting to utilize all the advanced means of controlling growth in a stable sort of way, and of providing affordable housing for our people through private enterprise, and we believe that a good transportation system is the key to this. For example, we are requiring now of major developers when they come in, we used to ask them for school sites and we still do, and we used to ask them for park sites and we still do, but we ask them now to set aside some part of their development for low-income and moderate-income housing, and we think we can provide incentives by utilizing some higher densities so that the private developer can make money and still provide the less financially fortunate the same kind of amenities that the rich get, and without going into great massive Federal projects of cities for the poor. We think that through the proper planning and utilizing the transportation system as the key we can disperse the ghettos and, my goodness, I cannot imagine a more dramatic impact we could cause on the incidence of crime if we are able to accomplish that. But this is all possible if we can get people thinking innovatively and we are coming to that now.

But this transportation, the providing of mobility for people, giving them opportunities to live in a free choice of where to live and still get to work in an economic sort of way is the real key to this kind of planning, and we think the major part of this can be done profitably by private industry, if government will furnish the incentives, and you can see examples of this happening in our sister country to the north, in Toronto and Montreal where they have done that and where the less fortunate people financially are still able to

have the kind of amenities that only have been available to the wealthy before, you know, and still provide green space so that we will not have these concrete canyons that the mayor speaks of and which have been the source of so much crime. It is a terribly, terribly important kind of concept, and it is a matter about which this government should have a major interest.

Chairman MOORHEAD. Mr. Boland, do you have any comments?

Mr. BOLAND. Mr. Chairman, if I could respond to go back to what I originally said in my opening comments if the Metropolitan Council concept of regionalism in the Twin Cities has any value that is it, to provide some kind of growth policy as indicated there which we are now trying to do, and then to fit the subsystems into that growth policy, but we have to know basically what the transit facility is going to be before we can do that, and I guess that is the purpose of your inquiry this morning but I think, again I share the comments and feeling of Mayor Orr and Mayor Jackson. This is a very important ingredient of urban America. Our quality of life has got to be maintained and we have to know once we develop the policies of our own growth and our own determination where transit will fit that.

Chairman MOORHEAD. Mayor Jackson, I want to discuss your nodal concept. Your prepared statement mentions, as Mayor Orr has, that a transit stop could include services and the like, and also relatively high density development. As you move away from the station, development would be less dense.

What I want to do is to see if this concept can be used to help provide the money that is needed for transit. In Toronto we can see from an aerial photograph where development is: the height of the buildings go up and down. The up part is where the transit stop is and the down part is in between. If we have this concept of the laundry and the drycleaning stores and so forth shouldn't this property be owned by the transit system and leased out to concessionares to help pay for the system? After all, when you put a stop in the property values go way up. Shouldn't the public body that is doing the acquiring and increasing the land values benefit in some way from this? Any of the members of the panel are welcome to comment.

Mayor ORR. Sure, we do that at airports, you know, why not at these terminals as well, and it can provide a means of local help, you know, additional local contribution and certainly we are looking forward to that sort of thing as a means of keeping down the amount of operating subsidy that is going to be required but inevitably with utilizing all of these techniques that we still are going to have to look forward to some help at all levels of government for operation.

Chairman MOORHEAD. Do you have a comment, Mayor Jackson?

Mayor JACKSON. Yes, I have, Mr. Chairman, I am not quite sure what position I would take on your question but I do think of one major negative which may or may not be offset by the benefits you have suggested. The major negative is that you would then have more and more potential development that is not paying taxes; that is, not being subjected to the tax digest in areas where you could have tremendous increases in the tax digest. That is of conern to us even though our digest is increasing at the rate of about 4.7 percent per year. Costs for the delivery of city services are spiraling about 7 percent per year, so that is one concern. I am not quite sure whether or

not, however, what you suggest might be the benefit to offset that detriment. I really have not considered the question before.

I do think either way, very careful governmental control of the development of these highly impacted areas is a necessity. Whether it be through Government control by ownership, as you suggest, or whether it be through rules and regulations, zoning ordinances and planning codes specifically, is a matter which I think we would have to give some very careful consideration to.

Mayor ORR. You would not have to have governmental operations of the various concessions, but you could handle it the same as you do in airports, with the Government having the ownership of the land and leasing out the concessions.

Now, then I think, too, you could have high-density developments around there that could be totally private so I think we can have both aspects of it, and part, at least, will serve to take up some of the cost of this operation.

You know we have in every major airport in the country, Atlanta included, concessions at all our airports and they are operated privately, paying a fee to the Government for the provision of the physical facility, and then adjoining each airport ordinarily there are motels, hotels, and all that sort of thing. But Mayor Jackson is right, it has to be subject to very careful and very close governmental control of growth.

Chairman MOORHEAD. The way I see it, and I do not know if my idea of the three nodal rings is exactly the same as yours, Mayor Jackson, but on the first inner node would be very much the way I see the airport. There would be concessions and so forth. Here I think the transit system could logically finance part of its operations by the concession technique found in airports. The middle and outer node could be the same thing as the motels around an airport. Is there any way that the transit system or the Government can benefit from that development? Is it just the increased value of the property which would then be realized by the city—or in the case of a county airport, the county—in increased real estate taxes? Is that the only way we can benefit or is there something else we should be thinking about?

Mayor ORR. Well, you know, most of the instant ecologists who are on the scene today seem to have an idea that low density is the answer to all problems. I do not think that is true, and I think that through the awarding selectively of high density zones we can increase the tax role, make it economically feasible for developers to develop affordable housing, you see, and better plan our total community. It is much easier to furnish governmental services to concentrated areas, and who would not rather live in, you know, say, in San Francisco than in Los Angeles, which has a tremendous problem with urban sprawl, and most of their air pollution is a result of the automobiles that clog their many, many miles of expressways. I do not think we all have to make that same mistake.

Chairman MOORHEAD. Thank you.

I notice that both the testimony of Atlanta and Miami had referendums on mass transit. What about the Twin Cities area?

Mr. BOLAND. Mr. Chairman, we have not had any and I do not know but I suspect that maybe an alternative that the State legislature would take. Basically, the decisionmaking process there would go to

the legislature. Now they could of and by themselves say, "We won't solve it, we will have a referendum to do that," but all indications we have in the last two sessions particularly, was the legislature would simply solve the problem, take the choice of mode and then figure taxes on it accordingly. There have been no indications at this point that there will be any referendums involved.

Mayor ORR. Mr. Chairman, I was in Toronto and talked to some of their planners, and we are learning a lot from them, incidentally, and having a number of people come down to our community very shortly, and I was discussing the speed with which they were able to operate, and a principal planner up there said, "You know, your metro charter starts out with the people of Dade County seeking to provide a more efficient government, and so forth, our program starts out with Her Majesty, the Queen, proclaims."

Chairman MOORHEAD. There are some differences.

In another capacity, serving on the Housing Subcommittee, I went to Toronto to look at their mass transit system and it really is very impressive.

Mayor Orr, you used the term "fixed guideway." Does that in your mind mean steel wheels on steel rails, or are you considering other types of systems?

Mayor ORR. It is a combination. We have not made a decision. That is what our preliminary engineers are looking into.

There are several alternatives. One is the system such as BART has where there are concrete pylons, this above ground, on the ground, and underground there. We could not go efficiently underground in Dade County, Fla., on account of our problem with the water table, and so forth, but they have a fixed guideway and they have steel on rail. Montreal has a fixed guideway on rubber tires. Toronto has a fixed guideway on rail, steel on rail. There is a new system that we are looking into that was designed. I believe, by a Swiss designer who initially designed skilifts who is, who has a system that is being—there are some pilot projects now in Europe, where they are utilizing a wire system that is maybe one-tenth the cost of the other.

We are considering all of those possibilities. But basically, we are talking about a fixed guideway as opposed to a bus system that would travel on any road as it saw fit.

Chairman MOORHEAD. Basically, what you need for rapid transit is a separation of the system from competition with general traffic, is that not correct?

Mayor ORR. Precisely.

Chairman MOORHEAD. Whether you use wires, water, steel rails, or rubber tires and concrete.

Mayor ORR. Precisely.

Chairman MOORHEAD. It has got to be separated.

Mayor ORR. That is right.

Chairman MOORHEAD. Yes, Mayor Jackson.

Mayor JACKSON. That clearly is the case for rapid transit. Mass transportation as a concept can be multimodal, so that you can have fixed rail or other means of rapid transit. You can also have rapid busways as well as a supplemental system of much improved but transportation on regular streets. A combination of these is what is planned for Atlanta.

One more comment about this nodal concept, the tritiering idea. To go back to the white flight problem, though really it is not only whites but all middle- and upper-income people, they find more housing options in the suburbs of Atlanta than they find inside the city. One of the things we want to do is to spur more construction of better housing; good, decent, safe, and sanitary housing for all people, but to have an economic mix wherever possible. Frankly, as desperate as the need is for us to build better housing for low-income people and moderate-income people, there is also a very strong need for us to build better middle- and upper-income housing in our city to attract and keep in our city people of all incomes. We believe that the nodal concept will do this and we will be able to better influence through our planning codes and zoning codes the cost of the housing which will be made available to the people around the transit stations as they are spurred on by their development through very intense speculation. It is already starting now.

Chairman MOORHEAD. Mayor Orr, at one point in your prepared statement you talk about an automated system. What study have you given to this system? I am not talking so much now about the technology but about the factor of safety. There have been many allegations that if you could automate, for example, the New York subways, the safety factor would be so negative that it is not workable.

Mayor ORR. Well, we are looking into that and looking into places, these are primarily in Europe, where they have been successfully used and our preliminary engineers are examining that as another possibility, and not an exclusive one, of course, but for utilization in some parts.

You see, one other way, I would like to add, I mentioned it but I would like to reemphasize it, most of our travel in Dade County is north-south and it runs along that narrow ridge with the Atlantic Ocean on one side and the Everglades on the other. We found through looking into some water modes, there are these hydrofoils and when you get on the inside of these they look all the world like a fine jet aircraft. They have been able to make a run from 125th Street in North Miami down to the center of our city in 12 minutes. It takes about 35 minutes to make that trip by car, and we have conducted a similar experiment from the south into the center city. That is another possibility we are looking into in building this overall public transportation system.

Chairman MOORHEAD. Mayor Orr, I am afraid I did not make myself clear, I meant crime on the subway trains. If you do not have the conductor, the guard, and so forth, and just use an automated system.

Mayor ORR. Well, I do not think any system can be really totally automated for the very reasons that you are pointing out. You know, we cannot get away from the necessity of utilizing the human being and I think sometimes these days we are becoming overcomputerized. I saw a study recently made where, at some university, all of the information that existed at the time the automobile was invented, just before it was invented, with respect to transportation was fed into a computer, and the conclusion that came out of this computer having all of the information that was then available was that by 1950 the major cities of the United States would be covered in six inches of horse manure so that, you know, you cannot make too great a reliance on what we put

into these computers. It is still the information that goes in and it is the information that is available at the time, and I do not think we can do away with the necessity of human participation.

Chairman MOORHEAD. Mr. Boland, you had mentioned automated fixed guideways in your prepared statement.

Mr. BOLAND. Mr. Chairman, could I respond just briefly to that question of safety for a minute? I think it may be worth the committee's effort to find out, if you have not already done so, I may be presumptuous, what happened in Denver on their referendum. I think one of their selling points to the voter was that the so-called PRT or smaller vehicle was safer than the large one even though perhaps more automated. Obviously, I guess it was, and it seems to me after visiting with some of their transit people who actually sold the program to their voters which they are now about to implement, that was a factor that a smaller car and activated demand origin and destination type of thing would be more amenable to safety because you can in essence keep someone off you did not want because it was your car. I guess that is the concept.

We have in our particular area been designated by the State legislature to go with the Metropolitan Transit Commission, to come up with a study of so-called PRT or the actual language in the legislation is small vehicle transit alternatives.

We, as Atlanta and Miami have, obviously included some form of fixed guideway. Although it is only a small part of the system, the plan as it now stands, as is in the prepared statement, calls for 57 miles of fixed guideway. The question, of course, now is what can we get for our money if we go to a smaller vehicle systems, can we get more guideway system or what have you? But it is only a small part. Busways, carpooling, and so on, will continue to be a major ingredient in that. But we have to come back to the legislature by January 1975 with that study, so that is in essence where we are at the present time. We do have a plan which does include a 40-passenger rail on rail, 57-mile fixed guideway system. The legislature seemed a little uncomfortable with that, particularly for the amount of money being spent, and have asked us in the Transit Commission to come up with a study of the other kind, the smaller fixed guideway.

Mayor JACKSON. Mr. Chairman, I wonder if I could respond to two points. One is about the automation, and you specifically mentioned New York City. I think that in the case of most non-fully-automated systems they have persons who are there to run the system, as well as security. It seems to me that automation would simply eliminate one group; namely, those who are the conductors and so forth; but you still could have your security. The question of physical safety would not be the most prohibitive one.

Back to the question of who owns the land at the nodes around these stations. I guess maybe the reason we had not done too much thinking about this, Mr. Chairman, is that MARTA is a State constituted authority and surely we would want to think twice before urging MARTA to own the land around the stations in Atlanta. However, I think it certainly deserves some consideration.

Chairman MOORHEAD. It comes back to the point that Mayor Orr was making about the State governments and the urban governments and the conflict between them.

Mayor JACKSON. Yes.

Chairman MOORHEAD. Since this is a subcommittee of the Joint Economic Committee, I would like to get back to operating costs and what is the nature and size of the subsidy that would have to be financed at some level of government or some levels of government? I suppose that Atlanta, where the fares were 40 cents and were reduced to 15 cents, and the commitment has been made to continue that level of fares, might start to answer that question. What do you see as the operating deficit that has to be made up by some level of government?

Mayor JACKSON. Mr. Chairman, MARTA has a number of persons who have appeared before either this or other committees to present very specific testimony on that point. I would not want to speak off the top of my head in a manner which might contradict what they have said but I will give you the best recollection that I have. In Atlanta's situation we are in pretty good shape if we have anywhere near the kind of commitment that we thought DOT was making to us through UMTA. We think we will be able to do what we have to do with the 1 cent sales tax. We also think other counties are going to be coming into the system as they see more clearly the benefits to be derived from MARTA.

I would suggest to you that our hope nevertheless is to have an 80 percent funding level from the Federal Government.

But now, it has been suggested by some people that what we might want to do is to raise our 15-cent fare and, Mr. Chairman, even if it means not building that system we cannot, we must not, breach the faith with the people by raising the 15-cent fare. It is more than a casual comment, it was, in fact, a condition precedent to a commitment made by the people of Atlanta. It was there as an inducement based on which the people cast their votes, and that commitment was to have, for 7 years, the 15-cent fare. So whatever we do we are bound by that commitment.

Chairman MOORHEAD. Mayor Orr.

Mayor ORR. Our exact experience in the past, our present transportation authority which is being converted now into the Dade County Transportation Department, operates buses on 15.3 million route miles per year carrying 54.6 million passengers. The subsidy last year totally made up by local funds was $4,025,000. We expect, of course, with the greatly expanded service, that the fixed guideway system, plus the vastly expanded feeder system that we would increase that, both the number of route miles and the number of passengers dramatically. Presently, we paid that deficit this last year of $2.950,000 out of a 7-percent gas tax that the State permitted us to utilize, and we used a million dollars of our Federal revenue sharing funds for that purpose, and some $75,000 from a minibus operation that we have also installed.

But I would think that—I doubt that operating subsidies would have to be at the same level from the Federal Government's viewpoint as the initial construction. I think that we would need some Federal help but I doubt that we ought to be calling on the Federal Government for that higher percentage of operating funds but I think there has to be some recognition by the Federal Government that this is a public service that major areas have to be assisted with the precise level of which I am unable to even suggest.

Chairman MOORHEAD. So you are saying that in the Federal Government, we should be concentrating on capital funding and maybe in later years some assistance for operating subsidies?

Mayor ORR. Initially, I would. But, you know, you have to consider I am interested in Dade County, of course, but you have to look at a place like BART. Now, those people out there put up $800 million in front without any Federal assistance whatsoever, and I think that is a tremendously admirable undertaking.

The State legislature fastened upon them the necessity of operating out of the farebox, and that has been one of the major causes of the problems that BART has faced, and it seems to me that they, having made that, you know, very substantial local contribution they should not be penalized. They ought to be getting some Federal help. This is none of my business, but it is another major urban area and, in that sense, it is the business of all of us, ought to get some substantial help.

Mr. BOLAND. Mr. Chairman, if I may respond to your question. I am not sure of the exact total figure but the projected deficit for the Metropolitan Transit Commission of the Twin Cities area for this fiscal year will be $91½ million due primarily to the fact, I suspect, that the 30-percent bus fare, which is, unfortunately, double that of Atlanta, has been frozen at that level since 1970 and I suspect our credibility is also at stake if that were to be touched and we had to go to a system. It seems to me that the public is much more willing to accept the increase in mill levy to do that at this point than they are to raising the fare.

There is considerable debate going on at this point as we have zones, as we find the cabs in this town do also, we have zones for mass transit in the Twin Cities area, and the legislature almost put a 25-cent-across-the-board limit on all zones and that could get to be, for the Transit Commission, another $3 million they projected in deficits since we have 3,000 square miles to cover, but they did put a limit on it of 50 cents. So the most anyone could pay when they got on a bus for their initial trip or a trip no matter how many transfers is 50 cents and that, of course, increases the deficit but it also increases ridership. But it does impose a problem as we look at the development framework and how we would like to control that type of growth. Does this contribute to urban sprawl which we are trying to get a handle on in the Midwest?

Mayor JACKSON. Mr. Chairman, could I move to a point that I think was suggested by some comments made by Mayor Orr?

Chairman MOORHEAD. Certainly.

Mayor JACKSON. BART, BART despite the up-front $800 million, is still paying a 50-cent fare.

Mayor ORR. No; they have a graduated system. You pay as much as a $1.50 out there.

Mayor JACKSON. Which is one of the reasons they are having their problems, as Mayor Orr suggested. I would like to urge the committee to consider that our taxes pay for highways and, in most instances, those who ride the highways are not charged extra to ride a car down the highway. Gasoline taxes as well as other taxes are going to have to be used for a system of urban transportation by mass transportation which has no fee attached to it. I think it is justified now, but funding it and moving philosophically to that position poses some pragmatic problems: not for me but for those who make the laws. In that connection, therefore, we are talking about deficits, and who funds how

much. Ideally, Mr. Chairman, whichever government is needed to do the funding ought to be there with the funds through whatever means necessary, but not by charging additional fees by way of a fare to ride the rapid transit or the buses and otherwise.

Mayor ORR. This can have its impact on capital outlay. Millions of dollars have been spent at BART just on their fare-collection system so that to attempt to operate out of the fare box can increase, does in fact increase the capital outlay.

They have a very sophisticated system where you go in and buy a ticket, maybe a dollar ticket, and you ride and when you get off you stick that ticket in a machine and if you have a refund coming you get a slip saying that and if you have not paid enough they say, "Stop you can't get through this gate," you have got to go to another machine and insert more money and get another ticket. It is a tremendously expensive sort of operation.

One other interesting thing, I noted in terms of how you operate these things, I was in the control room at BART, and you get to thinking well, this is sort of a railroad operation, and I happened to ask the manager of this room, I said, "What did you do before you came here?" He said, "I was a B–52 pilot," you know, tremendous differences in the areas of competence that you need to operate these things.

Chairman MOORHEAD. While we are on this subject, as you know, there has been a great deal of criticism about the cost-effectiveness of transportation expenditures, particularly for rail rapid transit systems. I do not think that it matters whether it is rubber on concrete or steel on steel. Yet each one of you, as I understand it, is proposing for your core system some form of guided rail or other fixed guideway transit systems. How do you answer these criticisms? BART, in particular, has been criticized for being tremendously expensive and for its cost-effectiveness.

Mayor ORR. Well, I think this, I can answer that, because I have seen the cost-effectiveness survey and I suggest to you that was prepared by road builders, and I have seen two responses to that. I believe that the fixed-rail system is the most cost-effective system in terms of moving more people more rapidly from one point to another, and I think there have been a couple of answers to that. I had a report that came out. In the first place, my understanding is that study was initially authorized during the Kennedy administration, that it was received and rejected as containing so many fallacies that it was unworthy of publication, that it was later published by a private organization and then adopted by this administration. There have been, and I have available and can make them available to the committee if you do not have them, two very fine answers to that. I have a report that suggested that fixed rail is the most cost-effective.

Then, you have to think of other costs that Mayor Jackson was referring to. How about the cost of covering a community with concrete, is that something that you ought to be concerned with? Is that a cost? Sure it is. How about the cost in air pollution, when you are relying on a system that calls for private automobiles or just buses, is that a cost? That is a very real cost to people, you know, in all kinds of terms, health, among others. So that I think the argument that was made was fallacious.

I suggest to you that it was the—prepared by the very effective and extremely powerful road building lobby and it has no relationship to reality.

Chairman MOORHEAD. Have you any comments, Mayor Jackson?

Mayor JACKSON. Being a descendant from three Baptist preachers, my comment is, amen.

Chairman MOORHEAD. Mr. Boland. You cannot be any briefer than that.

Mr. BOLAND. That is true.

Mr. Chairman, I might make one slight correction. While the plan in the metropolitan area of the Twin Cities did include a fixed guideway in the core urban area, I think there was some hesitancy on the part of major decision-makers other than the transit commission, including the metropolitan council, to proceed with that, and we have in our development guide a firm commitment to something called regional diversified centers and we obviously have a question as to whether that met that or not and I think the legislature reflected that when they authorized us to go ahead with the small vehicle transit study. The transit commission which is charged with solving mass transit problems obviously does have 57 miles of fixed guideways in it, that is correct.

Mayor JACKSON. Mr. Chairman, one thing more, if I may. I think what is most cost-effective depends on where you are going to build. For our city the preliminary engineering for MARTA went on before the first referendum. It received some extensive modification before the 1971 referendum and in all instances the most effective for Atlanta was considered to be the fixed rail concept but multimodal; namely, fixed rail, rapid busways, crosstown bus lines, feeder lines, and so forth. So for Atlanta this was considered to be the most cost-effective.

Chairman MOORHEAD. Well, let me then ask each one of you what kind of a system—assuming each of you will say multimodel of some form—would you set up for your areas of densest population; for areas of medium densities, and finally for areas of suburban type densities? What would you use for the interface or interchange? Would you use exclusive busways? Would you use the jitney concept that Professor Hilton gave us a few weeks ago to connect certain elements to your core system? I gather from the three of you that the core system would be some sort of fixed guideway with most of you saying steel rail? What is the best system for our cities, particularly for the cities that you know best?

Mayor JACKSON. I am not qualified, Mr. Chairman, to comment on any system, any city other than my own.

In Atlanta, I think we have designed, although clearly it is imperfect, the best system for Atlanta from several different points of view. One of them is that we have a fixed rail system on a cross pattern, one major north-south line and one major east-west line crossing at a major central station.

One of the reasons for this is that historically Atlanta's bus patterns have required one to come to central city Atlanta. Even if you were going from northwest to northeast in our city you would still have to come into the heart of Atlanta and then go back out again. Now, that was kind of silly except that we have one of the healthiest central city business districts in this country.

What we are going to do is to maintain that central city business district as a thriving one. We now have coming out of the ground in the central area Five Points, where five streets converge. Within 2 miles of Five Points we have $1.7 billion coming out of the ground now in new construction. I do not mean MARTA either. Within 2 years we have another $2 billion coming out of ground in new construction. It is like a boom town. We want to maintain this by having the central crossing of the lines emphasizing downtown; creating more living downtown and more recreational opportunities downtown. At the same time we want to be able to serve the particular interests of other neighborhoods. This is why we will have cross-town busways for the first time. From northeast to northwest you will be able to go cross-town without having to come to the central city. We also will have the fixed busways to accommodate areas where we have expressways with adequate space for that purpose.

One other thing I would like to suggest is a particular favorite of mine. Its feasibility is now under study by the Atlanta Regional Planning Commission, which is our Council of Governments. It is a dial-a-bus. Many people think it is fiscally not feasible. If it can work fiscally then I think it is a great idea. It gives you tremendous flexibility. It also lets you load up your buses and maximize the use of the equipment you have by smaller units: Smaller bus units that are radio-equipped, that are zone controlled, that can be called to someone's house when they need to get a bus. It is under study in several American cities and a couple of Canadian cities.

Mayor ORR. It is my view that the fastest means should be primarily utilized to get working people to work. We have, you know, a substantial number of tourists in our community each year. We think that bus systems generally can serve them adequately and we would opt, of course, as I have stated earlier, for a multimodal type of system, but the thrust ought to be, in my judgment, giving greater flexibility to working people in terms of where they live and how they can get to their jobs and back.

Chairman MOORHEAD. In Miami you are different from Atlanta, which is a round city. You are a linear city.

Mayor ORR. But we are planning one crosstown or one east-west because our largest private employer and the largest site of employment in Dade County is at our airport, so that we need to provide means of moving people to and from that airport, working people. Eastern Airlines, for example, is our largest single private employer in Dade County.

Chairman MOORHEAD. I think that is very interesting because I think the problem of transit to and from airports has been one of the most neglected subjects of transportation. In my city we have only highway transit. To go to Dulles Airport in Washington, we have only highway transit and so forth.

Mr. Boland, would you tell me what your optimal transit system would be?

Mr. BOLAND. I am almost hesitant to do that because it gets me in trouble. I would point out I am speaking simply as an individual not as a transit planning. I guess in the Twin Cities where we are sprawled considerably over the 3,000 miles, a fixed guideway system united in the core cities may not be the major ingredient necessary.

Obviously, it may be part of a total multimodal picture, there is no question about that. But I guess we look back at the basic question of moving people, as the major pointed out, to their jobs. And it also seeems to me that this small vehicle transit study we have underway may provide for us hopefully, as it did to Denver, an answer which is both economically feasible and, at the same time, attractive enough so that we can get people to do that and I guess I personally at this point would opt for that if that study comes out that way. If it does not we may be forced by public pressure and political pressure to build a fixed guideway system.

Chairman MOORHEAD. You just mentioned the movement of people, which is what I think of when we talk about transit systems. But Mayor Jackson in his prepared statement says little or no attention has been paid to the movement of goods and services or the movement of waste. That statement rather intrigued me because traditionally when we talk about transportation we are talking about people. If there is some way we can combine these movements to make the whole problem more economical, I think it is a good idea.

Mayor JACKSON. Mr. Chairman, the incentive for that idea is the down time of a transit system. There is never a complete down time but there are times when the movement of people is quite minimal. This occurs usually at night. Most cities, in fact, move their wastes at night. I do not know if this is a feasible idea but we suggest it is worth looking at. Not only that but also the movement of goods, transportation of produce, for example, and other things at odd hours that are not occupied by the movement of people. We think it is worth looking at.

Chairman MOORHEAD. We appreciate your testimony very much. Your thoughts have been a great help to us. This last item you mentioned, the movement of produce is particularly interesting. If you see that, you have to be up very early in the morning. The highways and the streets are jammed with trucks unloading produce at various warehouses. If this could be integrated into a mass transit system with different types of vehicles, moving things at times when very few people are moving, it would be most helpful.

Mayor JACKSON. I have enjoyed the privilege of appearing before you and the subcommittee and sharing the ideas of Atlantans. We need your help.

Chairman MOORHEAD. Mayor, we have appreciated the help you have given us.

Someone said this is the think tank of the Congress. This is not the subcommittee that will come out with legislation tomorrow to take care of you. We are thinking at least 3 years ahead.

Mayor JACKSON. Yes, sir.

Chairman MOORHEAD. I think a lot of our legislation has been understandably a little on the hit or miss side. Do we use the highway trust fund: do we provide capital subsidies; do we provide operating subsidies? Nobody has thought carefully about the broader picture. In fact, transportation problems have been fragmented in various committees in the Congress. At any rate, thank you, Mayor Jackson. You are excused, as we are going to finish in a very few minutes.

I did want to ask you, Mr. Boland, a little bit more about the pooled van concept. This is a new one to me and I think we would be inter-

ested to know how it got started, how you promote it, and what are the essential ingredients?

Mr. BOLAND. Mr. Chairman, at this point it is basically a private industry experiment. There is no public money in it, and it started, in my understanding at any rate, with the Minnesota Mining and Manufacturing Co., which is located on the east side of St. Paul, which is basically away from the transit area; it is away from the developed areas of the metropolitan area, and they decided that it made sense to them if they could computerize their employees as to where they live, supply vans, Econoline type vans, for them, and they started on a very small basis and it just literally exploded.

The way the program works now is this: The driver to maintain this thing, is given the vehicle to use. He has an obligation of picking up whatever number of people are involved, and it averages somewhere between 11, 12, or 13 passengers per trip, and they pay $24 per month for their ride to and from work and it generally comes from their neighborhood.

Now, obviously, in some neighborhoods it is much more convenient. I was told by the person in charge of this at one point there was one van that had to go only two blocks and it was full and then on others, of course, it would have to travel several miles. Currently now there are 56 vans involved, carrying 630 people and there is a waiting list of getting 1,400 in the program. There are other things catching on in the Twin Cities but this was and still remains basically the incentive coming from private industry to help with the problem as they see it. I guess, to be very candid, when it started they were faced with building a new parking ramp of several million dollars and this effectively has blunted that need.

Chairman MOORHEAD. It is interesting to see the old economic incentive at work there.

Do you see this as a legitimate possibility in Dade County, Mayor?

Mayor ORR. It sounds good. I had not heard about it before.

Chairman MOORHEAD. That is certainly one of the objectives of these hearings; to exchange ideas and put out a report that will give various cities the benefit of the experiences of others, so we do not all have to make the same mistakes over again.

Mr. Boland, I wonder whether the demand for this van service increased as a result of the fuel shortage we have had?

Mr. BOLAND. It was started before that but I suspect that intensified it. Yes; there was no question about that. That was when it spurted was in January and February of this year, yes; when gasoline became expensive and short, there is no question. But there is no sign at this point, even though we are told by those I guess they know that is over, there is no indication, and gas is more available in the metropolitan area now, it has not stopped, it has increased and I think what happens, like everything else, is word of mouth by the employees it is much more convenient for them to sit in the back and relax than to hassle to get to work, and I think it is also a selling point, I think, of a little camaraderie going also. It has not been totally successful. Some people drop out after a month because they do not like who they are driving with perhaps but it increases because you know, they relax and particularly if they have a long journey they may get some work done, so it is right from the front door right to your office every day and you are not driving and, as an incentive for indicating

to the driver he gets to keep the van to use for his own personal purposes in off hours.

Chairman MOORHEAD. It was a very interesting concept and I think should be explored in other cities where it might be adopted.

Gentlemen, thank you very much for giving us the benefit of your careful thought on this subject and your personal experience being right on the firing line where the citizens are.

The Urban Affairs Subcommittee will reconvene on Monday, May 6, in this same room. At that time we will hear testimony from Congressmen Bill Frenzel of Minnesota and Mr. Frank Herringer, Administrator of the Urban Mass Transit Administration, Department of Transportation. Congressman Frenzel will speak about the Urban Transport Data Act of 1974, which he sponsors and Mr. Herringer will speak about criteria the Department of Transportation has been developing with respect to the feasibility of rail rapid transit systems as a solution to our urban transportation problems.

Accordingly, the subcommittee stands recessed.

[Whereupon, at 12 noon, the subcommittee recessed, to reconvene at 10 a.m., Monday, May 6, 1974.]

# PRODUCTIVITY IN URBAN TRANSPORTATION

**MONDAY, MAY 6, 1974**

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON URBAN AFFAIRS
OF THE JOINT ECONOMIC COMMITTEE,
*Washington, D.C.*

The subcommittee met, pursuant to recess, at 10:25 a.m., in room S-407, the Capitol Building, Hon. William S. Moorhead (chairman of the subcommittee) presiding.

Present: Representative Moorhead.

Also present: Ralph Schlosstein, economist; and Michael J. Runde, administrative assistant.

## OPENING STATEMENT OF CHAIRMAN MOORHEAD

Chairman MOORHEAD. The Subcommittee on Urban Affairs of the Joint Economic Committee will please come to order.

Today the Urban Affairs Subcommittee holds its third in a series of hearings designed to suggest methods for improving the effectiveness of our urban transportation expenditures. Today we will hear testimony from Congressman William Frenzel of Minnesota and Mr. Frank Herringer, Administrator of the Urban Mass Transit Administration. Congressman Frenzel will speak about the Urban Transport Data Act of 1974, which he introduced, and Mr. Herringer will speak about the Urban Mass Transportation Administration and the role he feels UMTA should play in improving our urban transportation services.

Previous testimony before the subcommittee has suggested that it is going to be a most difficult task to improve our urban transportation services. In fact, many of our witnesses have suggested that the information available for making these important transportation decisions leaves a great deal to be desired, often leading to inconsistent transportation policies at all levels of government. As an example, some of our witnesses have indicated that our urban public transportation services should be much less capital intensive using smaller buses, taxicabs and even jitneys. Others have suggested that a major rail rapid transit system is the most important component of any strategy to improve public transportation in our urban areas. One even suggested that UMTA should be eliminated.

Certainly, in the past, our urban transportation programs have not been as successful as we might hope. Since 1965, the Federal Government has spent almost $3 billion on programs of assistance to urban mass transportation, not to mention the contributions of State and local governments. However, during this same period, the number of total annual revenue passengers has declined by 1.5 billion riders, or

22 percent. It is certainly disappointing to note that in a period of major Federal commitment to improving our urban transportation systems, we have lost a large percentage of the people who were riding urban public transportation in the past.

Today we will discuss how we might improve the effectiveness of these expenditures, thus attracting a larger share of the urban travel market to public transportation. We will discuss the development of a national transportation policy, with specific attention paid to what objectives we might want such a policy to accomplish. We will also discuss what data and information is necessary for the development of such a policy.

Finally, we will examine more carefully, what the Federal role should be in the upcoming effort to improve transportation services in our urban areas.

We are fortunate to have such capable witnesses with us to discuss these important matters. Gentlemen, we welcome you.

First, we will hear from Congressman William Frenzel, one of the ablest Members of the House of Representatives and of the Banking and Currency Committee, which has jurisdiction, at the present time, over the mass transportation legislation. It was this committee which first enacted the Urban Mass Transportation Act of 1964.

Mr. Frenzel, please proceed.

## STATEMENT OF HON. BILL FRENZEL, A U.S. REPRESENTATIVE IN CONGRESS FROM THE THIRD CONGRESSIONAL DISTRICT OF THE STATE OF MINNESOTA

Representative FRENZEL. Thank you, Mr. Chairman.

Mr. Chairman, I want to compliment you and the members of this joint committee for holding these hearings. Surely few issues are more important for our country from the standpoint of needs, projected spending, and energy considerations than urban mass transit.

I want to discuss H.R. 13493, the Urban Transport Data Act. The bill was referred to the Transit Subcommittee of the Banking and Currency Committee, which is the committee of jurisdiction under our current organization. But since the Public Works Committee is working on the President's UTAP proposal, I have also called or invited that committee's attention to this particular bill.

The bill addresses a fundamental problem: We lack basic data to measure transit use and effectiveness, and to set transit objectives.

Our basic information is minimal. We know the Federal Government has spent $2.5 billion since 1965 on urban mass transit. We also know the market share for transit has declined precipitously since World War II. We think transit accounts for 4 percent of urban trips, but some transit experts think even this low figure is inflated. I do. I am not a transit expert but I think it is inflated.

We are at last begininng to spend sizable sums on improving mass transit. I support greatly increased capital and R. & D. expenses. But we need to also do a much better job of measuring transit performance if we ever hope to use the Federal transit dollar effectively.

Today we know just enough to recognize that transit is a disaster in the marketplace. People do not pick it voluntarily. We do not know enough to make transit competitive again. In order to make rational

transit choices, whether the choices are made by local or Federal people, we need to know the critical relationships between such factors as vehicle service characteristics, costs, urban density, environmental impact and ridership.

Today we simply lack the kinds of reliable, comprehensive, reproducible measures of transit performance which would allow us to perform this basic kind of analysis.

Let me cite just a couple of examples of the confusion that reigns when we try to assess transit performance. One important way of measuring our progress in achieving a more balanced transportation system is to compare changes in transit's market share over time. We need to know what the market picture is today if we are going to be able to judge our progress in achieving a more balanced transportation system and to compare changes in transit's market share over time. We need to know what the market picture is today if we are going to be able to judge our progress in achieving a more balanced transportation system down the road. Earlier I cited the figure of 4 percent as transit's current market share. When I originally tried to come up with that piece of information I was surprised to learn that neither UMTA nor the American Transit Association nor the Library of Congress had the information. By accident I later came across a reference put out by EPA which gave the 4 percent figure. Right or wrong it is pretty small and sufficiently fuzzy, so we should look for ways to sharpen it.

In the absence of good information, the transit statistics game is played with little restraint by those who have an obvious interest in demonstrating a maximum amount of progress. A recent article in Passenger Transport, the American Transit Association's weekly newsletter, provides a good example of how the numbers game is played. The front page headline in the March 1 edition reads: "Transit Ridership Continues Dramatic Rise." If true, that would, of course, be wonderful news. The story goes on to say that January 1974 ridership was up 5 percent over January 1973. Fortunately, in this case, the reader is also given a chart which is supposed to depict this dramatic transit comeback. In fact, it does nothing of the kind. At the end of the long downward slide of transit patronage is this microscopic little upturn, so small that they have an arrow pointing at the bulge in case the reader missed it.

This is it, Mr. Chairman—transit ridership continues its dramatic rise. Almost off the scale with a little bump, which if you have bifocals, like I do, you can find it.

Chairman MOORHEAD. Would you like to have that made a part of the record?

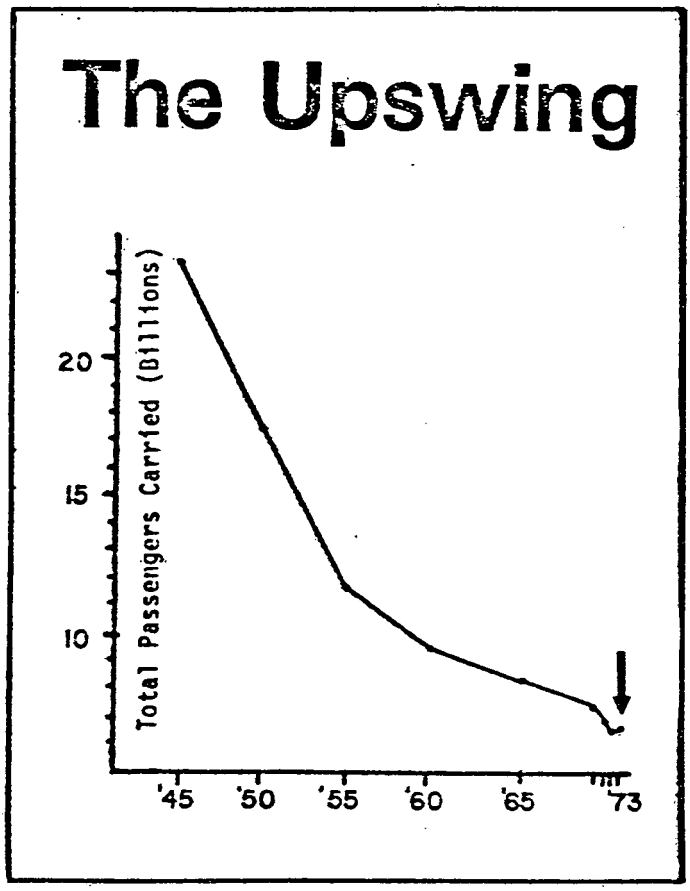
Representative FRENZEL. If you wish it. It is my only copy and it is the biggest laugh we have had in the office in ages and I hate to part with it.

Chairman MOORHEAD. I think we can arrange to have a copy made.

Representative FRENZEL. Thank you, Mr. Chairman.

Chairman MOORHEAD. Without objection, it will be made part of the record.

[The chart follows:]




Representative FRENZEL. The graph shows that transit carried over 24 billion passengers in 1945 and currently carries only about 6 billion. The recent increases, however modest, occurred only because of the energy crisis. We hope the increases will continue but we have no guarantee that they will. Even if we could somehow sustain a 5-percent annual rise in transit patronage and made the doubtful assumption that per capita trips and urban population remained constant—which, of course, they will not—it would take 40 years just to bring us back to where we were in 1945. Even if we achieved that unlikely success, we probably would not say we had a balanced transportation system.

We do not even have a very accurate way of measuring what constitutes a transit trip. One common method of estimating trips is to count the fare box. One obvious problem with this approach is that the person who takes the commuter train in from Long Island and switches to a cab or subway in order to get to work is counted as two passenger trips, although commonsense tells us this is really one trip on two different carriers. Nor can we normally distinguish between short and long trips. A 5-block trip looks the same in the figures as a 50-block trip.

Another side of the problem surfaces as communities across the country try to come up with the right long-range transit development plan. The controversy surrounding the proposed $6.6 billion transit system for Los Angeles is a good case in point. The people who think the proposed subway is great will tell you that it will at least quadruple transit ridership. Skeptics point out that Los Angeles transit now accounts for about 2 to 3 percent of total trips and quadrupling almost nothing is still almost nothing.

My purpose is not to take sides in the Los Angeles transit controversy. The same sort of manipulation with billion dollar stakes is going on in cities throughout the country. My own area of Minneapolis/St. Paul is locked in the same kind of struggle over just what the numbers mean and what our transit goals should be. Since there is no common framework for looking at transit performance, there is no rational way to guide our transit spending decisions.

The Congress has been no better equipped to make informed transit decisions than State and local officials will be if we adopt the administration's formula grant proposal. Governor Shapp wrote me that the Department of Transportation in Pennsylvania has undertaken exactly what my bill seeks to accomplish, but he adds that they are inhibited by only being able to look at one State. He adds, and I quote, "We have already found that gross industry statistics are only deceptions when it comes to specific application."

The problem has been serious enough at current spending levels. It will become even more serious if we begin pumping out $2.5 billion annually as proposed in UTAP's. I support the additional funding but only if we have the data to establish objectives and the feedback to assess whether program objectives are being met. I believe the Urban Transportation Data Act or something like it is absolutely necessary to arm local people with the data on which to make reasonable decisions.

The bill would create a three-member Transport Data Board within DOT. The three-member Board would be appointed by the President subject to Senate confirmation. One member of the Board would be a representative of the mass transit industry, another representative of automotive transport and highways, and a third representative of the general public. The Board would have the responsibility of devising a system for the collection of uniform, reliable, complete and objective data on the performance of urban transportation systems.

I understand that UMTA is going to make a special effort to improve their data collection services and have indeed instituted a system which they call FARE. Now, I have no reason to change what they are doing, in fact, I applaud the fact that they are doing it. On the other hand, I do not think they are going to be able to do it unless they have specific authority such as contained in my bill or some variation or even their own bill that will give transit operators the obligation or States to report to them, otherwise they will get exactly what they get now, which are the figures that people find convenient to give them, have enough time to give them, or indeed want to give them. to support the kind of programs that the transit operators are promoting.

The information that this bill would provide will not guarantee quick and easy solutions to what is obviously a set of very difficult and complex problems. But if we do not have this information, we stand

a very good chance of spending he very large number of transit dollars, perhaps not foolishly, but not most effectively. So I respectfully urge that this committee in making its transit proposal make a part of it the need for good data reasonably obtained so that we can make these sensible decisions.

Thank you very much, Mr. Chairman.

Chairman MOORHEAD. We want to thank you very much for an excellent statement, Mr. Frenzel.

I think you make a very dramatic point that the Federal Government, if it is going to participate at all in mass transit, which we both agree it should do more than just spread money around. It should be able to say from the information developed that this system was successful in one city and that system in another, depending upon population, density and other factors.

Representative FRENZEL. Exactly. This system is going to cost *x* number of cents per mile capital costs and operating costs and it will develop this many riders if you are similar to this location over here.

At least give them a hint of what a particular system might develop for a particular locality.

Chairman MOORHEAD. You put your board within the Department of Transportation. Have you considered whether it would be more independent and more authoritative if it were located outside DOT, as an independent agency?

Representative FRENZEL. I did, and that was really the first consideration, Mr. Chairman, but independent boards offend my sense of original nicety and sometimes I think it is properly said that they have less effect operating on the outside than they do on the inside. The Urban Mass Transit Agency is our mass transit agency. It should have inputs, it should in fact control. I made it a board to make it independent of some kind of bureaucratic policy, so that it would retain a little independence. I really would not object if you even made it a part of the agency. To me it is far more important we give them the authority to get the information. Whoever does it is far less important than that it is done.

Chairman MOORHEAD. I certainly share that thought. Thank you very much for your contribution to the hearings of this subcommittee, Congressman Frenzel.

Representative FRENZEL. Thank you very much, Mr. Chairman.

[The prepared statement of Representative Frenzel follows:]

PREPARED STATEMENT OF HON. BILL FRENZEL

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Today we know just enough to recognize that transit is a disaster in the market place. But we don't know enough to make transit competitive again. In order to make rational transit choices, whether the choices are made by local or federal people, we need to know the critical relationships between such factors as vehicle service characteristics, costs, urban density, environmental impact and ridership. Today we simply lack the kinds of reliable, comprehensive, reproducible measures of transit performance which would allow us to perform this basic kind of analysis.

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The chart[1] shows that transit carried over 24 billion passengers in 1945 and currently carries only about 6 million. The recent increases, however modest, occurred only because of the energy crisis. We hope the increases will continue but we have no guarantee that they will. Even if we could somehow sustain a five percent annual rise in transit patronage and made the doubtful assumption that per capita trips and urban population remained constant, it would take 40 years just to bring us back to where we were in 1945.

We don't even have a very accurate way of measuring what constitutes a transit trip. One common method of estimating trips is to count the fare box. One obvious problem with this approach is that the person who takes the commuter train in from Long Island and switches to a cab or subway in order to get to work is counted as two passenger trips although common sense tells us this is really one trip on two different carriers. Nor can we normally distinguish between short and long trips. A five block trip looks the same in the figures as a 50 block trip.

Another side of the problem surfaces as communities across the country try to come up with the right long range transit development plan. The controversy surrounding the proposed $6.6 billion transit system for Los Angeles is a good case in point. The people who think the proposed subway is great will tell you that it will at least quadruple transit ridership. Skeptics point out that L.A. transit now accounts for about 2–3 percent of total trips and quadrupling almost nothing is still almost nothing.

My purpose is not to take sides in the L.A. transit controversy. The same sort of manipulation with billion dollar stakes is going on in cities throughout the country. My own area of Minneapolis/St. Paul is locked in the same kind of struggle over just what the numbers mean and what our transit goals should be. Since there is no common framework for looking at transit performance, there is no rational way to guide our transit spending decisions.

The Congress has been no better equipped to make informed transit decisions than state and local officials will be if we adopt the Administration's formula

[1] See chart, p. 104.

grant proposal. Governor Shapp wrote me that the Department of Transportation in Pennsylvania has undertaken exactly what my bill seeks to accomplish, but he adds that they are inhibited by only being able to look at one state. He adds, and I quote, "We have already found that gross industry statistics are only deceptions when it comes to specific application."

The problem has been serious enough at current spending levels. It will become even more serious if we begin pumping out $2.5 billion annually as proposed in UTAP's I support the additional funding but only if we have the data to establish objectives and the feedback to assess whether program objectives are being met. I believe the Urban Transport Data Act would help fill this information gap.

The bill would create a three member Transport Data Board within DOT. The 3 member board would be appointed by the President subject to Senate confirmation. One member of the board would be a representative of the mass transit industry, another representative of automotive transport and highways, and a third representative of the general public. The Board would have the responsibility of devising a system for the collection of uniform, reliable, complete and objective data on the performance of urban transportation systems.

The information that this bill would provide will not guarantee quick and easy solutions to what is obviously a set of very difficult and complex problems. But at least we will begin to direct our multi-billion dollar transportation programs against real problems which we can now only vaguely comprehend. I would respectfully urge that this Committee consider making this proposal a part of its transportation program.

Chairman MOORHEAD. The subcommittee would now like to hear from Mr. Frank C. Herringer, Administrator, Urban Mass Transportation Administration, Department of Transportation.

Mr. Herringer, please proceed.

## STATEMENT OF HON. FRANK C. HERRINGER, ADMINISTRATOR, URBAN MASS TRANSPORTATION ADMINISTRATION, DEPARTMENT OF TRANSPORTATION, ACCOMPANIED BY LESTER P. LAMM, EXECUTIVE DIRECTOR, FEDERAL HIGHWAY ADMINISTRATION

Mr. HERRINGER. Thank you, Mr. Chairman.

It is a pleasure to be here before this subcommittee this morning. I brought along with me Mr. Les Lamm, who is on my left. Mr. Lamm is the Executive Director of the Federal Highway Administration. I understand the subject of these hearings is urban transportation and, of course, the Federal Highway Administration has a very real interest in urban transportation as well as UMTA.

Chairman MOORHEAD. We are pleased to have you with us.

Mr. HERRINGER. Mr. Chairman, I would like to briefly discuss what we see as the role of the Federal Government in meeting the transportation problems of our urban communities and more particularly the role of the Urban Mass Transportation Administration, UMTA, in these efforts.

As you are aware, UMTA carries out its functions under the authority of the Urban Mass Transportation Act of 1964. Under the authority of that legislation we have actively participated in the improvement of mass transportation services and systems throughout the Nation. This participation has taken the form of grants for capital improvements and acquisitions; planning studies; research and development; demonstrations of new transportation ideas and concepts; training for transit industry personnel; and transportation research at the university level.

INCREASED TRANSIT RIDERSHIP

As many of you know, as Mr. Frenzel pointed out, the calendar year 1973 marked the first year since World War II that transit ridership increased. While many factors such as the energy problem and environmental awareness caused Americans to increase their use of mass transit, it is my feeling that the UMTA program has been a significant force in revitalizing transit. There is no doubt that the 15,000 new buses, the 2,000 rapid rail cars, and 1,000 commuter rail cars which have been purchased with UMTA assistance have made transit riding more attractive.

FEDERAL-AID HIGHWAY ACT OF 1973

Acknowledging the public's increased demand for, interest in, and use of mass transportation during 1973, Congress enacted and the President subsequently signed the Federal Aid Highway Act of 1973. This act permits, for the first time, the use of highway-urban system capital funds for transit (both rail and bus) as well as for highways, and permits the funding of projects involving exclusive or preferential bus lanes, highway traffic control devices, bus shelters, and fringe and corridor parking facilities under any of the Federal aid highway systems. Additionally, the act permits a locality, in cooperation with the Governor, to substitute a mass transit facility or equipment for a segment of the Interstate Highway System where State and local officials determine that the needs of the community require greater mass transportation investments. While we are still in the early stages of administering the flexibility provision of the Highway Act, I am convinced that it will be a major factor in our mass transportation programs. Several cities, including Boston and Philadelphia, have given serious indication to DOT that they prefer to spend additional hundreds of millions of dollars on mass transit, now made available under the interstate substitution provisions of the 1973 act. In addition, and probably more significant in the long run, New York and other cities have indicated that they intend to use part of their urban systems highway money for mass transportation purposes. This additional funding is both welcome and needed.

UTAP

However, the administration recognizes the need to go beyond the present programs in our efforts to generate improvements in urban transportation. To this end, we have proposed the Unified Transportation Assistance Act of 1974 (H.R. 12859), which we refer to as "UTAP". UTAP has been designed to provide a solution to several problems:

First, our 2 percent urban programs—the UMTA program and the program funded under the Highway Act—are too dissimilar, short-term, and inflexible to permit the cities to make really good, coordinated, long-term transportation plans.

Second, our really large urban areas need greater Federal financial commitments for transportation uses than are presently available through the existing two programs.

Third, some of our urban areas clearly need the flexibility to use available Federal funds either for capital or as a supplement of operating costs. By opening up the range of uses, as UTAP does, we are confident we will see better local planning, better local resource usage, and better local public transportation; and finally,

Fourth, many of our rural and small urban areas are increasingly without any form of public transportation. Although a rural bus program could offer a low-cost way of helping such areas, we currently are limited in our abilities to help fund the capital and operating costs of such systems.

UTAP proposes to meet these problems in the following way:

One, highway trust fund authorizations of $1.1 billion per year can continue to be used for urban highway and urban public transit capital investment through 1977 (as provided by the Federal Aid Highway Act of 1973). None of these dollars would be used for operating costs.

Two, apportioned general fund dollars averaging $800 million per year for fiscal year 1975–77 can be used for any urban public transportation purpose, including transit operating assistance. Let me emphasize, however, that the Federal Government's interest in subsidizing transit operations is not to pick up operating deficits already incurred, but to provide a legitimate tradeoff in evaluating alternatives for improvements to public transportation.

Three, $700 million of the general fund authorizations for 6 years (1975–1980) will be reserved for direct urban mass transit capital grants. All other funds will be apportioned by formula.

Four, an apportioned $2 billion per year in fiscal year 1978–1980 can be used for urban highway and public transit capital and transit operating assistance.

Five, and finally, the present rural highway programs would be redefined to permit bus purchases and expansion of the rural public highway transportation demonstration program to allow operating subsidies as an eligible use.

UTAP proposes a $19.3 billion program to assist public transportation over the next 6 years, $11.6 billion of which is new money. While we consider this proposal to be generous, we should caution you that this amount is not sufficient to fund each and every proposed project of each and every urban area. We believe the Federal Government should not assume total financial responsibility for funding urban transportation projects; indeed, it is unlikely that the Government could fulfill such an open-ended obligation. Therefore, we have specifically designed UTAP to assist State and local governments in meeting their high priority transit needs. We are confident that the States and local governments are capable of supplying additional funding that may be needed or required. Aside from the substantial Federal financial commitments in UTAP, we believe that its provisions permitting greater flexibility in the use of urban transportation funds will help bring about the most effective solutions to the transportation problems in our urban areas.

I want to assure you that we are concerned with the matters with which this subcommittee is concerned—the alternatives available for improving urban transportation. In addition, we are concerned about the costs of urban transportation, and developing equitable means of

allocating the Federal funds that Congress has appropriated for urban transportation.

CRITERIA

The Federal urban transportation program is at the crossroads. To date, we have been able to meet nearly all requests for funding submitted by eligible applicants. However, we anticipate that, in the near future, the applications for Federal funds could greatly exceed the availability of such funds. The increase in the Federal share for transit projects to 80 percent means that each local dollar can now command four Federal dollars instead of only two. It has always been felt that the requirement for a significant local contribution to the cost of a project helps insure that the project is really needed and is a prudent use of Federal funds. The substantial reduction in the required local participation now raises the question of whether the Department must develop guidance and policies to better define legitimate transportation needs, in order to insure relatively uniform and equitable Federal participation in the achievement of quality transportation. For example, Federal service standards might be required both to insure that all urban areas provide at least minimal public transportation service, and also to insure that scarce Federal resources are not used to create excessive service or gold-plated systems.

Consequently, over the past few months UMTA has been intensively reexamining the question of what criteria might be developed to determine the extent of our participation in major new transportation investments. Our review started with an examination of the urban transportation planning process in metropolitan areas. We found that in several cases, all alternative approaches to meeting a particular transportation need were not fully analyzed.

We have possibly reached the point where the Department should propose spelling out in detail a rigorous requirement for a comprehensive analysis of alternatives as a precondition for any Federal assistance for new fixed guideway capacity. This requirement would specify the range of alternatives that must be considered, the methodology for projecting demand, and the time horizon for system design. It should require analysis of alternative levels or qualities of urban transportation service in addition to alternative mixes of facilities providing a given level of service. I would expect such guidelines to go a long way toward constraining unreasonable, or premature investments and to insuring that maximum use is made of existing facilities before new investments are made.

The problem of equity in allocating scarce Federal funds is troubling. Should the Federal Government support a gold-plated system in one city, and a spartan system in another? Perhaps the level of Federal funding for a community should be based on the most cost-effective (or cost-beneficial) alternative. This would insure equitable Federal participation between different cities and over time. To be made fully operational, this approach would require that we promulgate procedures for the analysis of proposed projects. The procedures would specify the costs and benefits to be included, discount rate, et cetera, of the project as well as the alternatives. Further work will be required to develop this methodology for practical application in the urban transportation planning process.

Obviously, the fundamental question of Federal criteria for urban transportation investments is not going to be settled quickly and easily. We have not yet completed our study and reached definite conclusions. Even then, we will undobutedly have to take an incremental approach to refining and implementing these recommendations. I expect and welcome reaction and interaction with anyone interested in these issues.

To this point, I have been talking principally about financial assistance. The Federal Government can—and should—do more to help urban transportation than merely distribute money. I believe we should take an active role in developing and testing transportation alternatives.

I noticed in some of the earlier testimony before this subcommittee that low capital intensive means of improving urban transportation service were given particular emphasis. We agree that these approaches should be explored in greater depth, and therefore, we have requested $18,750,000 in our 1975 Budget Request to develop and demonstrate innovative transit services. We are also encouraging local areas to consider low capital intensive approaches as they plan their transportation systems—with our technical studies funds.

Over the past several years, UMTA has invested significant sums in the development of a low capital intensive "Dial-A-Ride" service—door-to-door on demand systems with centralized, computerized dispatching. We have demonstrated such a system in Haddonfield, N.J., and one indication of its success is the fact that more than 40 cities across the country now either have or are seriously planning to institute similar systems.

Another very important change that the Department has been trying to encourage is the designation of exclusive lanes for buses on existing highways. When buses are given priority on freeways, such as Shirley Highway (I–95) in Virginia and on the I–495 approach to the Lincoln Tunnel in northern New Jersey, transit ridership has soared. Exclusive lanes or other priorities for buses also need to be established in downtown areas so that additional time savings can be gained and service made more reliable. Situations where buses move along quickly while auto traffic is stalled provide a great lift to bus transit. If any of you have ridden a Shirley Highway bus by the Pentagon at 40–50 miles an hour, past bumper-to-bumper auto traffic that is barely moving, you know what I mean.

We are also interested in helping cities better plan their transportation. We recognize the need for uniform data collection, and we have instituted a Financial Accounting and Reporting Elements (FARE) project which has developed uniform financial reporting standards for the transit industry. Implementation of this system is now in progress. In addition, UMTA has inaugurated an Urban Transportation Planning Systems (UTPS) program to develop such tools as analytic techniques, computer software, and planners' manuals to assist urban planners in refining their planning approach. Under this program, a computer-based urban transportation planning system for long-range planning has been developed and is now available for use. Currently, development of a short-range planning system is underway. Results from this should be available within 1½ to 2 years.

In conclusion, I feel that the net effect of the Federal involvement in urban transit has been positive. The UMTA program is a relatively new program, of course, but it has had a good start at its initial task, which I would view as stabilizing the massive national investment in what was a deteriorating industry. We are now moving into a new era of potential expansion that will require careful consideration by both the Executive and the Congress, and hearings such as these can contribute much to our decisionmaking.

We will now do whatever we can to answer any questions you may have, Mr. Chairman.

Chairman MOORHEAD. Thank you very much. I appreciate your concluding words about the hearings contributing as that is the objective of the hearings, to be friendly and helpful critics. If at any point questions appear to be unfriendly, it is only to jog you into a goal that I am sure we both share.

As one of the Members of Congress who worked in committee on the original bill back in 1964, I am somewhat disappointed with the statement you have made. I would have thought that in the number of years—since the original bill—this again is definitely not personal—that the Urban Mass Transportation Administration could come before this subcommittee and say, "Well, we found that this method which was used in this city was successful and a different method used in another was not successful. We have developed criteria to be used when a city asks for assistance which identify those systems which should be considered as alternatives." You should be able to say, "Your population density or other characteristics are this; so forget rail and don't even think of a grade-separated system." After all, you have had almost 10 years of experience in looking at cities not only in the United States but also presumably across the world. I do not think your record—again, not being personal—is one to be proud of.

Mr. HERRINGER. I did not mean to imply in my statement that we have no expertise or understanding regarding which alternatives work and which do not work. As I mentioned, we have sponsored the Shirley Highway project, we have sponsored the Dial-a-Ride project, we have sponsored a number of demonstrated projects analyzing how different modes and methods of transportation can be and cannot be successful in different environments.

I believe that one of the underlying concepts of the program, and not only the UMTA program but also the Federal highway program, is that the people most capable of deciding what systems or what particular approach might be best for a given city are the people at the local level. I think that was one of the intents of the 1964 act, that the local choice would be preserved. I do not think it is a proper Federal role to dictate or mandate whether a local area should or should not have rail or should or should not have exclusive busways.

I agree with you, however, that we should be in a position to provide information and I think we are in that position.

Chairman MOORHEAD. This is not a philosophical argument between the new federalism and the old. What I am saying is that the localities should be able to come to you for guidance. They are not coming to have you order them not to do something. They want to know from your experience, having looked at cities in 50 States, at cities in Europe and the rest of the world, what do you recommend that they consider?

They will make their own decision, but give them some help. They have not been all over the world. You and UMTA have.

Mr. HERRINGER. We certainly should do that and we do do that. The rail-bus issue is an example. A locality might ask whether it should select a rail system or a bus system. The Department has sponsored and conducted numerous volumes of research on this issue and all this information is available to local transportation planners. In addition, as I mentioned in my testimony, we are developing a totally new urban transportation planning system to assist local planners in making these choices. I do not think this area of activities is something we have totally ignored.

Chairman MOORHEAD. Well, the emphasis sounds so much like the testimony we had from the Department of Housing and Urban Development that the local communities should make up their own minds. You talk about a rigorous requirement for comprehensive analysis by the localities. I think that it is an abdication of Federal responsibility. Some assistance should be provided because Federal taxpayers' dollars are involved.

Mr. HERRINGER. My intent is that we would set up very rigorous standards and approaches for the generation and analysis of alternatives and then insure that the local areas go through this analysis. The issue is where the analysis should be done. I agree that at the Federal level we need the expertise to review the analysis and to make sure that all of the required steps have been completed. But I do not believe we should be in a position of actually doing the analysis for the localities. Instead, we should take a leadership role, leaving the responsibility at the local area, but without "abdication". I certainly do not encourage abdication.

Chairman MOORHEAD. The reason it seems to be at least a partial abdication, is that a great deal of the research that can be done at the national level can be done once, whereas if every city has to start from scratch and start reinventing the wheel, you are going to have to have multiplication and duplication of efforts.

It seems to me one service UMTA could render is to say to the cities that:

This is the result of our research. You can certainly eliminate from your decisionmaking this sort of system or that sort of system and concentrate on these two major alternatives which have already been worked out. We tried this in Atlanta and it worked. We tried a different one in Seattle and it did not work. So do not go through the same process all over again.

Mr. HERRINGER. One of the problems in administering any national urban program is that you quickly find out that each city is somewhat different and each has its own peculiarities and unique characteristics. But again, we do what I consider to be a significant amount of research and demonstration. We have been spending $60 or $70 million a year out of the portion of the bill which authorizes such activities. We have been involved in numerous demonstrations and attempts to develop innovative transit service and we do make that information available to cities and to potential grantees.

Chairman MOORHEAD. Well, let me give you an example. Secretary Brinegar mentioned in testimony before the Senate Public Works Committee that the Department was developing criteria which will specifically determine the feasibility of constructing rail rapid transit systems in various cities across the country.

He mentioned at that time that there were no more than 10 cities which would qualify under these criteria for Federal funding to build a rail rapid transit system.

Now, it seems to me from your statement that you are backing away from that statement, which may be right. I do want to know where do we stand though.

Mr. HERRINGER. The secretary has his views about how many cities can support rail and I believe that 10 is about the current number. This number has fluctuated from time to time. It is my opinion that what the secretary is really saying when he makes that statement, is that there are relatively few cities that do not now have, or are not in the process of building heavy rail systems, that can justify on a cost-effective or cost-benefit basis the $50 million, $60 million or $100 million a mile that it will cost at least in the next 10 years to build these systems. We could agree with him on that conclusion.

As I mentioned in my testimony, for the last 6 months or so we have been deeply involved in UMTA in an exercise to develop criteria. When I started out on this project I hoped that we would be able to develop a limited number of metropolitan characteristics that could be "thresholds." For example, if a local area did not have a density of $x$ then it probably should forget rail, or if it did not have a population of $x$, or some measure of that sort. I still believe that type of threshold would be best of all worlds. However, as we analyzed the Department and received the results additional research sponsored for the purpose, it became apparent that the factors which really determine whether or not rail is cost-effective are very site specific. These include such factors as the cost of right-of-way, whether or not a right of way is available, whether you have to tunnel or whether you can go on grade, and the like. Any analysis is so sensitive to these kinds of factors that it really does not make much sense to come out with a number like density or population. Consequently, I have concluded we cannot do that.

On the other hand, you could carry this conclusion another step and say: "OK, the decision in all cities is a site specific one, why don't we go and do research in all 25 of the handful of cities that are possible candidates for rail and find out whether any of these should have or should not have rail;" and we are actually considering that kind of analysis.

Chairman MOORHEAD. To reach the conclusion, whether you reach a conclusion of 10 cities, or 15 or 8, what are the criteria, what do you look at? You have to do something to reach that conclusion, do you not?

Mr. HERRINGER. Yes. Of course, we look at costs and you look at the number of people that could be moved; we look at the alternatives of doing nothing or making marginal improvements in the present system; we consider serving the demand with bus rather than with rail; we consider a new technology or a whole range of different kinds of rail or different kinds of bus service; and, for each alternative, we analyze these on a cost basis or cost-effectiveness or cost-benefit basis.

But as I am sure the chairman recognizes, when you start analyzing the costs and the benefits of projects such as those that we are involved in, you get into very gray areas. How do you value travel time? How do you consider the environmental impacts of the decision? How

do you consider and take into account the impacts that the system would have on land development patterns? All these questions are matters of debate and so the decision as to which system is best, whatever that means, is often one of judgment.

Chairman MOORHEAD. Would it not be possible to have basic questions that each city should ask? Do you have an existing right-of-way? What is the cost? Do you have to tunnel? What is the population density? And come up with a way of assisting the locality in determining whether rail is cost-effective for that area.

Mr. HERRINGER. That is precisely what we mean when we talk about developing detailed procedures for the analysis of alternatives. We would be laying out the questions that each city should ask itself before it comes to UMTA with an application.

Chairman MOORHEAD. Do you have such a form worked out now?

Mr. HERRINGER. No, we do not. We are in the process of developing it.

Chairman MOORHEAD. When would that be ready?

Mr. HERRINGER. Well, I sent a memorandum to the Secretary and circulated it internally last week and depending upon his reaction and depending on the reaction of others, we could have something within the next several months.

Of course, criteria are desirable in a general sense but it is difficult for the executive to enforce criteria that really go beyond the limits of the underlying statute. In the case of the UMTA Act, we have a limited number of requirements for grants. We have legal requirements, availability of the local share, and a requirement that the system be part of a comprehensive transportation plan. It is difficult for us in the absence of additional expression of legislative intent to go much beyond that.

Chairman MOORHEAD. One of the witnesses before this subcommittee said that, in his judgment, no new rail rapid transit system could be cost-effective. Since you are a representative of the Department of Transportation, would you agree with that? He is not talking about tearing up old ones but just that no new one could be cost-effective.

Mr. HERRINGER. I will react and Les can certainly react. I would imagine Les might agree and I might not.

Basically, I think the statement is too much of a generalization and without analyzing every corridor in every city and without defining precisely what you mean by rail, you cannot really make that statement. For example, there are corridors on Los Angeles where the volumes are equivalent to some in New York.

There is a corridor in San Juan that has extremely high volumes in a short, short distance. There is also a candidate corridor in Buffalo. Unless you went around on a city-by-city, site-by-site basis and analyzed each city, I would tend not to make that broad a generalization.

Mr. LAMM. To amplify that comment, even if it were possible to determine that no new rail facility is cost-effective, it still might be very fine public policy to go ahead with a few in certain instances, as Mr. Herringer has pointed out. There may be specific cases where other policy considerations of public agencies would outweigh the sole criterion of cost-effectiveness as a determination for going ahead or not.

Chairman MOORHEAD. If exclusive busways could be more cost-effective than a rail system, what are the public policy considerations that would lead you to a rapid rail transit system?

Mr. LAMM. You were directing that at me?

Chairman MOORHEAD. Either one of you.

Mr. LAMM. From the point of view of the programs of the Federal Highway Administration, we do feel that exclusive bus lanes are a transit tool which we have not made enough use of, so we are certainly promoting that. It would not fall to me to choose between a rail transit system and an exclusive busway, that decision would be made locally.

Chairman MOORHEAD. What would be the public policy considerations that would cause a locality to choose, and the Federal Government to support with Federal dollars, a less cost effective rail transit system over a more cost effective exclusive bus lanes system?

Mr. LAMM. They might be tied to such things as desired local development, where a certain type of land use could not really be carried out in the presence of exclusive bus lanes but would be very adaptable in the vicinity of a rail transit line.

Mr. HERRINGER. Yes; I think the point that Mr. Lamm made was very much on target. Environmental issues might be another consideration. One of the advantages of rail is that the pollutant source is away from the downtown area. An electric generating plant can also be a distance away. The buses are right there.

One of the critical things that a city has to do before it decides what kind of transportation system it should have, is to decide what kind of city it wants to be. This is a decision that we would have great difficulty making at the Federal level and is one of the principal reasons why a decision about a specific type of transportation system at the Federal level would be difficult. I don't know if we should be in a position of telling a city like Atlanta that it is not a good policy to develop the downtown area, that it should let the downtown deteriorate. That is one of the first decisions that Atlanta made before it decided to build a rail system; they wanted to encourage development in the central city. Another city might decide differently. Another city might decide to let its central city deteriorate and turn it into a park.

I don't believe anyone knows enough about urban development and urban land use patterns to decide and say categorically that one type of urban development is better than another.

Chairman MOORHEAD. Again I come back to the abdication of the advisory role. At least you could say that city $x$ developed as a donut and that these were the consequences.

Atlanta decided the opposite and these were the consequences.

Mr. HERRINGER. One of our problems in providing information is that we haven't had a major rail system built in this country, a new rail system in 50 years. BART in San Francisco presents an opportunity to develop that kind of information and we are spending $10 or $15 million on a comprehensive study of all of the impacts of the BART system. We collected a great deal of data before and during the installation of BART. Once the system operates we will collect data on what happened to the city. There is a great deal of theorizing about these issues and the theoretical work is available to anyone who

is making these decisions. But until we can develop some hard empirical evidence, it is difficult, very difficult.

Chairman MOORHEAD. Well, that brings us back to Congressman Frenzel and his bill. Do you need that bill to get the kind of data that will help us at the Federal level, and the localities at the local level, to make these decisions?

Mr. HERRINGER. I am not familiar with the details of Mr. Frenzel's bill. I understand that in general it proposes a centralized and a Federal process of data collection be established for the transit industry. We have been working with the transit industry over the past several years to develop a standardized reporting system. We have such a system. The implementation of the system is proceeding. We feel that in time, in a matter of years, this system will be voluntarily accepted by and implemented by the transit industry. So the need for legislation perhaps is not there. At the same time, I would have to say that I can't see that it would do any harm either.

Chairman MOORHEAD. If you want to comment on the legislation, we will keep the record open for you to do so.

Mr. HERRINGER. The Department may have made an official comment on it and I will submit that for the record if that has been done.

Chairman MOORHEAD. Thank you.

[The following information was subsequently supplied for the record:]

The purpose of the proposed Urban Transport Data Act of 1974 (H.R. 12398) is to gather and make available to the public timely and continuing reports containing the following data with respect to urban transportation systems and services:

(1) Standard, reliable, continuing and comparable measures of performance and safety;

(2) Uniform, comprehensive, and comparable operating, safety, and financial data reporting systems; and

(3) Identification, collection, analysis and reporting of comprehensive, comparable, objective, and reliable data concerning:

(*a*) The current status and changing trends of mobility in urban areas, and

(*b*) The operating and financial conditions of urban passenger and freight properties and carriers.

Additionally, authority would be granted to the Federal Government to:

(1) Set standards for a uniform system of accounts and records applicable to any class or property; and

(2) Compare foreign urban transportation systems and services.

In order to achieve these goals, H.R. 12398 would authorize a minimum of $8,000,000 to establish within the Department of Transportation an Urban Transport Data Board consisting of representatives of urban mass transportation interests, highway interests, and consumer interests to gather and make available detailed and accurate urban transportation data. Among other things, the bill would empower the Board to require annual, periodic, or special reports from properties (taxicab, motor truck, bus, trolley, coach, or rail transit firms) engaged in the provision of intra-urban area transport service, and from local public bodies [which are] responsible for regulating or otherwise supervising such properties. Furthermore, the bill provides both civil and criminal penalties for failure of properties or public bodies to maintain required records.

While the Department supports the objectives of gathering and making available accurate urban transportation data, it opposes the establishment of a separate Urban Transport Data Board within the Department of Transportation since the Department and its operating administrations already have the resources to gather transportation data.

UMTA particularly objects to the civil and criminal penalties for withholding information because it believes that coercion is not necessary to obtain the information desired.

Much information concerning urban transportation systems and services is contained in the "1972 National Transportation Report, Present Status—Future Alternatives" prepared by the Office of the Secretary, U.S. Department of Transportation. The Office of the Secretary is currently gathering much of the desired information in preparation for its "1974 National Transportation Study." The Study will address issues concerning highways, urban public transportation, airports, marine terminals, rail, truck and bus terminals. Each State is responsible for collecting and reporting information describing its existing transportation plan as well as its long-range development plan and short-term investment program. As a result of DOT's request, many States and urban areas are just beginning to collect and report transportation reporting measures for the first time. The Office of the Secretary already has plans to obtain performance measure information on a regular basis in future National Transportation Studies. Since transportation data measurements vary widely from State to State, the Office of the Secretary is already planning to expand and standardize transportation measurements in order that data may be easily compared. In addition, the Office of the Secretary currently has the authority to compare foreign urban transportation systems and services.

UMTA is contributing to the effort to set standards for a uniform system of accounts and records applicable to urban mass transportation of people through its Financial Accounting and Reporting Elements (FARE) protect (UMTA Project No. 1T-0034). The original four tasks in this program have been completed and have received the approval of the American Transit Association (ATA) and the Institute for Rapid Transit (IRT), whose members will use the newly defined standard system of financial and accounting reporting procedures. Based on the success of this project, a new task is scheduled for approval which will define a program for improving transit industry management information systems and design a computer-oriented processing plan for the FARE system. On February 11, 1974, UMTA's Director of Financial Management and Congressional Liaison Officer met with Congressman Frenzel to discuss the FARE program. A similar project concerning the taxicab industry has recently been completed by the Office of the Secretary.

The Department therefore opposes H.R. 12398 on the basis that the Department has the capability of gathering and supplying this necessary transportation information.

Chairman MOORHEAD. Mr. Henry Quinby testified before this subcommittee awhile ago and said, based on figures developed before the increase in gasoline price, that the cost per passenger mile of urban travel was 10 cents by auto, 12 cents by bus, and 14 cents by rail. Do you have any comments on those figures?

Mr. HERRINGER. No, I do not. I certainly don't have the information at my finger tips to challenge the figures, although I would question their usefulness in making decisions on transportation. If they have any validity, they are probably averages and, as I pointed out before, the critical variables are very peculiar to the site that you are considering, so you can't tell from those numbers. It would be difficult to generalize and say that rail is always more expensive than bus or automobile.

Chairman MOORHEAD. Well, another way of measuring the effectiveness of a system is the number of passenger trips per employee. I am informed that the national average is 127 passenger trips per employee but that on the BART system, it is only 40 passenger trips per employee.

First, I would like to ask you if passenger trips per employee is a statistic worth studying, and, second, are the figures I have given you for the national average and BART accurate, according to UMTA?

Mr. HERRINGER. I will comment on the latter for the record, if I could, and we will review them and determine whether they are accurate or not. I do think that it is an interesting statistic, at least. I

don't know particularly what the BART information is based on, but since BART is not currently operating across the bay, and, therefore, the number of trips is much lower than it would be if the full system were operating. On the other hand, the number of employees that they have now is the same as they will need when the full system is operating. Thus, it will depend whether that 40 trips per employee is based on actual data or forecast data.

Chairman MOORHEAD. I think the 40 is actual, and I understand that the forecast, when the system is fully in operation, will still only be 100 passenger trips per employee, which is below the national average. Isn't that unusual for a highly capital intensive operation.

Mr. HERRINGER. That is a very strange statistic and we will have to look at it and see why it comes out that way, because intuitively it should not.

[The following information was subsequently supplied for the record:]

The issue of BART's "low level of labor productivity" was posed by the statistic that BART is currently operating at a ratio of 40 daily riders per employee, whereas the average for all rail transit systems is asserted to be 100 daily passengers per employee.

BART is currently carrying approximately 70,000 passengers per day, as against a payroll of approximately 1700 staff, which works out to approximately 40 daily passengers per employee when trans-bay service is instituted in September 1974, as BART currently projects, the ridership is likewise projected to increase, to something in excess of 200,000 passengers per day, as against a stable, full-operations staffing projection of 2100 employees. This will work out to a ratio of approximately 100 daily passengers per employee, which was the figure hypothesized by the Chairman as an industry average.

Any measure of labor productivity applied to BART at this stage of its operations will produce a result distorted by the fact that BART has not yet commenced trans-bay operations. BART is now 80 percent staffed, but is carrying only one-third of the ridership that its projects under full operation. BART attributes part of its advance staffing strategy to the necessity to train personnel and shake down the system, and much of the remainder to the very high incidence of equipment failure and unscheduled maintenance occasioned by the technologically advanced aspects of the system design.

The BART system and its management have been subjected to a great deal of criticism over the past several months, and many critics have sought to draw invidious comparisons between BART and other systems based upon generally available statistical information. While the impulse to compare is natural and normal, we must point out that the measures that would permit useful, meaning comparisons have not yet been developed. Accounting procedures are not uniform between properties; the attribution of joint cost items may vary widely; local regulatory requirements may have an impact on staffing and operating patterns; some costs (policing, for example) may be borne by the transit property in some jurisdictions and by local government in others.

The Legislative Analyst of the State of California recently attempted to compare BART's staffing patterns with those of the Toronto (TTC) and PATCO (Lindenwold) operations. While any comparisons raise issues that may profitably be explored, the comparisons are not themselves conclusive, because the budget items reflect differences in accounting and operating procedures. The Toronto Transit Commission, for example, operates both rail and bus service, with many joint and common costs, which makes it difficult to isolate its rail costs for comparison. PATCO, which operates the Lindenwold Line, is a subsidiary of the Delaware River Port Authority and thus shares many management costs with its parent. Neither of these systems approach the technological sophistication of BART, and their maintenance policies and staffing patterns therefore reflect a different set of circumstances. We expect that the implementation of the FARE project will assist us in making useful comparisons between properties.

With respect to the usefulness of a daily-passengers-per-employee measure of productivity, we can respond that it is one among many productivity measures.

We do not think it (or, for that matter, any other productivity measure) very useful as applied to a new system such as BART while it is undergoing its initial staffing-up and shaking-down phase; the rate at which employees are brought on and trained is a problem for management to solve within the constraints of its ultimate system projections and current resource constraints.

Once a system is in operation, however, and uniform accounting and data collection procedures are developed for the industry, it should be possible to combine statistical data with site-specific information to develop useful insights. Given the great variety of local operating conditions, however, we think it would be a mistake to assume that any single quantifiable measure, or composite of quantifiable measures, will permit a federal merit-ranking of transit systems.

In terms of encouraging other communities to understand and learn from the BART experience, including particularly the technological aspects that have increased the number of maintenance personnel required, we have provided through Mr. Clement a description of our activities and we refer to his responses already in the hands of the Committee.

Response of Hon. Frank C. Herringer to a Supplemental Written Question Posed by Chairman Moorhead regarding the above

*Question.* The above response, which dealt with labor productivity on the BART system was slightly misunderstood. The Chairman pointed out that the projected rate of labor productivity on the BART system was 100 daily trips per employee; but that the national average was 127, not 100 as your answer implies. Since the BART figure is a projection, the fact that BART is not operating at full capacity now is irrelevant, as is the fact that some of the employees are *now* needed to "shakedown" the system. The projection assumes that these bugs will be removed. In oral testimony Mr. Herringer indicated that "intuitively" this relationship should not exist in capital intensive systems. Why then, is the *projected* rate of labor productivity for the BART system below the national average. You mention that daily trips per employee "is one among many productivity measures". What other specific measures would you suggest, keeping in mind that labor productivity measures output per employee, and that a major goal is clearly to carry more people on public transportation?

Answer. Several factors must be weighed in assessing the projected 100 daily trips per employee on BART as a measure of labor productivity. It is important to stress again that trips per employee is, by itself, neither an accurate measure of labor productivity nor a valid index for evaluating the quality of transit operations and management performance. Trips per employee is one among many measures that may assist in understanding the operation and cost implications of a transit system, but it is not the only one and, taken alone, is meaningless. In light of the lack of a uniform system of accounting for *either* number of passengers *or* number of employees, use of the measure as a comparison of systems may be altogether misleading. First, ridership varies according to factors which are, to a large extent, independent of system employment. Such factors may include the ease of operation of automobiles, the level, the number of families without automobiles, demographic and geographic circumstances, and the public perception of services offered, all of which exist quite apart from the employment level required to maintain a given level of service. Second, the level of employment in the BART system itself is influenced by BART's uniquely sophisticated technology and BART's organizational structure which precludes the sharing of management staff with a parent or other modal organization.

While the effect of advanced technology on staffing requirements is most pronounced during the initial operation phase, it is reasonable to assume that the *continuing* maintenance and management of BART's highly sophisticated system will require staffing patterns different from those in older, conventional rapid rail systems. This point was addressed in our earlier response.

Moreover, UMTA noted earlier that many mangement functions at other rail properties were shared either with a parent organization (as in the case of PATCO and Delaware River Port Authority) or with another model organization (as in the case of the Toronto Transit Commission in which management is jointly responsible for both bus and rail operations). Consequently, BART's employment level may include many positions which, on other systems, might either be shared with another organization or even subsumed entirely within another organization. Our earlier response also noted that the attribution of joint cost items may vary widely among transit properties, that local regulatory require-

ments may impact staffing and operating patterns, and that some costs (e.g., policing) may be borne entirely by the transit operator in some jurisdictions and by local government in others.

These issues underscore the need for more effective data reporting in the transit industry and for improved evaluative tools to monitor management and operations performance. To this end, UMTA has initiated three projects which will ultimately provide a vastly improved capability for performance and productivity evaluation.

Under Task V of Project FARE, detailed plans for the external reporting of transit financial and operating data will be developed, using the standardized industry accounting and reporting elements previously developed under Project FARE. In addition, management information systems will be developed to assist transit management in utilizing these data to provide for more efficient operations and increased labor productivity. This project is now in procurement; proposals from prospective contractors were submitted on November 18, 1974, and are being reviewed.

UMTA is also initiating studies of transit management performance measures and labor characteristics. One basic product of these research efforts should be a clearer understanding of labor productivity and its empirical correlates.

Finally, with regard to the trips/employee ratio, it is again stressed that no single equation can accurately express labor productivity in the transit industry. As noted above, the trips/employee relationship is seriously misleading, since these factors can vary independently of one another. Strictly speaking, the output of labor is in terms of service operations and the completion of discrete functional tasks. As such, labor productivity may be expressed as the relationship between these output units and selected input measures of time and cost. As we have indicated in the answer to Question No. 5 of the Additional Answers for the Hearing Record, a study to develop these measures is now underway.

Chairman MOORHEAD. Last week we had two mayors and the chairman of a regional government testify, and there was some debate over whether a transit system should own the land around its stations and stops. The argument pro was that the stop increased the value of the land for related opportunities and concessions. By owning the land around the station, a transit system could help pay for itself. One mayor indicated that he didn't like to see that valuable land going off the tax rolls. Does UMTA have any thoughts on this issue that it could be sharing with mayors and other officials across the country?

Mr. HERRINGER. We certainly support and encourage the planned development of activity around transit stations rather than just allowing it to develop without any thought to capturing or directing the growth that inevitably occurs. We are sponsoring numerous studies with the Atlanta authority, MARTA. Also there is a joint study, with HUD and UMTA funds, of station development here in the District, to plan exactly what should happen around these stations. We do not feel that it should be left to chance.

Chairman MOORHEAD. I think again I would have hoped back in 1964 when the bill was enacted that UMTA would have answers rather than coming up and saying we have studies underway. Ten years is a fairly long time to be charged with a national role in mass transit and not to have answers.

Mr. HERRINGER. Again, and I don't want to sound like I am making excuses or being overly defensive, but there have not been many stations built over this period of time. We did work with San Francisco on some of the stations there but it is a very unique and site specific question that depends to a large extent on what the city wants to do. We can and should provide information to help them make their decisions and to insure when they do make a decision that it is with full knowledge of all of the facts and all of the alternatives, that they know

what has worked elsewhere and what hasn't worked elsewhere. But I don't think we should be in a position of directing them to a solution.

Chairman MOORHEAD. Again, I am not suggesting that the city be directed to do that. Even if there haven't been stations built in the United States, we have a clear example in Canada of recent construction of rail transit. I don't believe that the Canadians are so much different from Americans that the results would be different, or is there a difference that makes the Canadian experience not valid for a study by UMTA?

Mr. HERRINGER. No, not at all. To my knowledge, there are no factors that make the Canadian experience that different from the United States.

Chairman MOORHEAD. And is there anything so unique about Toronto, its terrain and its population that UMTA couldn't give an American city the benefit of their experience of studying Toronto?

Mr. HERRINGER. No; and perhaps we should have paid more attention to what has gone on in Toronto. I know there have been several studies and analyses of the Toronto system. Periodically people ask themselves why the Toronto system is breaking even while our systems are not, and a team goes up and analyzes Toronto. I know there have been studies also of the land development patterns around the Toronto stations.

Chairman MOORHEAD. I realize that American cities aren't stamped out of a mold and that each one has some variations, but don't you think there is much in common. They are not so entirely different; the people aren't that different. There are cities that are flat cities. I don't come from a city like that, but the experience of one can be of great help to another which is almost identical. Cities of 500,000 population with a density of so many people per square mile are not that unlike?

Mr. HERRINGER. I would certainly say that cities information from one city can be helpful to another and I hope nothing I have said is construed as saying that each city has to be looked at in a complete vacuum. That is not the case. There are sufficient differences between cities and among cities that make it very difficult to generalize on the big questions, such as whether or not rail is suitable.

That kind of a question requires going in and actually determining whether or not the right-of-way is available, or whether tunneling is necessary, and what the tunneling conditions might be.

Mr. LAMM. If I could add a statement at that point.

Chairman MOORHEAD. Certainly.

Mr. LAMM. I believe the entire record here might suggest that the administration, the Executive, has not really given very much attention to this problem when in actuality during the 10 years since the passage of the 1964 Urban Mass Transportation Act there have been any number of local decisions made as to what type of transportation facility would be provided. They have been made within the overall transportation planning process which both UMTA and ourselves have helped to finance. They have also been made with our own planning staffs, field staffs in particular, influencing the local people during the planning process. Another of our principal activities during that period has been to disseminate the results of good planning studies from one area so that the planning staffs in each urbanized area can have the benefit. So I feel that we have by and large had a good deal of influence wielded but we have wielded it without the Federal mandate

which originally would restrict the choices open at the local level.

During that period also, as we have found out, some choices were restricted because of the availability of funding for one type of improvement as opposed to another.

I think you will find that the track record of the administration proposing legislation that would make the funding sources themselves more flexible has been very good during that period of time, too, and that the UTAP proposal is the latest in a series which would add to the available tools at the local level.

But I especially want to commend the planning staffs of the Federal Highway Administration and UMTA for the amount of influence which they have been able to wield at the local level while still remaining short of dictating.

Chairman MOORHEAD. I hope you understand, as I said at the beginning, that when I am critical it is coming from a friend. I am just trying to get you to think about this. Maybe, if I have any feelings of complacency, they aren't completely justified. Let me try this from a different angle.

What, as you see it, are the national objectives of the present law under which you are acting, and what do you see as the national objectives of the UTAP legislation which you are now sponsoring?

Mr. HERRINGER. That is a very broad and far-reaching question and if I could I would like to comment on that for the record as well as to make some comments here.

I believe that our current legislation was largely directed at the problem of stabilizing deteriorating transit conditions and protecting the massive investment in transit that existed. That is basically what the UMTA program has been doing over the last 10 years.

Now we are coming into an era where the expansion of public transportation is the question. This requires a different look. The objective of the UTAP legislation, the unified transportation assistance program legislation, is to provide the Federal funding in a way that does not bias local transportation choices and does not dictate mode by the pattern of Federal funding, but rather, allows a locality to be free in its choice with respect to mode. So this would enable a locality to make the rational decision more readily than the current programs might where we have separate pots and the money out of the one pot is lost if it is not spent.

Chairman MOORHEAD. All right, thank you.

[The following information was subsequently supplied for the record:]

The Administration's Unified Transportation Assistance Program is a six-year program that would commit substantial new resources to mass transportation, revise the delivery system to encourage greater participation by Governors and state-level agencies in mass transportation planning and development, provide a stable and flexible source of federal funding for high-priority urban highway and mass transit capital expenses, and for the first time make available federal funds for mass transit operating expenses.

The UTAP proposal would build upon the 1973 Federal-Aid Highway Act (P.L. 93–87) in concept and design. That Act authorized state and local governments to use some title 23 Federal-Aid Highway funds flexibility for either highway or transit capital investment. Localities may devote all or a part of the sums available under their Section 104(b)(6) urban systems apportionments to nonhighway mass transportation projects, and jointly with the Governor may petition the Secretary to delete segments of the Interstate Highway System and use amounts not to exceed the remaining 1972 cost-to-complete of the Interstate segment for sub-

stitute nonhighway mass transit projects. Regulations implementing the Interstate transfer provisions have recently been published in the Federal Register (39 F.R. 20658, June 12, 1974), and proposed regulations implementing the urban systems public transportation provisions will be published for notice and comment shortly. A number of substitute projects involving both provisions, and substantial amounts of money, are underway.

Even while the Department was in the process of working out the regulations implementing the 1973 Federal-Aid Highway Act, it became apparent that the existing levels of federal capital commitment to transit were probably inadequate and that a federal commitment to transit operating subsidies was an idea that was gaining widespread support. There was also an evident need to provide a stable source of federal funding so that communities could undertake intelligent long-range planning. Existing FHWA and UMTA programs were widely perceived as too restrictive to allow for genuine local planning to meet local transportation needs unbiased by consideration of fund availability, local share, etc. UTAP was thus designed to provide stable, flexible funding to be programmed in accordance with local needs through State and local governments.

UTAP would convert the existing UMTA capital grant program into two programs, a discretionary program and a formula grant program with a combined funding level of $1.4 billion for FY 1975, increasing to $1.5 and $1.6 respectively for FYs 1976 and 1977. The UMTA capital grant program would continue as the UMTA discretionary grant program, with a $700 million per year level. For FYs 1975, 1976 and 1977 a new formula grant program would be established, modelled on the highway urban system program. Funds would be apportioned to the Governors on a formula based upon population in urbanized areas (50,000 and more). The Governors would allocate these funds to the urbanized areas, with a requirement that funds attributable to urbanized areas of 400,000 or more be spent in those areas ("earmarking"). These formula allocation funds would be available for transit capital or operating expenditures. The Governors would submit a program of projects for Secretarial review and approval. This formula grant program would amount to $700 million for FY 1975, $800 million for FY 1976 and $900 million for FY 1977. Projects would be based on a continuing, cooperative and comprehensive planning process, not unlike the title 23 Section 134 process, covering all modes of surface transportation, in consultation with responsible public officials of the urbanized area in which the project is to be undertaken.

During the first three years of the program we propose to make some minor adjustments to title 23 in order to extend the flexibility concept to urban extensions (23 U.S.C. Sec. 104(b)(3)) thereby making available urban systems and urban extensions monies exclusively in urbanized, as opposed to urban, areas. We would create a new rural and small urban program to assist places of under 50,000 population, and would authorize operating subsidies in the rural bus demonstration program created by Section 147 of the 1973 Federal-Aid Highway Act.

For the last three years of the program, FYs 1978, 1979 and 1980, we would fold together the UMTA formula grant program and the urban systems/urban extensions highway programs, making available a single source of money to be used for transit or highways capital investments or transit operating expenses. This combined program would be funded at a $2.0 billion annual level from general revenues. The UMTA discretionary capital grant program would continue in its present form, at a steady $700 million per year, for a total program of $2.7 billion per year.

UTAP is intended to be an improved and expanded delivery system for urban transportation. We would expect to see results, though probably not quantifiable results, in local decision-making less biased by federal requirements and funding availability, in an increasing state role as demonstrated by the creation of state agencies with broad transportation development roles and an increased commitment of state resources to urban mass transit development, and in a shift in local programming away from capital-intensive solutions to transportation problems and more in the direction of service improvements as operating expenses become eligible for federal subsidy.

UTAP would also increase significantly the level of federal financial commitment to mass transportation, which will create a need for disciplined evaluation of the effectiveness of federal expenditures for these purposes.

The Department believes that the time has come to develop investment standards and criteria for the capital grant program, and has proposed in UTAP that it be given the authority to do so. From its inception the UMTA program has been principally concerned with the crises of public transportation—revitalizing

and modernizing aging rail and bus fleets, preserving transit service in many cities by making possible the public acquisition of private transit companies that for financial reasons could no longer continue in operation, and in other ways dealing with problems that were urgent and unquestioned.

In recent months, however, energy, environmental and urban design considerations are leading many people to view the expansion of urban public transportation as a potential positive solution to urban difficulties. The discipline formerly imposed upon local transportation planners by the necessity to raise a ⅓ local share for mass transit projects has been loosened by the increase in Federal share to 80 percent mandated by the 1973 Federal-Aid Highway Act. The decrease in local share has placed more cities in a position to request Federal funds, and has allowed others to think in terms of larger projects than would formerly have been possible.

Under these circumstances, we feel that an increase in the level of Federal financial commitment to mass transportation projects must be accompanied by the imposition of a Federal discipline on the process under which these projects are developed. The development of criteria to govern Federal investment in fixed rail facilities is especially critical now that a number of cities without fixed rail are proposing ambitious new systems.

We began with the idea of developing some nationally applicable, quantifiable standards that could serve as an easily accessible guide for cities contemplating transit investment. After considerable investigation of possible criteria designs, however, we have concluded that there are no criteria that can be reduced to uniform, quantifiable standards to be applied on a nationwide basis to determine when, for example, a city may justify a choice of fixed rail or any other new grade-separated system. We have examined the relevance of generalized mertopolitan characteristics (e.g., population, density) and have determined that the factors that are site-specific (e.g., right-of-way costs, amount of tunneling required, construction cost) so dominate any cost-benefit analysis that generalized characteristics cannot be relied upon as a guide.

We are therefore moving in the direction of requiring an applicant to perform a site-specific alternatives analysis as a precondition for funding of major capital projects. The idea of an alternatives analysis is of course very attractive, but in practice it raises several thorny problems. It is clear that the alternatives which should be considered include a range of technologies, and a range of variations within those technologies, such as variations in networks, link locations, station locations, vehicle fleet size, vehicle size and operating characteristics, control systems as reflected in headway and availability of off-line or on-line stations; as well as a variety of operating policies, such as alternative schedules in high and low demand periods, whether demand responsive or prescheduled; and pricing policies, such as flat fares, zone fares, monthly passes, etc.

Analyzing alternatives requires considerable expense in manpower and computer time. The central conceptual task in establishing criteria with respect to alternatives analysis will be to determine what complexity of analysis is reasonably related to the benefits to be derived from analysis. We will also be seeking surrogates and approximations that will bring the process within the range of reasonable local capabilities.

A corollary to the problem of complexity is the identification and weighing of the effects to be explored. Current transportation planning methodology relies heavily on traffic forecasting—the tracing out of transportation alternatives on volumes of travel that will occur at different time periods on different segments of the transit system, and the travel times and other aspects of levels of service which those flows experience. As the result of legislation and changing public concerns in recent years, attention has increasingly been given to other kinds of impacts as well, including air quality impacts, traffic noise, residential displacements, parkland takings, energy consumptions, and of course capital and operating costs. At present, the capability to predict these impacts is relatively primitive.

The next major problem is deciding what kinds of evaluation procedures ought to be required. It is clear that some—perhaps a great many—legitimate decision components are not quantifiable. These include such issues as consistency with regional development objectives; the impact of construction of highway or transit facilities on social cohesion of stable neighborhoods: the visual intrusion of a facility, etc. Economic analysis can give an indication of what user benefits accrue to which groups of travelers. If UMTA is to prescribe an alter-

natives analysis, we will have to give careful attention to the range of impacts that must be included in the analysis.

UMTA believes that a community ought not be required to select the most environmentally beneficial, or energy conserving, or socially equitable transit system. We do believe that the federal participation ought be limited, however, to the amount that would be required for the federal share of the most cost-effective system. Of course we do not underestimate the difficulty of determining cost-effectiveness; we expect that sufficient information will be generated by the alternatives analysis to enable the Department to determine the appropriate level of federal commitment. We have every expectation that somewhat more disciplined, if not necessarily quantifiable, instruments for program evaluation can be developed over the coming few years.

Chairman MOORHEAD. Under the existing law, from my memory, we never used the word "stabilizing" in the bill, but let's suppose that was your objective, how do you measure whether you were successful in city A and not successful in city B?

Mr. HERRINGER. Well, of course, one indication is ridership and whether the ridership goes up or stabilizes or continues to fall. That is certainly one measure.

The mere existence of public transit is another indication and in many of these cities public transit was going out of business. The program enabled public transit to continue. So absence of public transit versus existence of public transit is also a measure. When I commented on the objectives of the program, I was commenting not in a legislative sense because I could have cited such things as improved mobility and provision for the transportation deprived. What I was describing is the actual impact the program has had and the basic thrust of the program over this 10-year period.

Chairman MOORHEAD. I am sure that over the past 10 years you have spent some money that you wish you hadn't spent, and, on the other hand, you probably have some fantastic success stories. Can you tell us which programs are the good ones and which are the bad ones and why?

Mr. HERRINGER. Well, again I would prefer to comment on specific cases for the record. An example, however, is the Shirley Highway project here in the District. This project is a notable success and one in which the ridership has increased substantially; congestion has been alleviated; pollution has been eliminated; and anyone who drove in on the Shirley Highway this morning without those buses running on the exclusive bus lane recognizes, I think, the many benefits that non-users of the system also receive from a project such as the Shirley Highway system.

Indeed, the Shirley Highway experience is being duplicated as word of its success is spread by UMTA. We now have an exclusive busway in California on the San Bernardino busway, and there are others in the planning stages. Finally, there are numerous cities where the provision, expansion, and modernization of the bus fleet and other facilities have resulted in dramatic increases in ridership—as much as 40, 50, 75, or 100 percent—and we can provide the names of these cities for the record.

Chairman MOORHEAD. Do you find that the exclusive busways are better working the same way as the rush hour traffic or in the opposite direction of rush hour traffic?

Mr. HERRINGER. My guess is that when it is an exclusive busway, it doesn't really matter much. The buses aren't mixed with traffic. We

have seen a lane reserved on a freeway as opposed to a completely separate busway, work in both directions. One of the advantages of the contraflow is that it is self-enforcing. If a stream of buses is traveling contraflow at 60 or 70 miles an hour, cars can't generally mix in, whereas if you have buses running with the traffic, cars can mix in with the buses and one of the problems becomes enforcement.

Les might want to comment on that.

Chairman MOORHEAD. I think there would also be the psychology of going one direction and seeing a bus going by you. Psychologically, you want to get on the bus, whereas if it is going in a different direction it doesn't have the same psychological impact. On the other hand, I think it would be easier, if you had a four-lane or six-lane highway, to establish an exclusive lane going counter to traffic. You could still save your three normal inbound morning lanes for automobiles. I would think that this would be a choice which the experience of the Federal Government in looking at many cities across the Nation would be helpful to a locality making up its mind as to which way to go.

Mr. HERRINGER. This is a case in which the Federal Highway Administration does have extensive information and their technical experts do advise highway enginers daily on these problems.

Mr. LAMM. Yes; I would be happy to comment on that. I agree with your comments and the chairman's suggestion about why contraflow might be better in some cases than the flow in the same direction. Predominant heavy traffic would be better in other cases and very valid if safety is the consideration. If you are working on an existing interstate highway with 12-foot lanes and inside and outside shoulders, it is much safer to put a contraflow lane on that type of facility than in the case of a city street, where you might find vehicles parked, even though illegally, which might force bus traffic into oncoming lanes.

All of these factors are evaluated when individual cities are contemplating putting in a specific bus improvement and we do use the benefits of our previous experience to assist them in deciding what would be best in their case.

Chairman MOORHEAD. You have mentioned that some cities have experienced a 40- or 50-percent increase in ridership due to UMTA?

How do you reconcile this with a national decline in ridership of 22 percent since UMTA was established?

Mr. HERRINGER. Obviously there are cities where ridership has declined, where either the systems have gone out of business or there have been other reasons for deterioration of the service. Perhaps some of those cities did not have the benefit of UMTA grants, perhaps some of them did. I did not mean to imply that the job of stabilization and improvement of the current plant and equipment is completed because I don't believe it is; 15,000 buses have been bought with UMTA funds over the past 10 years. That only represents 30 percent of the existing fleet. There is still a great number of old buses out there and I am not so sure that 50,000 buses, which is the total fleet, is the right number now either. There have been considerable improvements in the commuter rail car fleet so that almost all existing commuter rail cars are of recent vintage. There are very few places that do not have new commuter rail cars. The same is not true in the rapid transit fleet for subway systems. There is still a great way to go in that area.

Chairman MOORHEAD. Could you supply for the record the cities that have shown the biggest increase and maybe then the 10 with the worst record?

Mr. HERRINGER. Yes, sir, I will be happy to.

[The following information was subsequently supplied for the record:]

The following transit properties reported additional revenue passenger volumes to the American Transit Association in 1973, as compared to 1972. All these properties have had capital grant commitments:

| City: | *Percent increase in 1973 over 1972* | City—Continued | *Percent increase in 1973 over 1972* |
|---|---|---|---|
| Akron | 9.6 | Oakland | 3.1 |
| Albany | 3.8 | Orange County, Calif | [1] 216.5 |
| Albuquerque | [1] 3.6 | Pittsburgh | .8 |
| Allentown | [1] 29.6 | Portland, Oreg | 6.4 |
| Atlanta | [1] 7.9 | Providence | 1.0 |
| Baltimore | 3.6 | Rockford | 6.0 |
| Cincinnati | 11.6 | Rock Island | .8 |
| Davenport, Iowa | 1.6 | Salt Lake City | [1] 10.1 |
| Denver | [1] 10.8 | San Diego | [1] 45.9 |
| Erie | 6.0 | Schenectady | .9 |
| Eugene, Oreg | [1] 86.6 | Seattle | 10.5 |
| Jacksonville | 9.2 | Spokane | 5.3 |
| Knoxville | 7.6 | Syracuse | 2.6 |
| Long Beach, Calif | 6.6 | Toledo | [1] 29.4 |
| Los Angeles | 3.8 | Waco | 1.5 |
| Madison | [1] 9.3 | Wichita | 7.4 |
| Miami | 3.7 | Wilmington, Del | .2 |
| Minneapolis | [1] 7.0 | | |

[1] Additional information attached.

NOTE.—In some of these cities, as for example Cincinnati, the basic reason for the riding increase was the lowered fare which was the result of public acquisition made possible by the capital grant. The new equipment or facilities to which UMTA is committed have not yet been delivered or installed.

ALLENTOWN, PA.

Capital Grant to Lehigh and Northampton Transit Authority (PA-03-0038) approved 3-5-73, Federal funding $2,002,726, for 59 new buses and other equipment. Amendment approved 12-26-73 provides additional $565,200.

This relatively small bus system (formerly Lehigh Valley Transit Company) serving the cities of Allentown, Bethlehem and Easton and a number of smaller communities, was owned by American Transportation Enterprises for many years. Revenue passengers declined from 7.2 million in 1961 to 3.0 million in 1971, by which latter year the average age of the transit bus fleet was approaching 20 years.

Lehigh and Northampton Transit Authority acquired Lehigh Valley Transit's property in November 1972 (without Federal assistance). New buses were delivered in the summer of 1973 and have replaced the entire fleet of old equipment.

In 1972 the decline in traffic continued, with the year's final figure 19.6 percent below that of 1971. In 1973, however, for the first time in years, an upward trend began. For the year, some 2.7 million revenue passengers were handled, for a 29.6 percent increase over 1972. Patronage figures for the first quarter of the past four calendar years are as follows:

LANTA RIDERSHIP

| | 1971 | 1972 | 1973 | 1974 |
|---|---|---|---|---|
| January | 216,000 | 168,500 | 193,700 | 287,900 |
| February | 196,500 | 171,800 | 182,600 | 294,000 |
| March | 233,500 | 183,800 | 212,600 | 297,000 |

During 1972, LANTA added 40 percent more route miles to its system and introduced an off-peak fare reduction from 45 to 25 cents. In 1973 LANTA replaced 72 buses with the 59 new buses in the grant and began an aggressive marketing campaign with a grant from Penn DOT. By December 1972, the long-term, downward trend in ridership was reversed and in 1973, significant gains were posted. Ridership in March 1974 was up 39 percent over the previous year and revenue was up 31 percent. LANTA's FY 1974 operating deficit, originally projected to be about $711,000, will be closer to $500,000.

ATLANTA, GA.

Capital Grant to MARTA (GA–03–0007) originally approved 10–22–71 for $30,177,666. Two amendments since then have brought Federal fundings to $39,-156,391. Project involves 490 new buses, garages, and miscellaneous equipment.

The Atlanta experience is, of course, well known. The capital grant was approved about two weeks before the election which approved the 1 percent sales tax for MARTA. The area's bus company, Atlanta Transit System, was acquired in February 1972 and bus fares in Fulton and DeKalb Counties were reduced 15 cents on March 1, 1972.

In 1971, last year of private operation and a 40-percent base fare, 44.4 million revenue passengers were handled. In 1972, 49.7 million passengers rode, an increase of 12.0 percent over 1971. Early in 1973, the first 125 of the 490 new buses were placed in service. These were used mainly to expand the fleet rather than to replace old equipment.

The trend continued in 1973, with total riding for the year up to 53.7 million, a 7.9 percent increase over 1972's results. This occurred in spite of a strike during June which lasted five days.

In 1974 the riding pattern continues upward, although the gasoline shortage, of course, has contributed to the rise. In January 1974, a 15.7 percent increase was reported as compared to January 1973. With 365 more new buses and additional service improvements scheduled for 1974, a major increase can again be anticipated.

DENVER, COLO.

Two capital grants to the City of Denver:

CO–03–0004, approved 6–8–71, Federal funding, $5,685,133, for acquisition of bus company, 37 new buses, etc.

CO–03–0006, approved 5–10–73, Federal funding, $1,144,446, for 32 new buses.

Denver is a well-known example of increasing transit ridership in the nation. In 1970, the last year of private transit ownership, 13.7 million revenue passengers rode. With the institution of public ownership in early 1971, coupled with fare reductions, aggressive marketing, and other measures, traffic rose as follows:

| Year | Annual revenue passengers | Percent increase over prior year |
|---|---|---|
| 1971 | 13,413,000 | (−2.4) |
| 1972 | 16,812,000 | 25.5 |
| 1973 | 18,628,000 | 10.8 |

It is estimated that traffic in 1974 will reach 25 million. Based on comparisons between first-quarter ridership figures for the past three years, this would not be surprising. First-quarter ridership in 1972 was 4.7 million passengers, in 1973 was 5.4 million, and in 1974 was 7.0 million.

The new buses funded in the first grant were delivered in June 1972. Originally intended to replace an equivalent number of old buses, they have been used in part to expand the fleet.

EUGENE, OREG.

Two capital grants to Lane County Mass Transit District:

OR–03–0005, approved 11–11–71, Federal funding, $427,350. Acquire private company, 22 new buses, etc.

OR–03–0007, approved 2–5–74, Federal funding, $1,043.012, for 19 new buses, etc.

This small bus system has experienced fantastic increases in riding, as follows:

| Year | Number of revenue passengers | Percent increases over prior years |
|---|---|---|
| 1972 | 847,000 | 40.7 |
| 1973 | 1,580,000 | 86.6 |

In January 1974 there was a 135.2 percent increase over the same month in 1973, while February 1974 saw an astounding 205 percent increase over February 1973. Much of this, of course, was due to the gasoline situation.

In other words, transit travel has more than doubled over the 1971 total of about 600,000.

This is an extremely ecology-minded university community, with a latent market for transit that was waiting to be tapped. An aggressive marketing program, combined with new equipment and service improvements, have made possible the excellent results obtained.

MADISON, WIS.

Two capital grants:

WI-03-0002, approved 4-5-71, Federal funding, $1,732,400, for system acquisition, 36 new buses, etc.

WI-03-0009, approved 6-13-73, $803,266. For 22 new buses and other equipment. WI-03-0009 amended 3-20-74, additional funding $81,721.

This system, which is managed by American Transit Corporation, went into public ownership in May 1970. Following is a tabulation of annual revenue passengers:

| Year | Number of revenue passengers | Percent increases over prior years |
|---|---|---|
| 1970 | 5,835,000 | |
| 1971 | 5,963,000 | 2.2 |
| 1972 | 6,576,000 | 10.3 |
| 1973 | 7,188,000 | 9.3 |

In 1974, this trend continues and (at least in January and February) is accelerating. January 1974 was 16.5 percent above the same month in 1973, while February increased 20.8 percent over February 1973. No doubt the gasoline situation was responsible in part for this significant increase.

In any event, there has been a traffic increase of approximately 25 percent since 1970. Again, aggressive management and marketing, new equipment (the first 36 new buses were delivered in 1972), and service improvements have combined in this State capital-university city (with a natural market for transit) to produce meaningful increases in transit usage.

MINNEAPOLIS-ST. PAUL

Four capital grants have been made to the Twin Cities Area Metropolitan Transit Commission. A small ($256,483) grant in 12-69 furnished funds for 16 minibuses. In 5-70, a grant of $9,723,800 furnished funding for system acquisition and 93 buses. In 3-72, $18 million was granted for 498 new buses. In 11-73, a $2,103,768 grant provided funds for 60 buses, etc.

American Transit Enterprises Management operates this system which has compiled a record of traffic increases ever since the 1970 public acquisition, as listed below:

| Year | Number revenue passengers (millions) | Percent increases over prior years |
|---|---|---|
| 1969 | 53.1 | |
| 1970 | 50.6 | −4.7 |
| 1971 | 50.9 | .7 |
| 1972 | 54.8 | 7.7 |
| 1973 | 58.7 | 7.0 |

New buses have been delivered each year since 1971, making possible the retirement of old equipment and the expansion of service. The management is, of course, extremely conscious of marketing techniques and has a very solid transit improvement program which is obviously producing results.

ORANGE COUNTY, CALIF.

Two capital grant commitments: CA–03–0048, approved 3–31–72, $245,070 Federal fundings for 9 new buses. CA–03–0064, approved 5–11–73, $10,901,014, for 162 new buses, construction of garage, etc.

The increase in patronage on this system has been phenomenal. In 1973, some 1.6 million revenue passengers were handled, a 216.5 percent increase over 1972 ridership.

Orange County has a large (over 1 million) population, although it is not densely settled. Over the years, transit service has been almost negligible, the most important bus routes being the SCRTD lines to Los Angeles, especially from the Disneyland area. It was obvious that the market for transit was largely untapped prior to the formation of the Orange County Transit District.

The former Santa Ana city bus lines were taken over on August 1, 1972, and the South Coast Transit lines on September 1. All fares were reduced to 25 cents; the former system of zone fares had gone as high as 95 cents per trip. In addition, increased schedules, better routes, and some new equipment (the 162 new buses funded in CA–03–0064 have not been delivered as yet) all contributed to the large traffic increase on the system. The area has a great many senior citizens and students, many of whom are either dependent on transit or actively prefer not to drive. As in Los Angeles proper, the problem is to sell the transit service, and this requires staff which can produce more than humdrum day-to-day transit operation. It might almost be said that if transit can be sold in Orange County, it can be sold anywhere.

SALT LAKE CITY

Three capital grants have been approved:

UT–03–0001, on 6–9–70, committed $907,419 to system acquisition, 6 new buses, etc.

UT–03–0002, approved 5–9–72, provided $453,075 for 17 new buses, etc.

UT–03–0003, on 2–5–74, provided $1,087,176 for 28 new buses, etc.

This system, which went into public ownership under the Utah Transit Authority in August 1970, has had some growth in passenger traffic during the past few years, as noted below:

| Year | Number of revenue passengers | Percent increases over prior years |
|---|---|---|
| 1970 | 3,120,000 | |
| 1971 | 3,101,000 | −0.6 |
| 1972 | 3,260,000 | 5.1 |
| 1973 | 3,589,000 | 10.1 |

The 23 new buses funded in the first two capital grant projects are in regular service, while the 28 recently funded will replace buses over 20 years old. It is anticipated that these additional new buses, along with service and schedule improvements, will bolster the upward riding trend in the Salt Lake City area which has emerged after years of continual and accelerating decline.

SAN DIEGO

Four capital grants approved. CA–03–0012, 5–26–67, $5,268,000 Federal funds. Acquisition and 100 buses. CA–03–0025, 7–13–70, $1,361,466. Construction of garage, etc. CA–03–0038, 3–26–71, $1,139,674, 40 buses. CA–03–0071, 6–21–73, $2,031,420, 58 buses, etc. (An additional $69,996 approved in March 1974.)

Ever since public acquisition of the system in July 1967, the long-term trend of transit traffic has been upward. The most dramatic increases, however, followed a general fare reduction to 25 cents (from 40 cents with zone charges) which became effective in June 1972. The deficits incurred are being funded through the California sales tax on gasoline authorized in the State S.B. 325 legislation.

In addition to the reduction in fare, the very livewire and aggressive management has accomplished a great deal in routing and scheduling improvements, while the new equipment (which is very well maintained) has stimulated traffic.

Year-to-year revenue passenger counts are shown below:

| Year | Number revenue passengers (millions) | Percent increases over prior years |
|---|---|---|
| 967 | 15,393 | |
| 1968 | 17,142 | 13.4 |
| 1969 | 18,279 | 6.6 |
| 1970 | 13,111 | [1] −28.3 |
| 1971 | 13,328 | 1.7 |
| 1972 | 14,833 | 11.3 |
| 1973 | 21,647 | 45.9 |

[1] Strike during year.

So far in 1974, the trend continues up. January showed an increase of 25.5 percent and February 36.6 percent, over the same months of 1973.

TOLEDO

A capital grant to the Toledo Area Regional Transit Authority (TARTA) was approved 4–22–71, with $5,088,260 in Federal fundings. Purpose was acquisition of the private company, 125 new buses, and miscellaneous equipment.

In 1973, TARTA carried 12,734,000 revenue passengers, an increase of 29 percent over 1972. The first two months of 1974 have seen smaller, but still upward, trends.

All 125 of the new buses in the project have been delivered and are in service. Added to routing and schedule improvements, service has become attractive enough, apparently, so that many new riders have taken to the buses. For years, the former private bus company was in a steady decline which, had it not been for the UMTA assistance, would probably have led to virtual abandonment of transit in Toledo.

Total UMTA capital grant funding from the beginning of the program in February 1965 to May 31, 1974 was $2.6 billion. Some 30 percent of this total ($826 million) was for bus-oriented projects. The commitment for all projects discussed in the narrative was $111 million, or about 4 percent of the total commitment.

*Fifteen Largest Commitments as of March 31, 1974*

| Area | |
|---|---|
| New York City | $643,666,882 |
| San Francisco | 405,511,618 |
| Chicago | 270,379,040 |
| Boston | 267,411,745 |
| Philadelphia | 135,805,046 |
| Atlanta | 108,689,724 |
| Pittsburgh | 96,365,295 |
| Washington | 70,964,322 |
| Baltimore | 47,261,932 |
| Los Angeles | 38,840,813 |
| Minneapolis-St. Paul | 30,649,781 |
| Cleveland | 22,227,572 |
| Dallas | 22,181,742 |
| Seattle | 20,395,311 |
| Detroit | 20,042,890 |

A majority of these commitments represent work in progress. Their impact therefore has not yet been reflected in ridership figures. Only a small percentage of UMTA's commitments to date are in completed and operating transit facilities. In fact, other than buses and certain rail rolling stock, the only significant projects are the Cleveland Airport Extension, the Chicago Kennedy and Dan Ryan Extensions, and the Boston South Shore Extension to Quincy Center. In the case of BART, service is not yet operating beyond a token basis on two dis-

connected segments, and traffic figures are quite meaningless. Large sums of money committed to New York City subway extensions, and rapid transit construction in Atlanta, Baltimore and Pittsburgh, have gone to projects that are in the very early stages of design and construction. The impact of these expenditures on ridership cannot be ascertained for several years.

*Impact of UMTA Capital Grants on Riding Trends*

Many factors other than Federal capital grants influence riding trends. These range from fare policy and service levels to fear of crime to the amount of activity generated by the centers served by the transit system. Even where there is an increase in ridership following an UMTA grant, it is difficult to ascertain with precision what portion of the increase is attributable to the UMTA-financed improvement. The UMTA grant is frequently part of a series of improvements to the public transportation system, including increased service, more aggressive marketing, fare rationalization and stabilization, and a general posture in favor of transit by local officials. An UMTA grant that makes possible the takeover of a private system, together with the requirement for a short-range transit improvement program, is frequently the catalyst for a greater public commitment to transit.

New equipment typically lowers maintenance costs, but the overall consequent decline in operating costs is slight. At least until recently, fuel costs were a minor percentage of operating costs, as is maintenance and repair of vehicles. Savings incurred as a result of lower maintenance costs may be more than offset by even modest wage increases, since wages and fringes constitute by far the greatest portion of a typical property's operating expenditures. It is not sensible, therefore to expect that improvements attributable to UMTA capital grants will have a discernible dampening effect on the overall trend of operating deficits.

## 15 LARGEST GRANTS SINCE JANUARY 1970 WHERE EQUIPMENT AND FACILITIES ARE IN SERVICE

| Project No. | Grantee | Date of approval | Federal funding | Purpose of grant | Status | Notes | Passenger traffic trends |
|---|---|---|---|---|---|---|---|
| IT-03-0019 | Washington Metropolitan Area Transit Authority. | Jan. 10, 1973 | $70,344,666 | Acquisition of 4 private bus companies 620 new buses, miscellaneous improvements. | Companies acquired January 1973, buses delivered and in service. | Additional project elements still underway. | A slight upward trend is reported in 1975. |
| CA-03-0036 | Golden Gate Bridge, Highway and Transportation District (San Francisco). | Dec. 23, 1971 | 36,047,030 | 186 new buses, construct garage, 3 new ferry terminals, miscellaneous equipment. | Buses in service 1972-73 garage completed, ferry boats nearing completion. | do | 5970-2,900,000 passengers (Greyhound); 1974—7,300,000 passengers (estimated). |
| MD-03-0001 | Mass Transportation Administration (Baltimore). | Apr. 16, 1970 | 19,805,932 | Acquistion of private bus company, 370 new buses, miscellaneous equipment. | Company acquired April 1970, buses in service 1975, project nearly completed. | do | 1970—100,100,000 passengers; 1973—105,100,000 passengers. |
| MN-03-0005 | Twin Cities Area Metropolitan Transit Commission. | Mar. 31, 1972 | 18,000,000 | 498 new buses, garage renovation, miscellaneous improvements, acquire suburban bus companies. | 458 new buses in service 1973-74. | do | 1970—50,600,000 passengers; 1973—58,700,000 passengers. |
| IL-03-0025 | West Suburban Mass Transit District. | Mar. 31, 1972 | 28,689,739 | 25 new cars, purchase and modernization of existing Burlington No. suburban equipment. | New cars in service 1974. | | Traffic up 12 percent. |
| MA-03-0004 | Massachusetts Bay Transportation Authority (Boston). | Apr. 21, 1971 | 24,544,476 | Construction of South Bay Maintenance Center for rapid transit and bus facilities. | Rapid transportation in service, bus area nearing completion. | | Project not directly related to passenger traffic. |
| NJ-03-0004 | New Jersey DOT | May 13, 1970 | 18,733,333 | 70 new cars for Penn Central New York-Trenton Suburban Service. | Cars now being delivered. | | Cars now being delivered. |
| PY-03-0014 | Metropolitan Transportation Authority (New York). | June 10, 1970 | 55,708,333 | 389 new cars for Long Island Railroad electrified lines. | Cars in service 1971-72 (381 similar cars funded by New York State). | | Traffic has declined somewhat for such reasons as decentralization, fare increases, etc. |
| NA-03-0014 | Southeastern Pennsylvania Transportation Authority. | Mar. 3, 1970 | 39,311,282 | 144 new cars for Penn Central (130) and Reading (14) commuter lines. | Cars now being delivered (Reading all in service). | | Cars just being delivered. |

15 LARGEST GRANTS SINCE JANUARY 1970 WHERE EQUIPMENT AND FACILITIES ARE IN SERVICE—Continued

| Project No. | Grantee | Date of approval | Federal funding | Purpose of grant | Status | Notes | Passenger traffic trends |
|---|---|---|---|---|---|---|---|
| CA-03-0034 | Southern California Rapid Transit District (LA). | May 28, 1971 | $10,855,616 | 100-51 passenger buses, San Bernardino Freeway busway facilities. | Initial service began February 1973, project nearly complete (largely funded through FHWA). | | At opening, 3,000 daily riders, currently, 11,000 daily riders. |
| CA-03-0019 | San Francisco Bay Area Rapid Tranist District. | Mar. 10, 1971 | 40,000,000 | 250 RT cars | BART opened between September 1972 and September 1974. Majority of these 450 cars now in service. | Additional project elements still underway CA-03-0019 originall. approved November 1968 for $28 million. | 115,000 to 120,000 daily system not yet in full service, operating problems preclude trend analysis. |
| CA-03-0059 | | Oct. 6, 1972 | 61,845,066 | 200 RT cars | | | |
| GA-03-0007 | Metropolitan Atlanta Rapid Transit District. | Oct. 22, 1971 | 39,156,391 | Acquisition of private transit company—490 new buses; construct garages; miscellaneous equipment. | Company acquired February 1972, 490 new buses in service 1973-74, 1 garage completed. | Additional project elements still underway. | 1971, 44,400,000 passengers; 1973, 53,700,000 passnegers. |
| IL-03-0024 | Chicago Transit Authority | Dec. 23, 1971 | 99,988,132 | 1,070 new buses, 100 new RT cars systemwide improvement and modernization. | 1,070 new buses in service 1973-74; new cars on order, many elements completed. | do | New buses are replacements for old equipment throughout the system. |
| IL-03-0022 | Northwest Suburban Mass | Dec. 13,1972 | 20,876,702 | 36 new cars, 13 new locomotives, purchase and modernization of existing Milwaukee Suburban equipment. | New cars and locomotives in service, 1974. | | Traffic up 7 percent. |

Chairman MOORHEAD. I am not criticizing the localities but trying to find an explanation for one city's success and another's failure.

Mr. HERRINGER. You are grappling with the very difficult question of evaluating the program's impact. That can be done on a number of levels and I have heard people in our organization say: "Well, we gave 100 buses to Seattle and Seattle transit ridership went up, therefore, the UMTA program has been a success in Seattle." This is pretty superficial. We have tried over the past year, by taking 13 of our past grants, and analyzing them in some detail on a case-by-case basis, to try to put our finger on why ridership has gone up or gone down. Can we really ascribe it to the new buses or is it actually because of the schedule or fare changes or whatever? We plan to have those analyses completed by June.

I am anticipating your question why this wasn't done 6 or 8 years ago. I can't really answer that. But we are doing it now and we will soon have this information available.

Chairman MOORHEAD. Well, that is exactly the question I am asking you, program evaluation. If we don't know why we succeeded or failed in the past, we are going to continue to go ahead, and not knowing whether we are going to succeed or fail in the future.

Just for example, I would think that you would have very good knowledge as to the reasonable prediction of what would happen if fares were decreased. We have had some experiments. What is the result?

Does it end up for the locality a net plus or minus? Do you have those figures?

Mr. HERRINGER. We have sponsored and participated in numerous studies of fare elasticity. Recently, we have analyzed the Atlanta situation in considerable depth and the impact of the substantial reduction in fare. This information is available to other cities that are contemplating substantial fare reductions.

There is a difficulty at the present time, I think, in generalizing from past experience on fare elasticity because we may be in a time when the basic underlying variables are changing, when the cost of alternatives are rapidly changing. This might have an impact on previously observed fare elasticity if you look at the transit situation.

Chairman MOORHEAD. In your oral statement you say that the calendar year 1973 marked the first year since World War II that transit ridership increased. How much was that increase?

Mr. HERRINGER. I believe Mr. Frenzel pointed out it was a very small increase, 1½ percent or so. But I would hasten to add that in the first few months of 1974 ridership is up markedly over a similar period in 1973. Of course at least some of that can be ascribed to the shortage of gasoline.

Chairman MOORHEAD. Where do you get those figures for 1973 and for the first quarter of 1974?

Mr. HERRINGER. From the American Transit Association.

Chairman MOORHEAD. Just like the oil industry having to rely on the American Petroleum Institute, their figures on supply and so forth.

Mr. LAMM. There are other figures, Mr. Chairman, for instance, on the fuel consumption. If you are willing to wait 3 months until gasoline tax revenues are known, you have an independent estimate on fuel use

and we, through the Federal Highway Administration publish those figures. But as I say, there is a much more substantial lag than there would be if you were inclined to use oil company estimates.

Chairman MOORHEAD. The reason I am asking some of these questions is that UTAP appropriates a $19.3 billion program. That is an awful lot of money to go back to our electorate, as we have to every other year, and justify it. If we say that the only figures we have, come from the American Transit Association, we have a little difficulty justifying a $19.3 billion expenditure. As Mr. Frenzel pointed out, we talk about ridership and we count one man who takes the commuter railroad and then a subway and then a bus, as three rides, when it is really only one. So I think we need program evaluation and sound statistics on which to have this evaluation.

Mr. HERRINGER. I agree with you, Mr. Chairman, and we are undertaking efforts in the direction of standardizing some of the statistics gathering and also in program evaluation. I can't resist adding, however, that of all of the times that I have testified before various committees of the Congress on the UTAP proposal, this perhaps is the first time that I have had to justify the proposal on the downside rather than the upside. The general reaction to the administration bill is that it provides inadequate funds. I couldn't agree with you more that we need some sound justification for spending $19.3 billion and even more, we need justification for spending the $25, $30 and $40 billion that some others would have us spend over the next 5 years.

Chairman MOORHEAD. It could be that when you come with the justification that the $19 billion is on the low side. The trouble is that it is a figure plucked out of the air now and we can't justify it on the up or downside.

Could you describe your FARE system a little more?

Is it mandatory, what information will you collect, will you find out what percentage of your total riders the systems in a given area carry?

Mr. HERRINGER. We will supply a detailed description of the FARE system for the record. Basically it is an accounting and reporting element standardization that has been developed in conjunction with the industry over a 2-year period. It is a standardized method of collecting any one of a number of data that are important to the transit industry. Ridership, of course, is one obviously important statistic, in addition also to various financial results of the system including how you account for the depreciation. It is a standardization of the many, many different approaches to accounting and to gathering statistics that the various transit authorities currently pursue.

It is not mandatory. As with many industries, the transit industry recognizes the advantages of standardization for comparative analysis and we expect it to accept standardization of records voluntarily. Private industry certainly accepts standardized accounting reporting systems for this reason. Our experience leads us to believe that the transit industry will do the same with the FARE system. In fact, I believe California and other States are making it mandatory. I believe the State of California has said that the FARE system will be the system for all transit authorities operating within the State of California. From our point of view, it should not be mandatory at the Federal level.

Chairman MOORHEAD. Would it not be a more effective tool if it were mandatory?

Mr. HERRINGER. Yes. I would have to say yes, it would be a more effective tool if it were mandatory. I believe that we would be better off allowing the transit industry to adopt it on its own rather than forcing it. I just don't think that will be necessary. But I could not say that it would not speed up the process to legislate it into effect.

Chairman MOORHEAD. I believe that the Frenzel bill is a mandatory system and obviously the people in the industry, whether it is public or private, doesn't like to be mandated to do anything. But if we are going to spend $19 or million, it seems to me we ought to have a very good system of evaluating whether we are getting our money's worth.

Mr. HERRINGER. I think you can see from my remarks that I agree with you and we have been working toward that end. Of course, you just can't turn it on overnight, even if it were legislated. And now we have a new set of accounts for all transit authorities. They couldn't adopt it overnight, it would have to be phased. Our observation is that the transit properties are moving along at a rate that is reasonable in implementing this system on a nationwide basis, and the rate at which they are moving would probably have to be reflected in any legislation that you might consider.

[The following information was subsequently supplied for the record:]

Transit systems which have adopted FARE as their accounting and statistical reporting system total nine. Implementation within this group varies, and the first three transit systems listed have fully implemented FARE.

| Transit system | Revenue passengers | Percent of national total |
|---|---|---|
| Washington Metropolitan Area Transit Authority (District of Columbia) | 120,000,000 | 2.26 |
| CITRAN (Fort Worth, Tex.) | 4,000,000 | .08 |
| Metropolitan Atlanta Rapid Transit Authority | 54,000,000 | 1.01 |
| Bi-State Transit System (St. Louis) | 52,000,000 | .98 |
| Kansas City Area Transportation Authority | 15,000,000 | .28 |
| Southwest Ohio Regional Transit Authority (Cincinnati) | 19,000,000 | .36 |
| Tri-County Metropolitan Transportation District of Oregon (Portland) | 18,000,000 | .35 |
| San Diego Transit Corp | 22,000,000 | .41 |
| New York City Transit Authority | 1,500,000,000 | 28.30 |

Note: 1973 total, 5,300,000,000.

The American Public Transit Association (APTA) maintains a statistical data base on and for its members, and APTA is converting its system to the FARE format. APTA (formerly ATA) annually publishes these data.

UMTA is currently soliciting bids for Task V of the FARE project. One of the work requirements will be an investigation and recommendation as to which organization should be responsible for collecting the data and managing the data base.

Task V will involve the creation of a committee of analysts representing Federal, State, county, municipal, and regional governments and the transit industry. The members of this committee will be made familiar with the data structure of FARE and define reporting formats which they consider meaningful.

The data base manager will be responsible for publishing the data.

Audit of the reported data will generally be a function of the organization which manages the data base. The new National Mass Transportation Act of 1974 (P.L. 93-503) requires uniform reporting by transit systems. UMTA antici-

pates that FARE will be the vehicle used to satisfy the requirement. It is anticipated that UMTA will assume an audit responsibility.

To date, UMTA has spent $620,775 on developing the FARE system. This was accomplished in cooperation with a committee selected by the transit industry, and it is estimated that the members of the committee contributed about four man-years of effort, which was an indirect cost to the transit systems which employ these individuals. In terms of dollars, it is believed the total salary cost of the committee members would be about $112,000.

Chairman MOORHEAD. Again, trying to evaluate whether we can justify various programs, do we get our money's worth out of a Dial-A-Ride program?

Mr. HERRINGER. Well, I believe we do.

Chairman MOORHEAD. How do you test it?

Mr. HERRINGER. Well, the critical test to me, in measuring whether we get our money's worth out of any research and development project that we undertake, is whether it actually is put into effect by communities other than the one, of course, that we are using for experimentation. In the case of Dial-A-Ride, there are some 40 or 50 communities that are currently in the process of either instituting or planning Dail-A-Ride systems along the lines of the one we have in Haddonfield.

As to whether a particular community gets its money's worth out of a Dial-A-Ride system or not, goes back to the problem of local choice. Dial-A-Ride is a very high-quality service. It is door to door. It is something that you have to pay a premium for. It provides excellent transportation for the elderly and the handicapped and if a community wants this kind of service for its residents, then it has to pay for it. That is a decision that it really has to make. Obviously many cities feel that it is worth paying for and they are going ahead and implementing Dial-A-Ride.

Chairman MOORHEAD. Dial-A-Ride would not be a mass transportation system; is that correct?

Mr. HERRINGER. This depends on the definition, of course, but it is a shared ride. The buses that we are using in Haddonfield carry 15 or 20 people. It is not scheduled point to point like most mass transportation systems are. but it is not a private automobile either; it is somewhere in the middle.

Chairman MOORHEAD. I was thinking it is not the solution to moving great numbers of people into the city in the morning and out of the city in the afternoon.

Mr. HERRINGER. No; it certainly is not. It is for relatively low-density areas.

Chairman MOORHEAD. Is the computer part of the system essential. Is that being used in all of the cities that have adopted Dial-A-Ride?

Mr. HERRINGER. No; it is not. The computer only becomes essential when the number of vehicles and the size of the area gets to be too great for a single human dispatcher to manage. This occurs, usually, anywhere from 10 to 15 vehicles.

Chairman MOORHEAD. In Haddonfield you did have a computer?

Mr. HERRINGER. Yes; we do have a computer, that is correct.

Chairman MOORHEAD. How many other cities after Haddonfield adopted the computer and what kind of cost are we talking about?

Mr. HERRINGER. We can provide that for the record in terms of who is actually contemplating using the computer system and we can provide extensive cost data on Haddonfield also for the record. But, for your information, the Haddonfield project loses money on a revenue

basis. It does not pay for itself out of the fare box. One of the reasons is that we provide a 7-day-a-week, 24-hour-a-day service which a private operator probably wouldn't do and a community doesn't have to do either. We are also paying diversion payments to the taxicab companies in Haddonfield for the rides we are taking that they no longer have. We are doing it as a matter of convenience to avoid litigation and to get our project finished. It is questionable as to whether a community would have to pay such diversion payments if they instituted a system.

Chairman MOORHEAD. We would appreciate it if you would provide that for the record. Incidentally, I presume that if we have some questions to submit to you in writing you will be willing to answer them.

Mr. HERRINGER. Yes, sir, we will be glad to answer them.

[The following information was subsequently supplied for the record:]

An itemized accounting of total funds expended on the Haddonfield Dial-A-Ride experiment.

| | |
|---|---|
| New Jersey Department of Transportation (Haddonfield Operations) Labor (75 percent): | |
| Drivers and Maintenance | $2,000,000 |
| Controllers and researchers | 1,300,000 |
| New Jersey staff | 100,000 |
| Subtotal | 3,400,000 |
| Facilities, materials, and services | 1,100,000 |
| Subtotal | 4,500,000 |
| Experimental design, analysis, evaluation, and computer support (MITRE): | |
| Design, analysis, and evaluation | 400,000 |
| Computer software development and maintenance | 600,000 |
| Computer rental (Westinghouse) | 100,000 |
| Subtotal | 1,000,000 |
| Haddonfield computer rental and maintenance (Westinghouse) | 100,000 |
| Total Haddonfield | 5,700,000 |

LIST OF COMMUNITIES WITH DIAL-A-RIDE AND INTEREST IN COMPUTER TECHNOLOGY

Attached is a summary of information on 51 demand responsive systems. Of these, 44 are Dial-A-Ride systems in the United States either currently operating or scheduled to go into operation within the next six months. Additionally, there are seven privately-owned shared-ride taxi systems in operation. The Orange County Transit District in California recently received a capital grant to fund equipment for six more Dial-A-Ride systems; the Montgomery County Department of Transportation in Maryland has requested a capital grant to initiate three Dial-A-Ride systems and a Dial-A-Ride system recently started operation in Dover, Delaware. Active planning is known to be in progress for additional Dial-A-Ride systems in Michigan and California.

Computer control is estimated to be required in Dial-A-Ride systems with fleets of 20 vehicles or more. Of the 44 Dial-A-Ride systems only three are above or near that size: Haddonfield, New Jersey with 19 vehicles; Ann Arbor, Michigan with 45 vehicles; and Santa Clara County, California with 90 vehicles. Haddonfield is being used to test the computer; Santa Clara County will use a computer and Ann Arbor will use automatic dispatching while experimenting further with manual scheduling. Additionally, Rochester, New York and Orange County, California are planning larger systems and both have written UMTA expressing their desire for the computer system.

Three factors affect the use of the computer system:

1. 37 of the 44 Dial-A-Ride systems have less than 10 vehicles and are not close to needing a computer,

2. development of the computer system is only now being completed, and

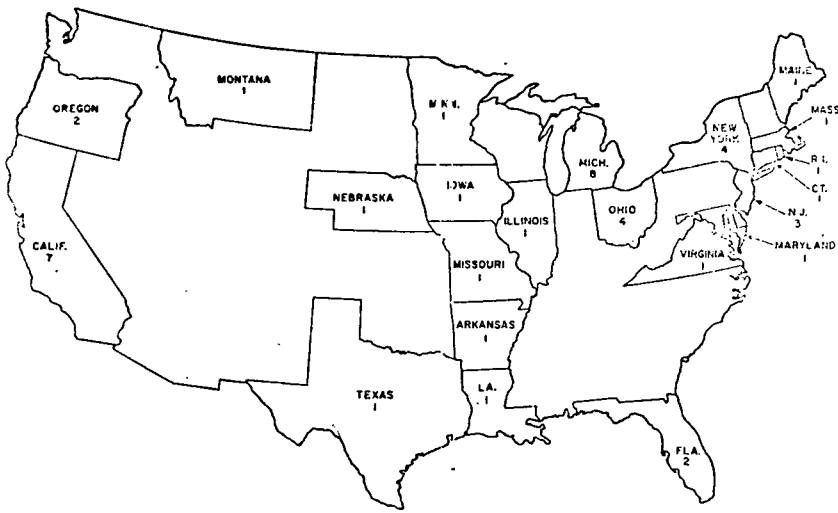
3. UMTA capital grant funds have not heretofore been available for purchase of the computer system.

As larger Dial-A-Ride systems are installed (e.g., Santa Clara County, Orange County and Rochester), with the completion of the development of the Dial-A-Ride computer system and as capital grant funds become available for purchase of the computer system, the demand for the computer system is expected to grow rapidly.

*U.S. Dial-A-Ride Systems*

| *Location* | *Fleet size* | *Location* | *Fleet size* |
|---|---|---|---|
| Alpena, Mich | 4 | Lincoln, Neb | 6 |
| Ann Arbor, Mich | 45 | Watts, Calif | 7 |
| Batavia, N.Y | 7 | Ludington, Mich | 3 |
| Bensenville, Ill | 2 | Medford, Mich | 1 |
| Buffalo, N.Y | 7 | Menlo Park, Mich | 1 |
| Cleveland, Ohio | 1 | Merced, Calif | 4 |
| Columbia, Md | 3 | Midland, Mich | 6 |
| Columbus, Ohio | 5 | Mt. Pleasant, Mich | 4 |
| Cranston, R.I | 3 | New Orleans, La | 4 |
| Dallas, Tex | 1 | Richmond, Calif | 13 |
| Davis, Calif | 1 | Rochester, N.Y | 7 |
| Detroit, Mich | 13 | Rockville, Md | 12 |
| Fairfax, Va | 3 | St. Petersburg, Fla | 13 |
| Ft. Walton Beach, Fla | 2 | Santa Clara County, Calif | 90 |
| Grand Rapids, Mich | 5 | Sault Ste. Marie, Mich | 5 |
| Haddonfield, N.J | 19 | Scott-Carver Counties, Minn | 1 |
| Helena, Mont | 5 | Traverse City, Mich | 5 |
| Hemet, Calif | 2 | Valley Transit, Conn | 3 |
| Holland, Mich | 5 | Washington C.O.G | 7 |
| Houghton-Hancock, Mich | 3 | West Palm Beach, Fla | 7 |
| Kent, Ohio | 2 | Androscoggin-Franklin-Oxford County, Maine | 10 |
| La Habra, Calif | 7 | | |
| La Mirada, Calif | 5 | | |

Figure 6. 45 Demand Responsive Transportation Services Operating in 22 States, May 1, 1974




Source: APPENDIX A

Chairman MOORHEAD. In conclusion, I would say that the part of your statement that I like the best is that the Federal Government can and should do more for urban transportation than merely distribute money. I hope that is emblazoned upon the doors of the entrance of UMTA. Do you have any people in UMTA looking well down the road, 5 years from now or 10 years from now, either studying the psychology of attracting riders or the types of vehicles which will be most effective?

How will we be handling the transportation of people in and around cities in the future? Have you done any studies of the economic effect on cities generally, and on the Nation if an area does or does not have rapid transit?

Mr. HERRINGER. Well, let me first answer your question very frankly by saying I don't believe that we have been paying enough attention to the 5- 10- and 25-year time horizons. That is not to be critical of the program as much as it is a recognition of the very real current needs. This goes back to the stabilization problem. There were immediate needs to be served in rescuing this industry from going completely down the tube as it were.

I believe, though, that it is now time that we did take a longer term look at some of these problems. The latter part of your question addresses again the problem of what kind of transportation systems should a particular type of city have. As I remarked in my statement, and as we discussed over the past hour or so, we are looking at this question, and we are trying to develop criteria. Over the history of both the highway program and the UMTA program, we have been of assistance to people in making these kinds of decisions, but we are continuing to advance our own ability in this area as well.

We have developed a great deal of information on the question of what particular type of system a locality should have and we will continue to develop better information.

Chairman MOORHEAD. I would strongly urge you to start separating some people away from the day-to-day responsibilities which afflict all of us. We are putting out fires that are burning instead of thinking about fires that might be burning 5 years from now.

This committee doesn't have jurisdiction to help you pass your UTAP program, but we try to be in this subcommittee several years ahead of the rest of the Congress, causing some people to say that we are the think tank for the Congress. What we are asking you is not whether we should pass this bill or that bill today or tomorrow, but what should we be getting the people in the Congress ready for that is going to come 3 years or 5 years, hence. I think maybe one of the problems that has afflicted mass transit in this country has been a bunch of localities making day-to-day decisions, because that is all they had the time to do. When we talk about the Federal Government doing more than merely distributing money, I think this is the function that we can and should perform. Maybe the function of this subcommittee is to kind of nudge you a little bit into doing that because you have the expertise that no congressional committee can have to do this kind of job for our country.

And incidentally, for justification of the $19 billion program, it seems to me a study of the economic affect of having a good transit

system would be one of the reasons for justifying that figure, or a higher figure.

Well, it is just past noon now, and I intended to recess by noon. The subcommittee will recess, to reconvene on Monday, May 13, at 10 a.m. in this same room.

On that day a panel will discuss the BART system and its potential for solving transportation problems in other communities. Appearing on that panel will be Mr. Robert Clement, Deputy Under Secretary of the Department of Transportation, in whose office the BART impact study is located: Mr. W. T. Howard, managing director of the Toronto Area Transit Operating Authority; and Mr. Willard Wattenburg, successful electrical engineer and BART critic.

The subcommittee is recessed.

[Whereupon, at 12:05 p.m., the subcommittee recessed, to reconvene at 10 a.m., Monday, May 13, 1974.]

[The following additional written questions and answers were subsequently supplied for the record:]

RESPONSE OF HON. FRANK C. HERRINGER TO ADDITIONAL WRITTEN QUESTIONS POSED BY CHAIRMAN MOORHEAD

*Question 1.* In the 1974 UMTA budget estimates, you clearly state three objectives for your capital grant activities. They are as follows:

(1) Achievement of land use patterns and/or environmental conditions which effectively contribute to the physical, economic and social well-being of urban communities.

(2) Improve mobility by improvement in overall traffic and reduction of time-in-travel about urban regions in peak hours of travel demand.

(3) Provide mobility to those segments of the urban populations which may not have access to the direct use of motor vehicles. This objective is directed at the transportation needs of the young, aged, poor, handicapped, unemployed, and secondary workers.

These objectives certainly should merit significant attention from any major Federal transportation effort. What specific and quantifiable evidence do you have that these objectives have been achieved by the capital grants program? What specific and quantifiable measures do you use to measure movement toward the achievement of these objectives? It would be helpful to have examples of individual projects, but I am particularly interested in the aggregate impact of the capital grants program: the impact on all systems as measured by the specific quantifiable measures you use to evaluate the achievement of these objectives (i.e., What quantifiable evidence do you have that objective three is being achieved. Perhaps total transit trips by these groups would be a good measure.)

*Answer.* Efforts to develop specific quantified measures of urban transportation performance and to set up a reporting system for the collection and analysis of the appropriate data are not advanced enough to enable us to evaluate the impact of specific capital grants or to rigorously assess the overall performance and effectiveness of UMTA's programs.

While aggregate data on transit ridership is available, showing that public transportation has begun to attract riders again, we do not feel that this data alone provides an adequate measure of transportation performance or a satisfactory means of evaluating the impact of UMTA's programs or their achievements. For example, trends in aggregate transit ridership will not disclose the particular classes of uses whom the improvements are benefiting; nor will they show how many of the additional riders are former drivers who have been persuaded to leave their cars at home. Such data does not reveal external factors that may influence ridership—such as employment shifts or population growth—and does not allow reliable estimates of what might have occurred in the absence of UMTA-assisted projects.

This is not to say that better output measures cannot be devised. For example, improvements in general accessibility and in the quality of urban transportation service could be measured by the increase in the percentage of the metro-

politan population which is brought within walking distance of a transit stop, or by the reduction in average trip and waiting time, or by the increase in transit route miles, etc. Data could conceivably be disaggregated enough to indicate the incidence of such improvements on different groups within the urban population, such as the poor, the elderly and the handicapped. Such data is presently available only in isolated cases as a product of locally initiated spot surveys. A system for consistent, nationwide collection and reporting of such information must be designed, established and shaken down before we begin to obtain an accurate picture of trends in urban transportation performance. UMTA is in the process of undertaking research projects aimed at disaggregating travel data for minority populations and the elderly and handicapped and enabling planners to forecast the impact of transportation alternatives on the mobility of the transit-dependent within these groups.

We recognize that better urban transportation indicators are essential if the Congress, DOT and UMTA are to be in a position to effectively assess the impact of federal aid to urban transportation and to measure progress toward the achievement of national objectives. At the same time, it should be realized that the development and implementation of such a continuous monitoring system is a task of major proportions, calling for the cooperation of planners, local government, highway and transit officials. It also requires the creation within DOT and UMTA of appropriate data analysis and evaluation capability. We fully intend to implement such a system and will be pleased to keep the Committee informed of the progress we are making toward this end.

*Question 2.* Last year you stated before the House Appropriations Subcommittee that "* * * We need to know more about * * * what happens when an operating company reduces the fare. Who rides the bus? Is a fare reduction a good thing? Does it help us accomplish the objectives of reducing congestion or do we just attract people onto the buses who weren't there before, who maybe walked before?

*Answer.* During the past year, we have initiated the evaluation of a number of local experiments with fare reduction—some of which were assisted with UMTA funds.

Attempts by transit authorities to increase ridership by fare reduction have taken several forms including:

(1) Direct across-the-board fare reduction;
(2) Reduced fares for special groups; and
(3) Reduced fares at specific times, e.g., off-peak hours.
(4) Reduced fares in special areas, e.g., the CBD.

Across-the-board reductions have been implemented in the Atlanta bus system (from 40 cents to 15 cents), in the Nashville bus system (50 percent reduction), in St. Louis, San Diego, Cincinnati, and several other areas. The Nashville experiment, which was accompanied by frequency and route changes, did not yield a clear pattern of effects. However, the Atlanta reduction was followed by a 31 percent increase in off-peak and a 12.5 percent increase in peak-hour ridership. The impact of the Atlanta experience is being evaluated with UMTA technical studies assistance through analysis of patronage data and interviews with non-transit users. Preliminary findings indicate that 91 percent of the increase was for "new" riders diverted from other modes. In addition, while revenue trips increased annually from 42.9 million to 54.7 million, total annual revenue decreased by $8.9 million.

A "no fare" experiment was conducted in Amherst, Massachusetts, with UMTA assistance which tripled ridership and reduced traffic congestion on and near the University of Massachusetts congestion on and near the University of Massachusetts campus. Analysis of the impacts of these and other reductions is being pursued with UMTA assistance in most of these urban areas.

A special fare-for-the-elderly had been in operation on Boston's MBTA during off-peak hours—before the general off-peak reduction was introduced. A Pittsburgh fare-for-the-elderly experiment generated approximately 1.1 million new trips (a measure of previously latent demand) at $628,000 revenue loss (the "cost" of providing this service). Many other transit agencies have special elderly fares which have generally increased riding by this group at an additional service cost.

Off-peak reductions were tried in the Lowell (Mass.) bus system and more recently on the Boston MBTA. In Lowell, there was a 75 percent increase in ridership. The Boston MBTA introduction of a "dime-time" (a reduction from 25 cents to 10 cents in rapid rail fare during the hours of 10 a.m. to 1 p.m. on

weekdays) has received positive ridership response. A station platform survey showed 31 percent of riders say they use transit more often since the introduction of "dime-time": The system has now been extended to the light rail lines, operates until 2 p.m. daily and all day Sunday. The Chicago Transit Authority has also experimented with weekend reduced fares with a large increase in ridership.

Reduced fares for special service areas have been initiated in Kansas City, Seattle and several other areas. In Seattle, a no-fare zone has been established in the Central Business District where riding within the zone is free. A study to evaluate this experiment will soon be initiated with UMTA assistance.

Preliminary analysis linking fare-reduction to congestion reduction objectives have not been conclusive. In Atlanta, there was a minor reduction in peak-hour auto travel. However, the figures available are system-wide and cannot be tied to specific corridors in which transit ridership increased. More specific traffic counting programs would have to be built into the evaluation studies to specifically identify impact on congestion.

Although evaluations are incomplete, it appears that fare reduction results in increased ridership, decreased revenues and possibly reduced traffic congestion.

*Question 3.* Last year you testified before the House Appropriations Subcommittee that, "the program (UMTA) has been around now long enough that we can start looking for some hard evidence of results. We need that evidence in order to feed back and alter operations of the program. We have to measure and evaluate everything that we do." Have you developed measures in the Department which would be useful to Congress in assessing the performance of the UMTA program? If you have developed these measures how do they relate to the stated objectives of the Urban Mass Transit Act of 1964 and to subsequent amendments?

On the basis of measures you have developed, what type of investments would you recommend to cities which would increase transit ridership? Under the UTAP bill, how do you intend to measure the performance of our transportation expenditures? How do you expect to hold local governments accountable to the levels of performance desired, particularly for expenditures made from Apportioned General Fund dollars? What measures are available to local governments to evaluate the performance of these programs?

*Answer.* See response to question 1.

*Question 4.* As you are well aware, labor costs constitute 70–80 percent of total urban transportation expenditures. What work is the Department doing to improve the labor productivity of the transit industry? Could you please include in your analysts, time series data showing the labor productivity of the transit industry for the last ten years. What has been the impact (specific and qualifiable) of UMTA expenditures on labor productivity in the industry? (Supply aggregate figures and any project specific data you feel would be helpful.) Would you expect UMTA expenditures to improve the labor productivity of the industry since they were mostly for capital?

*Answer.* UMTA has recently placed increased emphasis on transit management through the creation of an Office of Transit Management. The Office intends to have a positive effect on labor productivity through the development of improved marketing and managerial procedures, operating performance measures, manpower management techniques and training programs.

More specifically, UMTA is sponsoring a number of projects through its transit management and service demonstration programs that will assist in improving the productivity of transit systems in areas where system performance enhances labor productivity. Development of software packages, such as vehicle and driver runcutting and scheduling (RUCUS, which has been tested, where it reduced the need for buses and drivers by 2 to 5 percent), service inventory and maintenance (SIMS, a management information system) and maintenance planning systems (MPS, for rail systems) are projects that are being developed by UMTA to assist transit management in improving labor productivity.

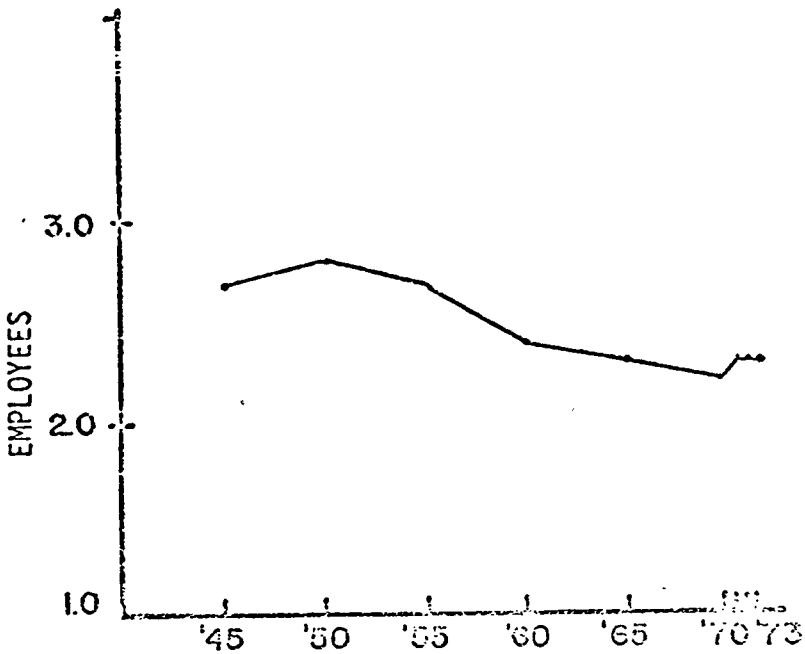
UMTA's service demonstration program has sponsored projects designed to increase service levels and labor productivity. Busways have increased the number of trips during peak hours of service (e.g., Shirley Highway and Golden State demonstrations). Reverse commuter routing has increased the passengers per driver ratio during peak hours (e.g., Capital Flyer and Shirley Highway demonstrations). Park and ride service has eliminated the need for collecting

and distributing (e.g., Blue Streak and other demonstrations). And high capacity buses, which will be put into demonstration service in the near future, will increase the passenger per driver ratio.

MEASURES OF LABOR PRODUCTIVITY

As a product of the project in which UMTA is developing urban transportation indicators and performance measures, UMTA intends to develop measures of labor productivity. At this time, it is not possible to isolate and measure the aggregate effects of UMTA grants on labor productivity in the transit industry. Data is available on trends in the transit industry for characteristics which could be considered to be indicators of labor productivity, such as employee per revenue vehicle (which is shown below on the graph entitled "Employees per Revenue Vehicle, 1945–1973"), and passengers and vehicle miles per employee (which are listed below).

EMPLOYEES PER REVENUE VEHICLE
1945 - 1973




Source: American Transit Association, 1973–1974 Transit Fact Book, 1974.

TOTAL PASSENGERS, REVENUE PASSENGERS AND VEHICLE MILES PER TRANSIT EMPLOYEE, 1960–73

| | Total passengers [1] | Revenue passengers [1] | Vehicle miles | Number of employees | Total passengers per employee | Revenue passengers per employee | Vehicle miles per employee |
|---|---|---|---|---|---|---|---|
| 1960 | 9,395 | 7,521 | 2,143 | 156,400 | 60,070 | 48,088 | 13,702 |
| 1961 | 8,883 | 7,242 | 2,077 | 151,800 | 58,518 | 47,708 | 13,682 |
| 1962 | 8,695 | 7,122 | 2,047 | 149,100 | 58,317 | 47,767 | 13,729 |
| 1963 | 8,400 | 6,915 | 2,022 | 147,200 | 57,065 | 46,977 | 13,736 |
| 1964 | 8,328 | 6,854 | 2,016 | 144,800 | 57,514 | 47,334 | 13,923 |
| 1965 | 8,253 | 6,798 | 2,008 | 145,000 | 56,917 | 46,883 | 13,848 |
| 1966 | 8,083 | 6,671 | 1,984 | 144,300 | 56,015 | 46,230 | 13,749 |
| 1967 | 8,172 | 6,616 | 1,997 | 146,100 | 55,934 | 45,284 | 13,669 |
| 1968 | 8,019 | 6,491 | 1,989 | 143,590 | 55,847 | 45,225 | 13,852 |
| 1969 | 7,803 | 6,310 | 1,967 | 140,860 | 55,394 | 44,796 | 13,964 |
| 1970 | 7,332 | 5,932 | 1,883 | 138,040 | 53,115 | 42,973 | 13,641 |
| 1971 | 6,847 | 5,497 | 1,846 | 139,120 | 49,217 | 39,518 | 13,269 |
| 1972 | 6,567 | 5,271 | 1,756 | 138,420 | 47,443 | 38,080 | 12,686 |
| 1973 | 6,660 | 5,345 | 1,835 | 139,950 | 47,588 | 38,192 | 13,112 |

[1] In millions.

Source: American Transit Association.

Although industry-wide data is available, it is inconclusive. For example, the graph shows a declining number of employees per vehicle, suggesting increasing labor productivity. But the table indicates a small decline in the number of passengers per employee, suggesting declining productivity, while little change has taken place in the number of vehicle miles per employee.

IMPROVING LABOR PRODUCTIVITY THROUGH CAPITAL ASSISTANCE

By themselves, capital facilities and rolling stock purchased with the assistance of UMTA grants should be expected to increase labor productivity, since the new equipment should be more reliable and require less maintenance and repair than replaced or older equipment. In the evaluation case studies of bus systems, mentioned in the response to Question 1, evidence was found of increasing reliability as the result of UMTA capital assistance.

"New buses often present maintenance problems related to assembly deficiencies or new components with which the operator is unfamiliar. Nevertheless, operator in all the case study cities noted a great improvement in vehicle reliability even though only a few systems exhibited the detailed maintenance data that is the basis for this conclusion. One such system is Portland, Oregon, where during the 9 months immediately preceding the delivery of the first set of UMTA funded buses in April 1971, reliability of the fleet as measured by vehicle miles per chargeable road call was averaging 2,914 per month. During the next fiscal year, fiscal year 1972, reliability increased to an average of 4,798 vehicle miles per chargeable road call per month; an increase of 65%. A second set of UMTA funded buses arrived in March 1972 and reliability again increased to an average of 8,228 vehicle miles per road call per month during fiscal year 1973. This represents a total increase in reliability after the 2 grants of 182%. If it were possible to project pre-project reliability to 1972 for comparison with past project reliability, the increase may have been even more dramatic. This increase of reliability of 182% cannot be assumed to be average or typical because Portland has a very new fleet (average age was 2.5 years in 1972). Also, characteristics such as vehicle miles, maintenance effectiveness, operating characteristics and conditions of replaced equipment differ widely enough to inhibit generalizations. Judging from the reductions in average fleet age and unanimous opinion of the case study operators, however, one can assume that there was sizeable improvement in vehicle reliability in most of the case study systems."

It should also be noted that the higher travel speeds mentioned in the reply to Question 1 not only increase transit's competitiveness with the auto but also reduce fleet size requirements and operating costs by making possible more trip per hour and thereby increasing labor and equipment productivity.

*Question 5.* Secretary Brinegar testified before the Senate Public Works Committee that there were about ten cities that he felt could justify a rail rapid transit system. In testimony before our Subcommittee, you indicated "There are corridors in Los Angeles where the volumes are equivalent to what New York might have. There is a corridor in San Juan that has extremely

high volumes and in a short, short distance. There is a corridor in Buffalo perhaps you can make the same statement about." Yet you state quite emphatically that the Department cannot determine which cities could justify a rail rapid transit system without an extensive alternatives analysis. If this is the case, what is the specific basis for your and Mr. Brinegar's comments? In earlier testimony you indicated that no reasonable criteria for rail systems could be developed, yet when asked if any new system is justified, you turned immediately to corridor volumes in your response. How do you reconcile this difference? Have Los Angeles, San Juan, and Buffalo undergone the comprehensive alternatives analysis you described as necessary to justify a system? You left the impression that the process was not yet completely devised.

*Answer.* There is actually no contradiction between Mr. Herringer's remarks and those of the Secretary. Extensive alternatives analysis is required as justification for rail rapid transit or, for that matter, for any major transportation investment. Improvements in transportation generally proceed from general regional transportation planning, to corridor planning, to preliminary engineering, to final engineering, and eventually to construction. Throughout this process, alternatives are continually analyzed and narrowed.

One element of a well-structured alternatives analysis is an investigation of traffic volumes expected to utilize a particular facility. In the initial phases of the study the anticipated volumes provide a preliminary indication of the types of systems that may have potential in major corridors. However, many additional factors must be considered as part of the subsequent analysis. For example, regional transportation planning includes evaluation of alternative transportation means of achieving regional goals and objectives. The regional objective might require a transportation system for a particular corridor designed to accommodate 100,000 riders per peak-hour in some future design year. This volume estimate would be developed on the basis of expected land use, employment and travel for the design year. The next stage of the process would be to develop alternative mean of satisfying this corridor demand. Alternatives under consideration might be a more efficient utilization of an existing freeway in the corridor, a busway, a PRT line, a rail rapid line, etc. The planner would assume a correlation between certain type of transportation facilities and certain land use patterns and assign traffic projections to the transportation alternative accordingly. However, many other factors would also need to be analyzed. For example, the planner might seek to factor in the impact of each of the proposed alternatives on air quality, energy consumption, mobility of residents in a community, etc. In summary, while an analysis of the volumes that would be expected to use a facility might lend insights into the analysis and help narrow the alternatives under investigation, many other considerations must be analyzed.

In each of the areas mentioned (Los Angeles, San Juan and Buffalo), certain of the preliminary analyses in the hierarchy are complete and lead to the initial perception that the corridors would support rail facilities; however, the detailed comprehensive alternative analysis which will lead to the ultimate local decision has not been completed. The decision cannot be made on volumes alone.

*Question 6a.* What is the difference in the products or outputs of the UTPS studies and the Section 9 studies?

*Answer.* The products of these two programs are distinctly different. Research and development projects in support of UTPS produce new and improved planning *methods*, whereas the Section 9 studies apply these methods and others to produce *plans* for transportation improvements in specific urban areas. The UTPS program provides the tools that are used in the Section 9 studies. The UTPS program *does not* produce plans for transportation improvements in specific urban areas.

*Question 6b.* Couldn't planning consultants, engineering firms and universities develop their own computer models and techniques?

*Answer.* The Federal government has assumed the lead in this area because the software is expensive to develop and has a large number of similar applications nationwide. The private sector, primarily consultants and computer "service bureaus," can and does develop such software but it is proprietary and is not available to State and local planning staffs unless they also purchase either consulting services or machine time from the providing company. This is not only costly but also has tended to retard the development of capable local planning staffs able to conduct continuing planning that is responsive to the day-to-day needs of local decision makers. UTPS provides an easy to use, well docu-

mented package of computer programs and attendant instructional and maintenance services that keep costs low and local staff competence high.

*Question 6c.* Who is developing the models for the UTPS program?

*Answer.* The staff of the Software Systems Division has final responsibility for the structure of the models contained in the UTPS package. This staff is assisted by the Transportation Systems Center at Cambridge, by the National Bureau of Standards and through contract research by several of the most competent planning consulting firms in the nation, including at this time:

PRC Systems Sciences Co.
DeLeuw Cather Co.
Peat, Marwick, Mitchell & Co.
R. H. Pratt & Associates, Inc.
Creighton-Hamburg, Inc.
Cambridge Systematics, Inc.
Barton-Aschman Associates
Wilbur Smith & Associates
Alan M. Voorhees & Associates, Inc.

*Addendum to question 6(c).* As an addendum to question 6(c) it would be helpful to know the total amount of money expended under the UTPS program since its inception and how much was received by the various groups conducting these studies (consulting firms, etc.). For instance, the itemization of amounts received by individual contractors should include the nine firms mentioned in the original answer and any other firms with whom UMTA has contracted under the UTPS programs.

*Answer.*

*Amounts obligated through end of fiscal year 1974 for UTPS*

| Contractor and subcontractor: | *Thousands* |
|---|---|
| PRC Systems Sciences Co | $1,045 |
| Alan M. Voorhees & Associates, Inc | (340) |
| Creighton-Hamburg, Inc | (228) |
| R. H. Pratt & Associates, Inc | (160) |
| DeLeuw Cather Co./TRW Systems Group | 903 |
| Consad | (207) |
| Wilbur Smith & Associates, Inc | (155) |
| Peat, Marwick, Mitchell & Co | 842 |
| Barton-Aschman Associates | (83) |
| Cambridge Systematics | (45) |
| Transportation Systems Center | 105 |
| Federal Highway Administration | 50 |
| Price Williams Associates | 10 |
| National Bureau of Standards | 145 |
| DOT working capital fund | 1,093 |
| Total | 4,293 |

*Question 6d.* How are the products of the UTPS program used in Section 9 studies?

*Answer.* The UTPS program produces computer software that can assist local planners in the analysis of multi-modal transportation systems in both a short range and long range context. UTPS is used to evaluate the probable benefits, costs and other impacts of alternative highway and transit systems. These are represented as "networks" to the computer, which then estimates travel demand for the roads and transit lines using population, employment, and other descriptors of the urban region being studied. From these demand estimates, the computer programs prepare statistics on transit ridership, highway congestion, pollution emissions, energy use, operating costs and other measures of performance and impact. Based upon study of these measures for a transportation system under study, local planners and policy makers are able to identify weaknesses in a proposed system and to develop modifications.

For instance, perhaps a plan under study includes a radial freeway which the computer output shows would severely congest downtown connecting streets and lead to unacceptable carbon monoxide levels on some of these streets. Local planners might substitute a rapid busway for the freeway in the "network" and run through the programs again. This pass might show acceptable congestion and emission levels but some diversion of shopping trips from downtown to outlying

shopping centers due to a reluctance of shoppers to use the bus service provided. Perhaps a final alternative would be a much reduced freeway configuration with exclusive bus lanes in the peak for work trips and good auto service in the off peak for shopping trips. UTPS software can analyze each of these alternatives and produce the technical data upon which local decisions are based.

*Question 6c.* Who are the "Users" of UTPS referred to in the UMTA budget estimates? Provide a list of State and local groups and identify those involved in the thirty percent increase over last year.

*Answer.* Below are lists of users of the UTPS system. The first list, entitled "FY 1974 Requests" includes all agencies asking for and receiving UTPS during FY 1974 (98). Those with asterisks had an earlier version of UTPS but were asking for the latest improved version (21). Those not having asterisks had never before asked for UTPS (77). The second list, entitled "Pre FY 1974 Users" includes all users who have an older version of UTPS and have not asked for a new version during FY 1974 (43). Total users prior to FY 1974 were thus 64 in number (21+43) and new users who did not have an old version were 77 in number representing over a 100% net increase in users to a current level of 141 total users (64+77).

FISCAL YEAR 1974 REQUESTS

(*Marks those requestors who had an earlier version of UTPS and were requesting the newer version)

Campbell Foxworth & Pugh, Orlando, Fla.
*Alamo Area COG, San Antonio, Tex.
Alan M. Voorhees, Ltd., London, England.
*Arizona Highway Department, Phoenix, Ariz.
Barton-Aschman Associates, Inc., Chicago, Ill.
*Maunsell & Partners, Ltd., Adelaide, Australia.
*Alabama Highway Department, Montgomery, Ala.
Analytical System Corp., Burlington, Mass.
Arkansas State Highway Department, Little Rock, Ark.
*Boeing Computer Services, Seattle, Wash.
Capital Regional Planning Commission, Baton Rouge, La.
Chicago Area Transportation Study, Chicago, Ill.
City of San Diego, San Diego, Calif.
Commonwealth Associates, Inc., Jackson, Miss.
Calspan Corp., Buffalo, N.Y.
Central Iowa Regional Association of Governments, Des Moines, Iowa.
Transportation Department, Calgary, Alberta, Canada.
*County of Santa Clara, Planning Department, San Jose, Calif.
Community Development Agency, Los Angeles, Calif.
Comp Do Metro De Sao Paulo, Soa Paulo, Brazil.
County Surveyor's Department, Warwick, England.
*California DOT, Sacramento, Calif.
Denver Regional COG, Denver, Colo.
Department of Highways, Carson City, Nev.
*Comsis Corp., Wheaton, Md.
Coverdale & Colpitts, Inc., New York, N.Y.
Daniel Mann Johnson & Mendenhall, Los Angeles, Calif.
Day & Zimmerman, Inc., Philadelphia, Pa.
Delaware Valley Regional Planning Commission, Philadelphia, Pa.
North Carolina State University, Raleigh, N.C.
Michigan State University, East Lansing, Mich.
Duke University, Durham, N.C.
FHWA–DOT, Washington, D.C.
*Florida DOT, Tallahassee, Fla.
Freeman Fox & Associates, London, England.
*Gannett Fleming Corddry Carpenter, Harrisburg, Pa.
*Delaware DOT, Dover, Del.
Hawaii DOT, Honolulu, Hawaii.
Geipot/Ministry of Transportation, Rio De Janeiro, Brazil.
General Motors Research Laboratory, Warren, Mich.
Georgia Institute of Technology, Atlanta, Ga.
Head of the Lakes COG, Duluth, Minn.
Canada Department of Highways, Edmonton, Alberta, Canada.

Howard, Needles, Tammen and Bergendoff, New York, N.Y.
Jamieson and Mackay, London, England.
Kent-Ottawa Regional Planning Commission, Grand Rapids, Mich.
Georgia DOT, Atlanta, Ga.
Harland Bartholomew & Associates, Memphis. Tenn.
D.C. Division of Highways and Traffic, Washington, D.C.
Honeywell Systems & Research Center, Minneapolis, Minn.
Kentucky DOT, Frankfort, Ky.
*Transportation Systems Center, Cambridge, Mass.
Louisiana Technical University, Ruston, La.
Massachusetts Bay Transportation Authority, Boston, Mass.
*Metropolitan Transportation Authority, New York, N.Y.
*Washington COG, Washington, D.C.
Los Angeles Regional Transportation Study, Los Angeles, Calif.
Maryland DOT, Baltimore, Md.
Metropolitan Tulsa Transit Authority, Tulsa, Okla.
Metropolitan Dade County, Miami, Fla.
Metropolitan Council, St. Paul, Minn.
Michiana Area COG, South Bend, Ind.
*Ministry of Works & Development, Wellington North, New Zealand.
*Montgomery and Greene County, Dayton, Ohio.
Nebraska Department of Roads, Lincoln, Nebr.
Middle Rio Grande COG, Albuquerque, N. Mex.
*New York City Transportation Authority, Brooklyn, N.Y.
Ohio Areawide Coordinating Agency, Cleveland, Ohio.
*North Central Texas COG, Arlington, Tex.
NYC Planning Commission, New York, N.Y.
Raytheon Co., Bedford, Mass.
International Programs–OST–DOT, Washington, D.C.
Research Triangle Institute, Research Triangle Park, N.C.
Pennsylvania State University, University Park, Pa.
Reconstruction and Urban Planning, Saigon, Vietnam.
Rhode Island Statewide Planning Agency, Providence, R.I.
*Richmond Regional Planning District, Richmond, Va.
Southern California Association of Governments, Los Angeles, Calif.
Stanford Research Institute, Menlo Park, Calif.
Swiss Federal Institute of Technology, Lausanne, Switzerland.
* Southwestern Pennsylvania Regional Planning Commission, Pittsburgh, Pa.
Scientific Control Systems, Milton Keynes, England.
Southeast Michigan COG, Detroit, Mich.
Spokane Metropolitan Area Transportation Study, Spokane, Wash.
State Highway Commission of Kansas, Topeka, Kans.
Sydney Area Transportation Study, North Sydney, Australia.
Systems Data Processing Services, Inc., Waltham, Mass.
Texas Highway Department, Austin, Tex.
Tri-State Regional Planning Commission, New York, N.Y.
University of Florida, Gainesville, Fla.
Technical University of Denmark, Lyngby, Denmark.
Transportation Planning Associates, Bristol, England.
City of Los Angeles, Los Angeles, Calif.
Uni-Coll Corp., Philadelphia, Pa.
University of Oklahoma, Norman, Okla.
University of Toronto, Toronto, Canada.
VTN Consolidated, Inc., Newport Beach, Calif.
Wilbur Smith & Associates, Columbia, S.C.
BRH Mobility Services Co., Houston, Tex.
Ohio Department of Highways, Columbus, Ohio.
County Surveyors Department, Winchester, England.
Humphrey, Thomas F., Bureau of Transportation, Boston, Mass.
Colin Buchanan & Partners, London, England.
Datum, E. V., Annabergerstrasse, West Germany.
De Leuw, Cather & Co., Washington, D.C.
Virginia Polytechnic Institute, Blacksburg, Va.
University of Newcastle Upon Tyre, Newcastle Upon Tyre, England.
East West Gateway Coordinating Council, St. Louis, Mo.

Foreign Projects Division—FHWA, Washington, D.C.
Indianapolis Department of Metropolitan Development, Indianpolis, Ind.
Johns Hopkins University, Silver Spring, Md.
Lockheed Missiles & Space Co., Sunnyvale, Calif.
Marin County Planning Department, San Rafael, Calif.
Logicomp Corp., Los Angeles, Calif.
Louisville Transportation Study, Jeffersonville, Ind.
Massachusetts Institute of Technology, Cambridge, Mass.
Coordinated Charlotte Thoroughfare Study, Raleigh, N.C.
Northrop Airport Development Corp., Vienna, Va.
Michigan Department of State Highways, Lansing, Mich.
Missouri State Highway Department, Jefferson City, Mo.
Oregon State Highway Division, Salem, Oreg.
Princeton University, Princeton, N.J.
R. H. Pratt & Associates, Kensington, Md.
Oklahoma Department of Highways, Oklahoma City, Okla.
Puerto Rico Highway Authority, San Juan, P.R.
Rand Corp., Santa Monica, Calif.
Tennessee DOT, Nashville, Tenn.
San Joaquin County COG, Stockton, Calif.
Alabama Highway Department, Montgomery, Ala.
Wisconsin DOT, Madison, Wis.
Tippetts, Abbett, McCarthy & Stratton, New York, N.Y.
Transportation Planning Division, Lansing, Mich.
University of Missouri, St. Louis, Mo.
Mitre Corp., McLean, Va.
Univac, Cinnaminson, N.J.
Washington Metropolitan Area Trans Authority, Washington, D.C.
Transport & Road Research Lab, Crowthorne Berks, England.
Vogt, Sage & Pflum, Cincinnati, Ohio.
Wasatch Front Regional Council, Farmington, Utah.
Wayne State University, Detroit, Mich.
York County Planning Commission, York, Pa.

*Question 6f.* What specific examples can you provide which demonstrate a specific and quantifiable impact of the UTPS program or the improvement of urban mobility?

*Answer.* It would be misleading to imply in response to this question that in-the-ground results directly attributable to application of UTPS are widespread. This is, of course, not unique to UTPS but applies to all planning tools and even quite a few actual planning studies. Reasons for this are numerous, major among these are:

The decision-making process involves many considerations, only some of which can be provided by planning studies. A clear linkage between planning inputs and final decisions is usually not evident. Moreover, long range planning concerns itself with setting directions now that will lead to a better urban environment many years from now. The intervening time tends to obscure any linkage between planning and on-the-ground improvements.

Existing UTPS capabilities are appropriate to long-range planning. The system is in the process of being extended to include tools appropriate for short-range improvement. However, UTPS has been in existence for not quite two years. Even short-range transportation improvements (e.g. better bus routes, schedules, priority) resulting from application of the package could scarcely have been implemented under even the most optimistic schedule.

Conduct of urban transportation planning as a prerequisite for Federal aid to urban transportation has been required by Federal law for over a decade. Such planning is in fact being applied in well over 240 urban areas in this country at an annual cost of the Federal government alone at more than 50 million dollars. While it is indeed the broader goal of the UTPS program to promote better transportation, the objective more specifically stated is to provide these local planning agencies with analytical tools that are more efficient to apply and more relevant to current decision making. It is apparent that there is great potential for improvement in both categories and the research and development funds spent on the UTPS program are aimed at realizing this potential.

The UTPS package or its predecessor, the "HUD" package, has been used in studies of major rapid transit systems in Washington, D. C., Atlanta and Baltimore which are in various stages of implementation. They have also been used

in studies of bus transit systems in numerous urban regions, and UTPS is currently being used in a major review of the Metro bus routes and schedules in the Washington area. Many state and local agencies use UTPS (see question 6(e)) and some specify use of UTPS in consultant contracts. It is expected that in future years actual transportation improvements stemming from analyses using UTPS will be much more readily identifiable, particularly those resulting from use of the new short range planning capabilities which will be developed.

*Question 6g.* How much money has been expended under Section 9 since its inception and who are the ultimate recipients of these funds (a list of all consulting firms, universities and other "third-party" recipients and the total amount they have received through December 1973 would be helpful.)

*Answer.* By June 30, 1974, UMTA will have committed approximately $132.1 million of Section 9 funds over a 8-year period (an annual breakdown is provided below). This represents approximately 560 grants which have been made to numerous regional planning agencies, cities, States and transit agencies. We are currently providing funds to about 100 urban areas on a continuing basis.

Over the past 3 years UMTA has been utilizing the designated A–95 areawide planning agency as the single recipient agency for all Section 9 funds with certain of these funds being passed through to cities, counties, or public transit agencies. In each case the latter are "third party" recipients. Although UMTA has been encouraging the expansion of local planning staffs, a number of agencies have relied on consultant support. A current list of these firms and amounts received does not exist. Last, universities are generally not third party recipients of Section 9 funds although there is nothing to prevent such arrangements if locally desired. University activities are usually supported under the Section 11 UMTA University Research Program and coordinated with Section 9 studies where possible.

| Fiscal year | Program level [1] | Grants |
|---|---|---|
| 1967 | $3.0 | 9 |
| 1968 | 5 | 27 |
| 1969 | 5 | 49 |
| 1970 | 9 | 53 |
| 1971 | 15 | 71 |
| 1972 | 25 | 51 |
| 1973 | 33.5 | 100 |
| 1974 | 36.6 | 200 |
| Total | 132.1 | 500 |

[1] In millions.

*Question 6h.* How do you measure the effectiveness of Section 9 expenditures?

*Answer.* A single "effectiveness" measurement for Section 9 expenditures is not possible. Section 9 funds provide an opportunity to plan, develop and analyze alternative means for improving mass transportation services in a local community. The reasons for initiating such studies are as varied as the circumstances surrounding the community's desire to improve transit service—a need to take over a faltering private carrier, concern with congestion, pollution, energy conservation, etc. Descriptions of representative technical studies grants follow:

SELECTED EXAMPLES OF TECHNICAL STUDIES

*Norfolk, Va.*

In February 1972, Virginia Transit Company, a private bus operator, notified the City of Norfolk that service would cease in six months. With the assistance of a $45,000 technical studies grant ($67,500 total project cost), the City of Norfolk initiated a study in April 1972 of the feasibility of public takeover or other options to maintain transit service. The recommendations of that study ultimately resulted in formation of the Tidewater Transportation District and public ownership of VTC through a $6,266,717 UMTA capital grant in February 1973.

*Salt Lake City, Utah*

In May 1972 a technical studies grant was provided to the Wasatch Front Regional Council to prepare a regional transit development program. New buses have been purchased under an UMTA capital grant as recommended in the study. The study also recommended the annexation of the surrounding areas

into one regional transit district. In November 1973, by overwhelming majority, the citizens voted for annexation. As a result, there is presently pending a capital grant request to purchase the Ogden City Lines, and its subsidaries, and new buses to serve the increased service area.

*Wilkes-Barre-Scranton, Pa.*

In May 1972 UMTA approved a $74,402 technical studies grant ($111,604 total project cost) to develop a coordinated transit improvement program for Wilkes-Barre and Scranton. The flood disaster of June 1972 led to a quick revision of the study to first produce an immediate action plan to relieve the transportation crisis in Wilkes-Barre, where post-flood bus ridership was up 112 percent. The results of this study led to a $1,462,068 capital grant in March 1973 primarily for new buses and, subsequently, in February 1974, to public acquisition of the two key operators serving Wilkes-Barre.

*Seattle, Wash.*

UMTA has supported through technical studies assistance the development of a long-range transportation plan for the Puget Sound region. The transit element of the plan was completed in June 1972. The plan calls for the development of a regional express bus system to serve the major centers of the region. The plan served as the basis for a successful King County election in September 1972 that authorized METRO (the transit operator) to perform the functions of public transportation and to levy a sales tax to support the system. The key elements of the plan are now in the process of being implemented. Specifically, detailed corridor planning studies and designs for park-and-ride lots are or will soon be underway. In addition, a major bus improvement program is being implemented. The first phase of the program is to be funded by a pending UMTA capital grant request.

*Baltimore, Md.*

Technical studies funds were used to support the development of short- and long-range transit plans in Baltimore. As part of the short-range program, the Mass Transit Administration (MTA) took over the former Baltimore Transit Company in 1970 with capital grants assistance. The grant also included the purchase of 370 new buses. In 1972, an additional grant was made to assist in the purchase of 100 more new buses and to buy out four small suburban bus companies. In addition, MTA has initiated many of the route and schedule changes recommended in the short-range program.

The long-range program calls for a phased implementation of rapid transit. The first 8½ miles of projected 28-mile line has been chosen as the first leg for implementation based on cost/benefit analysis of alternative staging strategies. In 1972, a capital grant was made to the MTA for the final design, land acquisition and construction of the first leg. A capital grant request is now pending for additional design, land acquisition and construction of the line. Technical studies are now underway to evaluate additional corridors for rapid transit implementation.

*Detroit, Mich.*

The Southeastern Michigan Transportation Authority (SEMTA) has been determining the most effective ways to improve the existing bus systems in the Detroit area and to plan for possible fixed transit investments in the future with the assistance of technical studies funds. Recommendations are being implemented on a continuing basis including the acquisition of three failing suburban bus lines by SEMTA; route and schedule changes throughout the region; capital improvements to physical plant; equipment replacement; and changes in management.

SEMTA also recently unveiled a preliminary proposal for high and intermediate level transit in the Detroit metropolitan area. This proposal represents a continuing effort supported by UMTA funds to refine fixed transit plans for Detroit.

*Chapel Hill, N.C.*

In May 1971 a technical studies grant was given to the City of Chapel Hill to determine the feasibility of establishing public transportation service for the area. Based on the recommendations of this study the residents of Chapel

Hill voted for a $350,000 bond issue to finance the local share of a capital grant and granted permission to levy a special tax on property to support transit operations. In December 1973 a capital grant was approved to purchase 18 buses, construct a garage and establish a transit system. Buses under this grant will be delivered in late summer 1974.

The result has been public investment in improved mass transportation systems; however, the enumeration of number of buses purchased, increasing passenger volumes, etc., is not a realistic measurement of Section 9 effectiveness. The technical study provides a framework of alternatives to be discussed in the political and public forum. The effect of the Section 9 study on the ultimate decision will vary based on the size and complexity of the proposed transportation system. In many of the smaller areas the recommendations of the study become the basis of local decisions and ultimate improvements. In the larger cities, the political process plays the major role in determining the ultimate system for implementation.

At the origins of the UMTA program, the principal obstacle to development of effective transit services was lack of adequate institutions and planning mechanisms. The major thrust of the Section 9 expenditures has been the creation of such capabilities at the local, metropolitan and state levels, as evidenced by the growing number of state departments of transportation, metropolitan planning agencies, and regional transit plans and programs.

We recognize, of course, that the ultimate test of effective planning is the degree to which it successfully promotes larger community goals such as greater accessibility, environmental quality and desirable patterns of urban development. We believe that the institutions and mechanisms created with the help of UMTA's planning grants have been effectively contributing toward the achievement of these goals.

*Question* 7. Research, Development and Demonstration:

(*a*) In testimony before the Subcommittee you indicated that the performed of RD&D grants can best be evaluated by how extensively the new systems or technologies are adopted by the industry. What are some specific accomplishments of this program?

(*b*) What are some specific examples of systems and methods developed by UMTA which are in actual revenue service?

(*c*) List the cities which have adopted the specific technology or system developed by UMTA for each of these projects.

(*d*) What was the cost of these specific projects and what is the total cost of the RD&D activity since its inception?

*Answer.* The answers for question 7(a)–(d) are provided for each major category for R&D project.

BUS-ON-EXCLUSIVE-LANE

Shirley Highway Bus-on-Exclusive-Lane: As the Shirley Highway bus-on-exclusive-lane-on-freeway experiment draws to a close in December 1974 it has already far exceeded expectations. It carries over 34,000 passengers a day, has attracted 8,000 new riders during the a.m. peak period, has caused a diminution of 5,000 autos on the highway during the a.m. peak period, and has caused an estimated reduction of 1,730 tons per year of auto-generated pollutants.

State and local financing for continuing the service at the end of the demonstration has been assured, and WMATA will take over the operation. UMTA R&D Funds—$6,894,000.

Additional users: San Benardino Freeway, Los Angeles, CA I–495 approach to Lincoln Tunnel, Northern New Jersey.

Seattle Blue Streak: The Seattle Blue Streak service has enjoyed similar success and local authorities have agreed to accept responsibility for continuing its operation. The Seattle system operates in mixed traffic with an exclusive exit.

DIAL-A-RIDE

Dial-A-Ride: The Dial-A-Ride Program, which is emulated in dozens of cities throughout the United States, has been highly successful. Its total cost was just short of $10 million, or which $3 million was spent on initial research and planning, $1.3 million for technical support and $4.5 million to the New Jersey Department of Transportation for the operation in Haddonfield.

Additional users: (See response to information supplied for the record.)

UTPS

UMTA's Transportation Planning System (UTPS): At the beginning of 1974, more than 130 State and local groups were using UTPS, a 30 percent increase over the preceding year. Four training sessions in the use of UTPS were offered during fiscal year 1974 in various locations throughout the United States, and the number of applicants for these training sessions was three times the number of people that space could accommodate. Newsletter and technical bulletins were furnished to over 1,700 transportation planners who had requested that they be kept informed of all UTPS developments. UMTA R&D Funds Through fiscal year 1974: $4,978,000.

Additional users: (See response to question 6e.)

WASHINGTON RAIL COMMUTER FEASIBILITY STUDY

Washington Metropolitan Area Commuter Feasibility Study: This study, which cost UMTA $17,000, has been used by the State of Maryland for a program of upgrading the existing commuter rail services operated by the B&O and Penn Central Railroads in the Washington-Baltimore area. A preliminary capital grant application has been made to UMTA for physical refurbishment of passenger car equipment, station repairs and parking lot improvements. In addition, the State of Maryland is sponsoring a new commuter train on the B&O which started on March 18, 1974. Maryland now subsidizes all B&O commuter operations in the region.

RUCUS

RUCUS: UMTA's Run Cutting and Scheduling (RUCUS) package of computer programs enhance the quality and improve the efficiency of vehicle and driver assignment schedules and also provide detailed operating test analyses for transit plans. The RUCUS system will be installed in the Syracuse transit system in June 1974 and has been adopted by the DOT's of California, Florida and Georgia. UMTA's cost was approximately $400,000.

Additional users: Los Angeles and San Diego, CA.; Rochester, N.Y.; Fort Worth, Texas.

ENVIRONMENTAL CONTROL HANDBOOK

Environmental Control Handbook: The Environmental Control Handbook provides subway system planners, designers and operators with methods for determining answers to complex factors involved in ventilation shafts and air conditioning (which represent 8–10 percent of *total* cost of underground subway construction). WMATA used the handbook and the resulting redesigning saved $2 million. Baltimore MTA was able, as a consequence of data and formulae in the Handbook, to eliminate seven ventilation shafts with a savings of $0.5 million each. Thus, for those two systems alone the Handbook led to savings totaling $5.5 million whereas the cost of the research to the Federal Government was $3.3 million.

Additional users: Port Authority of New York and New Jersey, Atlanta, Hong Kong.

LIGHT RAIL STANDARD SPECIFICATION

Light Rail Standard Specification: UMTA's standard specifications for light rail (trolley) cars were used by MBTA and SFMR for the purchase of 220 cars at $300,000 per car. Earlier, without the specifications, San Francisco entertained a bid for $500,000 per car. The project cost UMTA $134,000.

ENVIRONMENTAL IMPROVEMENT KIT

The Environmental Improvement Kit (EIP), developed by GM and tested and endorsed by UMTA, has been a standard component on almost every new diesel bus engine manufactured since 1969 and has been retrofitted on hundreds of older ones. Thus, the majority of buses in our larger cities have the benefits of the Kit: significantly less emissions, less vibration and less noise. The tests funded by UMTA cost $224,936.

BART PROTOTYPE RAPID TRANSIT CAR

Funded the development and testing of the BART prototype cars. The experience gained from road tests, modifications and retrofitting provided the basis for the initial production run of 60 BART cars. UMTA share—$5,000,000.

BART AUTOMATED FARE COLLECTION

BART Automated Fare Collection: UMTA's automated fare collection equipment is in operation in the BART system and is highly successful. It will also be installed in Washington's Metro. UMTA's contribution was $1,133,333.

PRT

Personal Rapid Transit (PRT): The UMTA Office of Research and Development has provided a substantial share of the development and demonstration cost of six automated vehicle systems; the Westinghouse Transit Expressway, the four systems demonstrated at Transpo 72 and the Morgantown System.

The Westinghouse "Transit Expressway" was the first major domestic development of an automated rubber-tired vehicle urban transportation system.

Between 1963 and 1971, UMTA provided $4,500,000 to the Port Authority of Allegheny County to partially pay for the total $7,400,000 development and demonstration cost of the Westinghouse system. The system utilizes 28-seat vehicles and is designed to provide 120 second headway line haul service at 50 mph. Three trainable vehicles were operated on 3.54 lane miles of elevated test track with two online stations.

The "Transit Expressway" technology has found commercial application at Tampa and Seattle-Tacoma Airports. The Tampa system encompasses 1.51 lane miles of elevated guideway and cost $4,500,000 in 1968. The Seattle-Tacoma (Seatac) system has 1.70 miles of underground guideway and cost $5,300,000. Westinghouse is also constructing a $3,500,000 0.53 lane mile elevated system at Miami Airport.

In 1971 and 1972, UMTA funded the development of four automated systems by Bendix-Dashaveyor, Ford, Rohr-Monocab and Transportation Technology Incorporated-Otis. The four systems were demonstrated at Dulles International Airport in May 1972.

The federal expenditure on the development phase of the four systems was approximately $7.1 million. The systems were tested and evaluated after the exposition. UMTA expended approximately $2.4 million on the test program.

A direct consequence of the Transpo program was the award to the Ford Motor Company of a $4.4 million contract to construct a 0.75 mile system at Bradley Field in Hartford, Connecticut. Ford also won a competition to install a 1.5 mile elevated system of same design spanning the Rio Grande River between El Paso and Juarez. Ford also plans to install a 0.5 mile system at a Ford development near Fairlane, Michigan.

A version of the Bendix-Dashaveyor system, using larger vehicles than those developed for Transpo, will be installed at a zoo near Toronto. The project will cost $11,700,000 and will utilize 3.2 miles of guideway.

*Answer 7d.* The total cost of UMTA's RD&D activity since its inception through fiscal year 1973 is $253 million.

*Addendum to question 7d.* It would be helpful if you could supplement the information already provided on the Research, Development and Demonstration activity, with a list of all RD&D projects funded by UMTA, which involved more than $400,000 in UMTA RD&D Funds. Include with each project, a list of cities which have put the system or method developed into actual revenue use? Include with each city mentioned an itemization of the sources of funding (with approximate percent of the total for each source) for the implementation of the system or method developed.

*Answer.* Attached is a computer print-out of all approved Research and Development projects with UMTA shares of greater than $400,000. A list of the projects that have resulted in actual revenue service and the cities that have initiated the service was provided with the initial response, as was a list of the cities using Dial-a-Ride and a table detailing the source of funding.

(EDITOR'S NOTE.—Subsequent conversations with the Department of Transportation indicated that the research and development projects described in the answer to question 7 were the only projects that have been put into actual revenue service.)

URBAN MASS TRANSPORTATION ADMINISTRATION APPROVED PROJECTS WITH UMTA SHARE GREATER THAN $400,000 AS OF JUNE 30, 1974

| | Grantee and description | Project approval date | Net project cost | Federal grant |
|---|---|---|---|---|
| CA060014 | Contract to be awarded—contractor unknown: evaluate the kinetic energy wheel using current technology as an energy storage device for use in ground transportation vehicles. | May 25, 1973 | $910,000 | $910,000 |
| CA060021 | San Francisco Bay Area Rapid Transportation District—Oakland: Develop and test new concepts in rapid transit design and operation. | June 18, 1963 | 9,329,000 | 6,219,333 |
| CA060022 | Oakland, City and Port of Board of Port Commissioners: Determine operating and economic feasibility and public acceptance of an air cushion designed to provide convenient public transportation in area. | Jan. 26, 1965 | 1,942,896 | 787,817 |
| CA060023 | San Francisco Bay Area Rapid Transit District, Oakland: Design and demonstrate automatic fare collection equipment. | Feb. 2, 1965 | 1,700,000 | 1,133,333 |
| CA060026 | San Francisco Bay Area Rapid Transit District, Oakland: Test, install and demonstrate improved methods and new concepts for rail fastners, establish standards for track installation and improve rail surface. | Apr. 8, 1966 | 1,200,000 | 800,000 |
| CA060027 | Los Angeles, City of; Department of Airports: Determine feasibility of designing, constructing, maintaining, and operating a high-speed skylounge transportation system between airport and CBD. | Apr. 19, 1966 | 735,175 | 490,112 |
| CA060030 | California, State of; Transportation Agency: Determine and test relationship between public transportation system and job and other opportunities of low-income groups. | May 26, 1966 | 3,200,000 | 3,200,000 |
| CA060031 | California State Legislature Assembly Rules Committee, Phase I: Procure and demonstrate 4 transit buses with external combustion engines in transit operation. | Feb. 7, 1969 | 3,441,788 | 2,294,525 |
| CA060032 | San Francisco Bay Area Rapid Transit District, Oakland: BART prototype cars. | Mar. 21, 1969 | 15,000,000 | 5,000,000 |
| CA060035 | Southern California Rapid Transit District, Los Angeles: Conduct development and testing of an exhaust emission control device on an SCRTD bus. | June 29, 1970 | 568,905 | 477,682 |
| CA060067 | Rohr Industries, Inc.: Dual mode transit sytsem development program, phase I: Concept design, was part of IT-06-9999(04). | Nov. 17, 1972 | 500,000 | 500,000 |
| CO060001 | IAA—DOT, Federal Rail Administration: Complete design and engineering work for south spurline, overpass, initial portion of UMTA test track, and HSGTC at Pueblo, Colo. | Dec. 11, 1970 | 6,789,036 | 6,789,036 |
| CO060006 | Transportation Technology, Inc.: Dual mode transit system development program, phase I: Concept design, was part of IT-06-9999(04). | Nov. 17, 1972 | 500,000 | 500,000 |
| CI060008 | Valley Transit District, Derby: Develop and evaluate a flexible transit system for residents of a "deep suburban" type community. | June 30, 1971 | 1,187,250 | 1,119,550 |
| DC060008 | Institute of Public Adminstration: Augment the tier of technical assistance contractors supporting UMIA, with expertise in the institutional side of urban mass transportation. | Jan. 14, 1969 | 769,969 | 754,034 |
| DC060010 | Transit Development Corp.: Ventilation and environmental control in underground rapid transit systems, phase 1. | June 17, 1970 | 4,023,064 | 3,796,414 |
| DC060030 | Arthur D. Little, Inc.: Central city transportation study | Nov. 1, 1968 | 2,785,959 | 2,725,000 |
| DC060035 | Institute for Defense Analysis: Technical assistance in transportation systems analysis. | Feb. 5, 1969 | 780,482 | 780,482 |
| DC060050 | IAA—Bureau of the Census: Fiscal year 1970 financial support of the Census Address Coding Guide improvement program. | June 15, 1969 | 500,000 | 500,000 |
| DC060057 | IAA—DOT, Federal Highway Administration: Urban traffic control and bus priority system. | Apr. 21, 1970 | 3,750,000 | 1,707,000 |
| DC060062 | IAA—Federal Highway Administration: Study for alleviating traffic congestion in eleven metropolitan areas by coordinated use of existing UMTA-FHWA programs. | June 24, 1970 | 4,500,000 | 3,500,000 |
| DC060066 | IAA—National Bureau of Standards Technical Analysis Division: Shirley Highway express bus on freeway evaluation. | Dec. 4, 1970 | 716,800 | 716,800 |
| DC060077 | IAA—DOT (OST) working capital fund: Provide computer support for VA-06-0012, MD-06-0014, IT-06-0044, IT-06-0049, and IT-06-0050. Project from old INT-RDC-7. Amendment 3 is basic project. | Sept. 20, 1972 | 893,000 | 893,000 |

URBAN MASS TRANSPORTATION ADMINISTRATION APPROVED PROJECTS WITH UMTA SHARE GREATER THAN $400,000 AS OF JUNE 30, 1974—Continued

| | Grantee and description | Project approval date | Net project cost | Federal grant |
|---|---|---|---|---|
| DC060084 | Contract to be awarded: Determine whether transit needs of various groups can best be met changing present systems or by initiating new specially designed systems and equipment. | June 27, 1973 | 1,460,987 | 1,460,987 |
| FL060006 | Florida, State of, Department of Transportation: Combination of 2 projects; I-95 bus-carpool systems and NW. 7th Avenue bus priority systems. | Mar. 2, 1973 | 1,564,000 | 1,407,600 |
| IL060010 | Chicago Transit Authority: Develop, test and evaluate an on-line real-time electronic information system. | Mar. 8, 1968 | 2,310,860 | 1,859,860 |
| MT060009 | Tri-State Transportation Commission—Connecticut, New Jersey, New York: Test the effect of faster schedules, more frequent service and expanded station parking facilities in attracting more journey-to-work and mid-day traffic. | June 18, 1963 | 1,948,631 | 1,299,087 |
| MT060014 | Tri-State Transportation Commission—Connecticut, New Jersey, New York: Stable, long-term arrangement for continued and improved railroad suburban service within a large metropolitan area. | June 21, 1965 | 4,500,000 | 3,000,000 |
| MT060015 | Tri-State Transportation Commission—Connecticut, New Jersey, New York: Phase I, Long Island RR. gas turbine test, GI-I. | Jan. 18, 1966 | 2,477,635 | 1,651,750 |
| MT060016 | Tri-State Regional Planning Commission, New York: Test whether changes in public transport service can improve access to employment concentrations located outside of central business districts. | Mar. 9, 1967 | 2,332,222 | 2,100,000 |
| MT060020 | Washington, D.C., Metropolitan Council of Governments: Test improved bus service for low-income center city residents, and for high-income suburban residents, via a coordinated bus loop service. | Oct. 22, 1968 | 745,338 | 670,804 |
| MT060021 | National League of Cities, U.S. Conference of Mayors: Assess the impact of transportation linking inner city poor youth with employment and cultural opportunities in the 51 largest U.S. cities. | May 20, 1969 | 4,924,640 | 2,750,000 |
| MT060024 | Northern Virginia Transportation Commission, Arlington: Phase I of the transit service improvement program of the Shirley Highway express bus on freeway project, including purchase of 30 buses. | Sept. 14, 1970 | 6,177,283 | 5,868,419 |
| MT060025 | Booz-Allen Applied Research, Inc.: Bus technology systems management contract. | Dec. 18, 1970 | 26,635,689 | 26,635,689 |
| MT060026 | Boeing Co., Vertol Division: Urban rapid rail vehicles and systems. | do | 15,844,051 | 17,213,000 |
| MT060031 | Rohr Industries: Design a tracked air cushion vehicle | May 5, 1971 | 8,363,796 | 12,384,442 |
| MT060032 | Transportation Technology, Inc.: Engineering evaluation of the 4 PRT systems demonstrated at Transpo 72. | May 10, 1971 | 1,937,950 | 1,938,000 |
| MT060034 | Arthur Andersen & Co.: Financial accounting plus reporting element—A uniform method for classifying and reporting financial and operating data for transit systems. | Mar. 1, 1972 | 620,742 | 620,775 |
| MT060043 | IAA—DOL: DOT-DOL summer youth project | May 17, 1972 | 1,500,000 | 500,000 |
| MT060044 | PRC Systems Sciences Co.: Deliver incremental improvements to existing transportation planning software (1 of 4 projects split from INT-RDC-7: Includes a a neg. amend of $40,000). | Mar. 01, 1972 | 1,145,000 | 1,145,000 |
| MT060049 | Duluth Cather & Co.: Software pilot testing and new systems development engineering coordination. | do | 902,500 | 902,500 |
| MT060050 | Peat, Marwick, Mitchell & Co.: Advanced transit planning methods, including indicators, interactive sketch planning, and station simulation. | do | 842,500 | 842,500 |
| MT060052 | IAA—DOT, Federal Aviation Administration: Funds for site preparation and soil borings at Dulles for Transpo 72, IAA-OST. | Aug. 30, 1971 | 428,580 | 428,580 |
| MT060053 | Vought Aeronautics: Perform design and fabrication for the tracked air cushion vehicle (TACV). | May 5, 1971 | 2,432,538 | 2,753,105 |
| MT060054 | The Ford Motor Co.: Generate test procedures and instrumentation requirements for the Dulles postexposition test program. | do | 1,929,913 | 1,930,000 |
| MT060055 | Monocab (VARD), Inc.: Demonstrate PRT at Transpo 72 | do | 1,924,000 | 1,924,000 |
| MT060056 | Dashaveyor Co.: Demonstration and follow-on testing of a personal rapid transit system (PRT) at Transpo 72. | do | 1,937,950 | 1,938,000 |
| MT060070 | IAA—DOL, Manpower Administration: Provide additional information on impact of improved transportation, the summer youth transportation program for fiscal year 1973-74. | May 14, 1973 | 1,700,000 | 500,000 |
| MT060078 | Contract to be awarded: Transit marketing project: Determine transit consumer attitudes and motives; determine the best use of advertising to increase use of mass transit service. | Nov. 11, 1973 | 600,000 | 600,000 |

URBAN MASS TRANSPORTATION ADMINISTRATION APPROVED PROJECTS WITH UMTA SHARE GREATER THAN $400,000 AS OF JUNE 30, 1974—Continued

| | Grantee and description | Project approval date | Net project cost | Federal grant |
|---|---|---|---|---|
| IT069004 | Contract to be awarded (3): To develop preliminary designs for 3 PRT systems suitable for use in an urban environment. This part of the project was originally designated IT-06-9999(11). | June 14, 1973 | 3,170,000 | 3,170,000 |
| IT069005 | To be selected: Develop high capacity PRT system | Apr. 2, 1974 | 1,300,000 | 1,300,000 |
| IT069010 | To be selected: Develop improved efficient, quiet, non-polluting paratransit vehicle. | Nov. 26, 1973 | 1,000,000 | 1,000,000 |
| IT069999 | Contracts to be awarded: This project contains contracts to be awarded—Each amendment represents RFP's reserved but not awarded—For internal UMTA use only. | Oct. 6, 1972 | 2,089,000 | 1,340,000 |
| MA060006 | University of Massachusetts, Amherst: Amherst campus demonstration: Experiments with free bus transportation and changes in price, convenience and other service attributes. | Mar. 21, 1972 | 930,861 | 667,391 |
| MA060007 | Massachusetts Transportation Commission, Boston: Test bus and rail improvements. | Sept. 28, 1962 | 5,400,000 | 3,600,000 |
| MA060009 | Massachusetts Institute of Technology: Obtain software and manual backup capability to operate a demand-responsive dial-a-ride system. | Dec. 31, 1968 | 1,495,350 | 1,421,700 |
| MA060016 | Mitre Corp., Electronic Systems Division: Continuing technical assistance in transportation systems analysis: December 1968-May 1970. DOT contracted as a rider to Air Force contract F-19628-68-C-0365. | Dec. 11, 1968 | 1,321,500 | 1,321,500 |
| MA060018 | Transportation Systems Center, Cambridge: UM01—Urban TACV technical assistance. | July 1, 1970 | 2,312,000 | 2,312,000 |
| MA060024 | Transportation Systems Center, Cambridge: Radio communication and control of transit vehicles: radio spectrum usage, noise problems, initial funding, Fiscal year 1971. | do | 725,300 | 725,300 |
| MA060025 | Transportation Systems Center, Cambridge: Rail supporting technology systems manager: Tests, diagnostic vehicle, and supporting research. Initial fiscal year 1971 funding. | do | 18,532,000 | 18,532,000 |
| MA060026 | Transportation Systems Center, Cambridge: Technical support for Morgantown demonstration. Initial fiscal year 1971 funding. | Apr. 5, 1971 | 1,133,000 | 1,103,000 |
| MA060027 | Transportation Systems Center, Cambridge: New Systems development engineering: technical support and management of promising new systems. Initial fiscal year 1971 funding. | do | 1,932,000 | 1,832,000 |
| MA060029 | Transportation Systems Center, Cambridge: Technical support for dual mode system: design and development. Initial fiscal year 1972 funding. | June 14, 1972 | 730,400 | 695,400 |
| MA060030 | Transportation Systems Center, Cambridge: Bus technology program: provide continuing direct engineering support. | Oct. 13, 1972 | 486,000 | 446,000 |
| MA060031 | Transportation Systems Center, Cambridge: PRT urban deployment program. Initial fiscal year 1973 funding. | Jan. 8, 1973 | 790,000 | 750,000 |
| MA060041 | Transportation System Center: Technical support for advanced AVM demonstrations. | Nov. 6, 1973 | 900,000 | 1,069,000 |
| MA060049 | Transportation Systems Center: Summary of transit experimental results, service demonstration designs, systems application analysis. | Mar. 22, 1974 | 450,000 | 450,000 |
| MD060008 | Johns Hopkins University Applied Physics Laboratory: New systems component research and development program. | June 1, 1971 | 1,082,998 | 1,083,760 |
| MD060009 | Johns Hopkins University Applied Physics Laboratory, Sliver Spring: Research project aimed at seeking to develop new modes of urban transit vehicles. | Nov. 4, 1968 | 500,000 | 500,000 |
| MD060011 | Johns Hopkins University Applied Physics Laboratory: produce communication and control systems for the various automated transportation networks now under way. | June 14, 1969 | 750,000 | 750,000 |
| MD060012 | Johns Hopkins University Applied Physics Laboratory: Continue high priority development engineering tasks for new systems of urban transportation begun in projects MD-06-0009 and MD-06-0011. | Oct. 9, 1970 | 434,000 | 434,000 |
| MD060018 | Johns Hopkins University Applied Physics Laboratory: Funds for the extension of the APL command and control studies. | Jan. 8, 1973 | 1,550,000 | 1,450,000 |
| MI060007 | Flint Transportation Authority: Innovation to be tested is a home to destination and return bus service, in and near the city of Flint—a community of about 220,000. | Jan. 15, 1968 | 1,895,415 | 1,263,610 |
| MI060016 | General Motors Corp.: Dual mode transit system development program, phase I: Concept design. Was part of IT06-9999(04). | Nov. 17, 1972 | 500,000 | 500,000 |

URBAN MASS TRANSPORTATION ADMINISTRATION APPROVED PROJECTS WITH UMTA SHARE GREATER THAN $400,000 AS OF JUNE 30, 1974—Continued

| | Grantee and description | Project approval date | Net project cost | Federal grant |
|---|---|---|---|---|
| MO060002 | St. Lous, city of, model city agency: Identify transportation needs of inner city residents; market-test variety of services to meet needs; measure impact of improvements on residents. | June 12, 1967 | 1,275,000 | 1,147,274 |
| MO060003 | Kansas City, city of, design: Run experiments with and evaluate multipurpose transportation service in city's consolidated employment program (CEP) project area. | May 7, 1969 | 494,359 | 444,923 |
| NJ060002 | New Jersey, State of, Department of Transportation: Market test of dial-a-ride concept in Haddonfield, N.J. | Feb. 16, 1971 | 9,457,517 | 4,523,892 |
| NY060005 | Metropolitan Transportation Authority, New York: Dual power gas Turbine-Electric commuter cars (GT-E). | June 29, 1971 | 7,400,000 | 7,400,000 |
| NY060006 | Metropolitan Transportation Authority, New York: Demonstrate stored energy (flywheel) propulsion for rapid rail cars. | do | 1,896,000 | 1,264,000 |
| NY060009 | New York, City of, Transportation Administration: Provide improved transportation for more peak-hour riders through expansion of capacity with minimum construction of new facilities. | June 21, 1963 | 4,778,000 | 3,185,000 |
| NY060011 | New York City Transit Authority: Provide and test 2-way radio communication systems for a subway line: Determine effectiveness in increasing reliability of its rapid transit service. | June 25, 1964 | 750,805 | 500,537 |
| NY060013 | New York, State of, Department of Public Works: Develop, field test and validate a modal choice simulation model to be used for planning urban transportation facilities. | Mar. 6, 1967 | 682,105 | 454,736 |
| NY060017 | Niagara Frontier Transportation Authority, Buffalo: Test ways new transportation facilities can best be applied to increase employment levels in distressed urban areas. | June 26, 1968 | 547,074 | 492,367 |
| NY060044 | Metropolitan Transportation Authority: Demonstrate feasibility of double-deck buses in scheduled transit operations and to determine public acceptance of double-deck buses in transit use. | June 21, 1974 | 415,984 | 415,984 |
| OH060006 | Cleveland Transit System: Demonstration of AC propulsion system and improved interior design for rapid rail cars. | June 7, 1971 | 2,168,627 | 1,728,456 |
| OH060009 | Cleveland Transit System: Procedure and demonstrate in The Cleveland Transit Service, a small transit bus powered by a regenerative gas turbine engine. | Oct. 29, 1971 | 676,000 | 644,026 |
| OH060010 | Kent State University Center for Urban Regionalism: Develop and test a modern management control system for transit operations to be demonstrated on the AC transit system. (See project No. CA-06-0033. | Mar. 6, 1967 | 871,920 | 819,420 |
| OH060012 | Kent State University: Develop electronic equipment, computer software, and systems procedures to improve the ridership potential, and economic operation of bus systems. | June 24, 1969 | 469,217 | 422,295 |
| OH060018 | Cleveland, city of: To determine the extent that a demand-responsive transit system for the elderly enables the elderly to make an independent living. | May 24, 1973 | 1,004,675 | 700,000 |
| PA060008 | Southeast Pennsylvania Transportation Authority, Philadelphia: Test commuter rail service improvement. | Oct. 22, 1962 | 4,674,300 | 3,116,200 |
| PA060009 | Port Authority of Allegheny County, Pittsburgh: Transit expressway test program, phase I. | June 15, 1963 | 7,400,000 | 4,472,000 |
| PA060011 | Southeast Pennsylvania Transportation Authority, Philadelphia: Develop and test techniques for restructing railroad commuter service in a major metropolitan area to minimize commuter service deficit. | Apr. 23, 1965 | 4,742,000 | 2,977,000 |
| PA060014 | University of Pennsylvania: Test minicar system as a collector and feeder to a rapid transit system using the Philadelphia central business district as the study area. | May 9, 1967 | 1,462,039 | 1,430,125 |
| RI060005 | U.S. Navy Underwater Systems Center, Newport: NUSC studies on: Intertransit demonstration design; PRT simulation model; Water bus; safety and reliability. Also analyze unsolicited proposals. | Apr. 24, 1972 | 530,000 | 530,000 |
| TN060002 | Metropolitan Transit Authority of Nashville: Establish express service between the medical centers of metropolitan Nashville and downtown. | June 30, 1966 | 723,000 | 482,000 |
| TX060004 | Dallas, City of Dallas Public Transit Board: Procure 2 freon II external combustion engines and install them in 2 buses of the Dallas Transit System to conduct operating and endurance tests. | Feb. 18, 1969 | 995,433 | 913,613 |
| TX060007 | Dallas-Fort Worth Regional Airport Board; Develop and test new transit technologies for people and cargo for regional airport. | Feb. 12, 1970 | 1,471,315 | 1,021,315 |
| VA060004 | Mitre Corp.: Transit operations and management systems program (TOMS). | June 1, 1971 | 3,772,000 | 4,107,000 |

URBAN MASS TRANSPORTATION ADMINISTRATION APPROVED PROJECTS WITH UMTA SHARE GREATER THAN $400,000 AS OF JUNE 30, 1974—Continued

| | Grantee and description | Project approval date | Net project cost | Federal grant |
|---|---|---|---|---|
| VA060012 | Mitre Corp.: Dial-a-ride: Haddonfield, N.J., market and technology tests. | Apr. 1, 1970 | 4,257,805 | 4,544,815 |
| WA060004 | Seattle Transit Commission: Seattle blue streak express bus. | Dec. 12, 1967 | 1,939,583 | 1,293,055 |
| WV060005 | Boeing Co.: Initial funding of Boeing as the systems manager for the Morgantown PRT project. | Aug. 9, 1971 | 48,109,049 | 54,239,000 |
| WV060006 | West Virginia University: People mover demonstration project. | Sept. 23, 1970 | 545,000 | 545,000 |
| WV060007 | NASA-Jet Propulsion Laboratory: To produce a plan for activities an an assessment of resources requirements for the demonstration project at West Virginia University. | Aug. 20, 1970 | 8,190,000 | 8,196,000 |
| | Total by activity | | 336,024,760 | 299,644,910 |
| | Grand total | | 336,024,760 | 299,644,910 |

# PRODUCTIVITY IN URBAN TRANSPORTATION

MONDAY, MAY 13, 1974

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON URBAN AFFAIRS
OF THE JOINT ECONOMIC COMMITTEE,
*Washington, D.C.*

The subcommittee met, pursuant to recess, at 10 a.m., in room S-407, the Capitol Building, Hon. William S. Moorhead (chairman of the subcommittee) presiding.

Present: Representatives Moorhead and Widnall.

Also present: John R. Stark, executive director; Ralph Schlosstein, economist; Walter B. Laessig, minority counsel; and Michael J. Runde, administrative assistant.

## OPENING STATEMENT OF CHAIRMAN MOORHEAD

Chairman MOORHEAD. The Subcommittee on Urban Affairs will please come to order. Today the Urban Affairs Subcommittee holds its fourth in a series of hearings on improving the effectiveness of urban transportation expenditures. We will discuss the feasibility and applicability of major rail rapid transit systems, such as BART in San Francisco and GO in Toronto, for solving our urban transportation problems.

BART is without a doubt one of the technological masterpieces of our time. It has, in my opinion, been to urban ground transportation what Apollo was to lunar travel. I'm told that anyone who has traveled on the system or even seen it, must be impressed with its comfort, convenience, architectural design, and engineering excellence.

Even more significant, the BART system represents a serious and purposeful local effort of massive proportions to meet the transportation problems of the region. It is an outstanding example of a local community willing to take a major risk—to go out on the limb—in an effort to achieve its objectives. It is certainly a most adventuresome act for any government to undertake.

However, as I have found out, the BART system has been the subject of endless controversy in the bay area. As far back as 1966, questions have been raised about both the technical feasibility of certain elements of the system, and more important, its ability to solve the transportation problems of the region. Controls have proved faulty, electronic systems have failed, and the size of the labor force has far exceeded original projections. As recently as January 1974, an average of nearly 10 trains a day were removed from service due to electronic or mechanical problems.

We are not here, though, to criticize or condemn in any way the idea or the operation of the BART system. Rather, we hope to learn from both the successes and the failures of the first rail rapid transit system built in this country in over 50 years. As many cities consider these major investments in future years, it is essential that we learn firsthand from these important experiences.

Our primary purpose here is to examine the concept of a rail rapid transit system (or any fixed guideway, grade separated rapid transit system) and its effectiveness in solving the transportation problems of a region. We must look at which trips this system can realistically expect to serve, what percentage of total trips it will carry, what are the socioeconomic characteristics of the riders and most important what will its impact be on the quality of life in the region. These are the questions which every city must struggle with as it considers the form its transportation services will take in the decades to come. In considering these questions we will draw on the experiences of Toronto and other rail rapid transit systems, as well as BART.

We are fortunate to have the assistance of three extremely knowledgable witnesses to consider these important questions. First, we will hear from Mr. Robert Clement, Deputy Under Secretary of the Department of Transportation, in whose office the BART Impact Study is located.

Our second witness will be Mr. William Howard, Director of Transportation Operations, Ministry of Transportation, Ontario, Toronto, Canada. Mr. Howard, as I told you before the hearing, I had occasion to observe your region carefully 3 years ago as a member of the Housing Subcommittee of the House Banking and Currency Committee. I look forward to hearing in more detail about transportation services in your region.

Finally, we will hear testimony from Mr. Willard Wattenburg, an electrical engineering consultant and critic of the BART system. I received a call moments ago from Congressman Stark, who says he hopes to get over here. If he doesn't he wants me to say that he extends the welcome to you to Washington and says you are, among other things, a radio announcer and you use that as a forum for making your criticisms known.

This subcommittee intends to hold balanced hearings excluding neither the proponents nor the opponents of mass transit in general, or any system in particular. I regret that the local proponents of BART have seen fit to decline our invitation to testify today. I expect to extend to them another invitation in the future and I hope they will reconsider their position so that the subcommittee will accomplish its objective of hearing a balanced presentation.

Gentlemen, we welcome you.

Mr. Clement, I understand you have some associates with you?

Mr. CLEMENT. Yes, sir.

Chairman MOORHEAD. Do you want them to come forward to the witness table? I can ask Mr. Howard and Mr. Wattenburg to withdraw temporarily.

Mr. CLEMENT. That is perfectly all right. If it seems appropriate for them, I will call them.

Chairman MOORHEAD. Very well, Mr. Clement, you may proceed.

**STATEMENT OF HON. ROBERT H. CLEMENT, DEPUTY UNDER SECRETARY, DEPARTMENT OF TRANSPORTATION, ACCOMPANIED BY RICHARD BOUCHARD, DIRECTOR, OFFICE OF TRANSPORTATION PLANNING ASSISTANCE; ALAN SIEGEL, DIRECTOR, DIVISION OF ENVIRONMENT AND UTILITIES TECHNOLOGY, DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT; AND JEROME PREMO, ACTING ASSOCIATE ADMINISTRATOR FOR CAPITAL ASSISTANCE, URBAN MASS TRANSPORTATION ADMINISTRATION**

Mr. CLEMENT. Thank you. I am pleased to be here to relate some of the Department's views on the improving the effectiveness of urban transportation expenditures.

In doing so I will make special reference to an analysis which we had performed on the San Francisco Bay Area Rapid Transit, so-called BART system, under our BART impact program.

I have previously supplied the subcommittee a copy of my prepared statement for the record. In view of this, and with your permission, Mr. Chairman, I would like to cover the high points in that prepared statement so that we may perhaps move more quickly to the interchange between the subcommittee and this panel.

Chairman MOORHEAD. That is very satisfactory, and without objection your entire prepared statement will be made part of the record.

Mr. CLEMENT. I have with me today Mr. Richard Bouchard, Director of our Office of Transportation Planning Assistance who serves as the technical director of this program.

In addition, Mr. Jerry Premo, who is the Acting Associate Administrator for Capital Assistance in our Urban Mass Transit Administration, so-called UMTA, who as the man who reviews transit construction applications for the Department has a very special interest in the program.

I want to make two principal points at the outset:

One, the BART impact program is not an investigation of the BART system and its management. Rather, it is a detailed research effort, designed primarily to: (a) quantify the impacts of a new and large-scale areawide rapid transit system; and (b) to analyze these impacts as a basis for improving planning and decisionmaking capability of the transportation and community development practitioners across the Nation and the world. We are using the BART area, simply because it is the only area in the United States to build an areawide rapid transit system in the past 50 years, and because it is representative of the technology under consideration for development in other urban areas. We plan to extend these research efforts in the Washington, D.C., area and in other areas that might proceed with the implemenatation of such new technology systems.

Two, the impact assessment program is in its very early stages. While I have some preliminary results to discuss with you today, I would first caution that these results do not as yet reflect an exhaustive analysis of impacts and causal factors. Second, as you know, the key ling in the system, the transbay tube, is not as yet open to service. Accordingly, the preliminary results may or may not be representative of the fully operational system.

With this as a preface, let me briefly describe the BART impact program for you. The inauguration of BART operations brings to fruition a process of planning and construction that occupied more than a decade, and opens an important new era in urban transportation for the bay area and for the Nation.

BART offers a test bed for a comprehensive evaluation of rapid transit on the basis of actual experience.

The hard facts that will come to light in the next few years, as BART goes into full-scale operation and its ridership builds up, will permit an accurate appraisal of the benefits of rapid transit and an objective weighing of those benefits against the associated costs.

We in the Department of Transportation and our participating agencies are committed to taking advantage of this opportunity.

DOT and others began planning for a thorough assessment of BART impacts as construction of the first lines of the system neared completion in 1972. This resulted in the formal establishment in mid-1972 of the BART impact program that had been informally initiated in late 1971. On slide 1 [1]—can you read that, Mr. Chairman?

Chairman MOORHEAD. Yes.

Mr. CLEMENT. The three overall objectives of the program are stated in the first slide as three incisive what, why, and how questions. The what question is a challenge to identify and quantitatively measure what the impacts of the system have been on travel conditions, economic activity, land use and urban development, public policy, environmental quality, and other aspects of life in the bay area.

The why question seeks to determine the reasons why these impacts occur and why the anticipated impacts did not occur or occurred in a different way than anticipated.

The how question addresses one of the issues raised by your subcommittee, applicability to other cities. We call this transferability and are continuously seeking to determine how the BART-derived knowledge can best benefit other metropolitan areas in the Nation. We need to know how it might influence Federal and local policies, guidelines and procedures and, specifically, how it might be utilized in improving rapid transit systems, including BART, throughout the country and the world.

On slide 2 [2], the six specific major impact areas that we are investigating are identified. Together, these areas of investigation encompass the many facets of life in the bay area. As I'll explain more fully later on, our research approach includes the formulation of in-depth what, why, and how questions in each area, the establishment of hypotheses to test the answers, and the gathering of appropriate data to provide the basis for quantitatively and qualitatively evaluating the hypothesized impacts during each phase of our comprehensive 5-year program.

We recognized at the start that the program phases must be keyed to the various stages of construction and operation of the BART system. Accordingly, we defined three time phases for our impact program:

One, the "Pre-BART phase" preceding September 1972, when service began on the first BART line;

[1] See slide 1, p. 184
[2] See slide 2, p. 184.

Two, the "Transitional phase" covering the time between September 1972 and the time when reliable, 7-day, 20-hour per day operation of the full BART system is achieved; and

Three, the "Operational phase" following the advent of full service operations. We have completed the "Pre-BART phase" and are now in the "Transitional phase."

I am pleased to report that the BART impact program has received great interest, technical, and financial support, and day-by-day participation by a number of Federal agencies. Besides DOT, HUD has technically guided and financially supported the research in many areas, particularly the land use and urban development, environment, and public policy areas. The National Science Foundation has funded complementary research efforts by grants to university researchers who are working in close cooperation with us and whose projects we regard as integral parts of our research program.

National Science Foundation will be a major sponsor of the future economics and finance institutions and life styles efforts.

EPA has closely followed the ongoing work and has agreed to participate more directly in the environmental area and to support several of the other areas.

The State of California's Department of Transportation (CALTRANS) has actively participated in our pre-BART data collection efforts, beginning in the spring of 1972 with the collection of data on traffic volumes and vehicle occupancy along routes within BART corridors. They will continue to provide similar data collection support during the remainder of the program.

The overall organizational structure for managing the program is shown in slide 3.[1] I serve as the chairman of the program's policy committee. Other members of the committee are, as shown, representatives of the sponsor organizations at the assistant secretary level. The purpose of the committee is to review program progress and to provide overall policy direction.

To take advantage of the collective knowledge of nationally recognized experts in the many technical fields inherent in the program, we have asked the National Academy of Engineering (NAE), to form a BART Impact Program Advisory Committee. This committee meets approximately three times each year and has provided us with valuable advice on the scope and direction of the program, on technical specifics of individual impact areas, and on other management and technical aspects of the program.

The Federal sponsors agreed that an optimum location for the Federal Program Office is within DOT's focal point for transportation planning assistance, the Office of Transportation Planning Assistance. This office is responsible for the overall daily management and technical direction of the program. It is supported by a small, full-time technical staff from our Transportation Systems Center (TSC) and by the Federal Technical Advisory Committee (FTAC) which includes technical representatives of the various sponsoring agencies. The FTAC serves as a strong technical coordinating and review mechanism among sponsors on all aspects of the program.

[1] See slide 3, p. 185.

The program sponsors have worked closely with the regional transportation planning agency, the Metropolitan Transportation Commission (MTC), to design and plan the implementation of this program. MTC was selected to be the prime contractor responsible for the program's on-site management. For this purpose, MTC has developed a technical staff who are working with the Federal agencies to select subcontractors, to ensure the quality of their work, and to integrate the products into a total program.

Slide 4 [1] illustrates the BART system and the time at which each of its five prime segments either was or will be opened for service. Note that: The Fremont line was opened in September 1972; the Richmond line was opened in January 1973; the Concord line was opened in May 1973; the West Bay line was opened in November 1973; and that the Transbay line is scheduled to be opened in September 1974.

Chairman MOORHEAD. While we have slide 4 up, could you indicate what portions of the line are above ground and what portions are below?

Mr. CLEMENT. Well, George, could you with your pencil show that?

Mr. GEORGE GRAINGER. It is underground through all of Berkeley, because they voted to do so. The Transbay tube and almost all through San Francisco is underground. Then, as soon as you get outside of the metropolitan areas it is above ground.

Mr. CLEMENT. Oakland has some below ground. There is the tube that goes through the Berkeley Hills that runs from Berkeley into the Orinda area. That is all underground.

Chairman MOORHEAD. Thank you very much. I don't want to lose that chart.

Mr. CLEMENT. After all lines are operational, 20-hour-a-day service will begin probably in November 1974 and weekend service will start in January 1975. This schedule of openings and the hours of service provided have had some ramifications on the BART impact program as I alluded to a moment ago. Despite this, we have been able to collect and analyze the data required to get a sound and accurate picture of the region, its inhabitants and their travel patterns prior to the provision of BART service. Pending the opening of the transbay line, we have been collecting and analyzing initial impact assessment data in the areas surrounding the opened facilities. The main "after" data collection and analysis activities will begin once the Transbay line is opened, as I have said previously.

With this background and my cautionary statements in mind, I would now like to discusss what has been learned to date on the impacts of the BART System. For purposes of organization I am dividing my comments into the six major impact areas mentioned earlier. In each case, I shall attempt to highlight the particular items to which you referred when you invited us to testify here today—namely:

One, cost data, service and performance characteristics and information on ridership.

Two, socioeconomic characteristics of present and potential users.

Three, anticipated diversion of auto users.

Four, impact on land use patterns.

Let me now review some preliminary findings with you.

You can take that off, George.

[1] See slide 4, p. 185.

First, the "Transportation System and Travel Behavior Study"—this is the first of the two impact areas we have underway this year.

Ideally, I would like to be able today to show you a complete analysis of the profile of the total transportation system and its users in the San Francisco Bay area, both before and after the opening of BART. However, this is not possible as I've previously pointed out; while we have the complete picture "before" BART, we have only partial inforamtion "after" BART. Nevertheless there are some interesting observations to be made at this point about the characteristics of the systems, as they affect to the users. I'm referring of course to the time and cost of such usage.

On slide 5 [1] is a comparison in this regard in the Fremont and Concord corridors.

Here, the traveltime and fares for typical trips from Hayward to Oakland and from Walnut Creek to San Francisco are examined. Note that before the opening of BART's Concord line, the peak-hour trip took 58 minutes and cost $1.56 to make by automobile (including tolls and parking costs) and it took 71 minutes and cost $1.19 to make by the bus system. In lieu of the Transbay line's opening, express bus service has been dovetailed with present BART service.

Also shown in slide 5,[1] this combined "BART and bus" mode takes 56 minutes and costs $1.29. Since neither the highway system nor the bus system has been radically changed since BART opened, the above-referenced times and costs have remained about the same.

Using current projections for traveltime and fares for the Transbay line, this same trip can be made on a fully operational BART, including getting through the departure and destinations stations, in about 43 minutes at a cost of $1.24. The time savings here are likely to be attractive to most travelers. The fares for all three transit modes are in the same ballpark, all roughly 25 cents less than that for the auto.

The lower table in slide 5 [1] gives similar data for Hayward to Oakland trips along the Fremont corridor. The "BART and bus" mode is not required since BART serves both cities. The typical choice of mode of travel here is probably determined by each traveler's value judgments regarding traveltime and fare. If he does not mind the time investment, he might opt for the bus because of the fare savings. The choice between his auto and BART will probably not be decided by the 20-cent fare saving offered by BART. More likely, he will weigh the relative inconvenience of making the trip by each mode. For example, if he uses his automobile to get to the Hayward station, he might elect to use his car for the entire trip. Alternately, since parking at the Hayward BART station may be relatively more convenient than at his Oakland destination, he might opt for BART.

The traveltime and fare statistics for the other corridors served by BART are relatively consistent with those presented in slide 5.[1] Over time, it is our assessment that the BART system figures will remain about the same, but the traveltimes for highway and bus modes will increase because of increased congestion. This assessment, of course, will be another one of our to-be-tested impacts.

[1] See slide 5, p. 186.

On the travel behavior side, some interesting observations on the shift of travelers to BART have been made, as shown in slide 6.[1] The upper table in the slide presents the results of an analysis conducted by CALTRANS in support of the BART impact program. In the Concord line corridor, it was estimated that before the opening of BART, 79 percent of the trips were by auto and the remaining 21 percent were by bus. Since the opening of BART, these percentages have shifted as follows: 75 percent by auto, 15 percent by bus, and 10 percent by BART. This shift away from auto and bus is expected to be more pronounced when BART becomes fully operational.

As regards this shift at the present time, a recent survey conducted by the BART District (BARTD) indicates, as shown in the lower portion of slide 6,[1] that over 50 percent of those riding BART previously drove their autos while over 30 percent previously rode the bus. Another 13 percent represented new trips.

Similar observations have been made in other corridors in the area. Indeed, it has been determined that the proportion of BART riders who have been lured from their autos is considerably higher than projections made in the planning stage, which had been regarded by some observers as optimistic projections.

We expect that once the Transbay line is open that the full regional story may well be more significant, particularly in regard to auto diversion. We believe this is likely because the time and cost savings for San Francisco-bound East Bay riders are more significant for this trip than for trips solely within the East Bay area.

There are other indications as well, that BART is having an effect on travel behavior. On slide 7,[2] we have shown some "before" and "after" traffic volume figures for two selected parallel freeway routes. That is, parallel to the BART lines.

Past experience has shown that vehicular traffic on these routes has gone up about 3 percent per year over the past 10 years. The results presented in slide 7 [2] suggest that the tide has been stemmed in the peak periods while, in the offpeak periods, the parallel freeways have seen pleasing reductions in the rate of increase of vehicular traffic. As I've noted earlier, these changes should not be "tagged" as BART impacts; rather, they become one of the to-be-tested impacts that will be examined as part of our program.

Before I leave the subject of transportation, let me briefly describe the profile of current BART ridership. The data presented in slide 8 [3] was derived from a BARTD survey of BART riders who reside in the Alameda and Contra Costa counties. There is a lot of data there and I apologize, I hope you can find it in my prepared statement.

Chairman MOORHEAD. I found that slide extremely interesting.

Mr. CLEMENT. BARTD also surveyed the residential neighborhoods from which the BART riders originated, thus providing the two profiles shown in slide 8.[3] The BART riders are seen to be concentrated in the 18–34 age group, nearly equally divided by sex, predominantly white—76 percent—only 10.4 percent do not own an auto, and 93.5 percent have at least a high school education.

[1] See slide 6, p. 186.
[2] See slide 7, p. 187.
[3] See slide 8, p. 187.

Compared to their neighbors, they are less transit dependent, have completed more formal education, and are slightly younger. As the program progresses, we will be refining these and similar transportation-related figures, comparing them with the pertinent costs, further pinpointing the transportation effects of BART.

Second, environment is the second impact area on which we have recently initiated a major impact assessment project.

We have, however, some early clues to environmental impacts. One is the positive environmental impact associated with the linear parks under portions of the elevated structures. While it is difficult to show this impact, except visually, it is nevertheless a real one. Beneath the elevated structure of BART through El Cerrito there was constructed a 2.7-mile linear park, which is now being utilized by the young and old alike for pleasure and recreation. The beauty and usefulness of this park, and others like it on the system have also sparked both neighborhood and home improvement projects in the area. Some idea of this is shown in several of the photos on the collage.

In the area of train noise, we have done some preliminary work. Our surveys indicate that noise initially was and continues to be irritable to persons living directly on the line, particularly when they are not inside their homes. Also, the level of irritability is about the same as that associated with a typical diesel truck.

Since energy consumption is closely related to the quality of the environment, we have prepared slide 9 [1] to illustrate and compare the relative Btu expenditure rates for each mode of travel. It is clear that shifts from autos to either transit buses or BART will benefit both the environment and conserve our disappearing energy resources. Once BART becomes fully operational, it is anticipated that its energy consumption rate will decrease significantly as patronage continues to rise. That is, per passenger, obviously.

Third, Land Use and Urban Development is the first of the four remaining impact areas for which we are developing study designs in preparation for full scale impact assessments.

And while we have not completed our study design as yet, let me share with you several of the claimed BART impacts that have been published in the Bay Area press.

One, through 1971, the values of new commercial construction started in the 10 years since BART construction was announced in downtown San Francisco had exceeded $1 billion.

Two, all of the large new buildings are located within 5 minutes of a transit station.

Three, Oakland has launched a $165-million city center adjacent to its downtown station.

Four, to date, there is not much evidence of BART-induced increased real estate values near nondowntown stations.

Five, few suburban stations are causing significant changes in development patterns or real estate values, except where strong zoning measures have been advanced in dynamic communities.

I've presented these to illustrate their role in our program. Each provides a clue to a potential BART impact. Our approach is to challenge such observations and, where further analysis appears fruitful, to place them in the category of to-be-tested impacts of the BART

[1] See slide 9, p. 188.

system. I might add that the collage contains some photographs that illustrate some of the physical change in land development near the BART system.

Fourth, Public Policy is the second of the four impact areas in which a study design project is underway.

Here, many communities with BART service have been stimulated to make BART-related policies and plans but few have been explicit decisions reflecting community desires about development around BART stations. By way of contrast, communities without BART service have been stimulated to conduct assessments of the most desirable policy interrelationships between potential extensions of BART service and their presently contemplated community growth plans.

Fifth, Institutions and Life Styles is the third impact area for which a study design is presently underway in preparation for the full scale assessment project. However, it is much too early to confidently predict the impacts in this area.

Sixth, Economics and Finance is the fourth study-design-then-full-scale-assessment project.

Lest you feel that all of the impacts from BART might be positive, given that this is the general nature of my preliminary report today, let me hasten to add that I have said precious little about costs, damages, those left unserved, and so forth, and have not reported on region-wide impacts by and large. This is because this information is not yet available. Only when it is, will the full impact story be known.

In closing, let me briefly touch on two areas we believe the BART impact program has identified that need additional attention if we are to improve the effectiveness of urban transportation expenditures.

The first area concerns the integration of rapid transit services with other transportation services in an urban area. Our studies in the bay area and elsewhere have indicated that such integration must begin with feeder bus service and parking facilities easily accessible to an area's freeway system. We are continuing to stress the importance of this matter in our planning grant programs and we find agreement with the concept among State and local officials and transportation experts. The main problem is who provides the service and what are the economic consequences. Our unified transportation assistance program (UTAP), now before committees of the Congress for consideration, would, of course, help integrate different types of transportation investments under a single program structure so as to encourage States and localities to interrelate the planning and operations of different modes of transportation.

The second area concerns the integration of land development actions with those of the rapid transit system. We have seen in the BART impact program, and in others as well, that the more active a community is in promoting sound land development around a transit station, or a transit line, the more rational that development is and also that it contributes to the usage of the transit system. While many have been preaching this from a philosophical point of view for some time, we frankly have been less than successful in achieving significant local action. And as you know, land development decisions have been traditionally a function of local government. To help alleviate the situation, where local officials desire to take positive

action, we are continuing to broaden our planning assistance programs to permit detailed studies of land development potentials of transportation system improvements.

This conclues my formal presentation this morning.

I thank you for your very kind attention.

Chairman MOORHEAD. I think you have an excellent statement, Mr. Clement, particularly since we are asking you to give us an impact study on a not completed system. I realize the handicaps you are laboring under.

[The prepared statement of Mr. Clement follows:]

PREPARED STATEMENT OF HON. ROBERT H. CLEMENT

Mr. Chairman and members of the Subcommittee, I am pleased to be here today to relate some of the Department of Transportation's views on improving the effectiveness of urban transportation expenditures, with special reference to analyses which we have had performed on the San Francisco Bay Area Rapid Transit (BART) System under our BART Impact Program.

I am here as the Department's spokesman today because the BART Impact Program is the one single research effort in the Department that Secretary Brinegar has reserved for administration in his own *immediate* office. We feel that this effort, because of its comprehensiveness, may well hold a key to fundamental improvements in our nation's transportation and community planning and development capabilities.

While we have many years of experience in measuring and quantifying the impact of regional highway systems, such is not the case regarding rapid transit. This is so because we haven't built any new regional rapid transit systems in this country in 50 years—save the BART System which, as you know, is not quite finished. Former Secretary Volpe recognized the need therefore to take advantage of the partial opening of the BART System in 1972 to begin the important and painstaking process of measuring rapid transit impacts, so that future proposals for such systems might profit from a more quantitative cost and benefit analysis. Secretary Brinegar concurs in that view.

I have with me today, Mr. Richard Bouchard, Director of our Office of Transportation Planning Assistance, who serves as Technical Director of this program. I likewise have Mr. Alan Siegel of the Department of Housing and Urban Development, who are partners with us in this effort. Finally, I have Mr. Jerome Premo, Acting Associate Administrator for Captial Assistance in our Urban Mass Transportation Administration, who, as the man who reviews transit construction applications for the Department, has a very special interest in the program. The special interest by UMTA was covered in hearings before this subcommittee last week by Administrator Herringer.

INTRODUCTION

I want to make two principal points at the outset:

1. The BART Impact Program is *not* an investigation of the BART System and its management. Rather, it is a detailed research effort, designed primarily to: a) quantify the impacts of a new and large scale areawide rapid transit system; and b) to analyze these impacts as a bsis for improving planning and decision-making capability of the transportation and community development practitioners across the nation and the world. We are using the BART area, simply because it is the only area in the U.S. to build an areawide rapid transit system in the past 50 years, and because it is representative of the technology under consideration for development in other urban areas. We plan to extend these research efforts in the Washington area and in other areas that might proceed with the implementation of such new technology systems.

2. The impact assessment program is in its very early stages. While I have some preliminary results to discuss with you today, I would first caution that these results do not as yet reflect an exhaustive analysis of impacts and causal factors. Secondly, as you know, the key link in the system, the Trans-bay tube, is not as yet open to service. Accordingly, the preliminary results may or may not be representative of the fully operational system.

THE BART IMPACT PROGRAM

With this as a preface, let me briefly describe the BART Impact Program for you. The inauguration of BART operations brings to fruition a process of planning and construction that occupied more than a decade, and opens an important new era in urban transportation for the Bay Area and for the nation.

For many years, as cities and suburbs have struggled with limited success to accommodate a rising tide of automotive traffic and to sustain a steadily declining transit industry, rapid transit has been viewed by many people as an essential ingredient in the metropolitan transportation system of the future. A modern rapid transit—fast and comfortable, with frequent service and moderate fares—*can* attract travelers from their autos in a way that neither the old-style subways nor the typical bus operation of today can do, so the argument has gone. The hoped-for results generally include reduced traffic congestion and air pollution, rejuvenated downtown business districts, opportunities for structuring urban growth, expansion of th job opportunities available to workers, and many other benefits. This line of reasoning has been persuasive in several metropolitan areas, which have begun or are seriously considering rapid transit systems.

But rapid transit has also had its doubters. They argue generally that such a system can reach only a small fraction of the homes in a metropolitan area, and few of the jobs outside the downtown office centers. They have pointed to the very high costs of building such a system and providing it with the automatic equipment that permits greatly reduced operating costs. Such arguments have carried the day in several cities whose public officials or voters have rejected rapid transit proposals.

Now BART offers an opportunity to end the era of claims and doubts by providing a "test bed" for a comprehensive evaluation of rapid transit on the basis of actual experience. The hard facts that will come to light in the next few years, as BART goes into full-scale operation and its ridership builds up, will permit an accurate appraisal of the benefits of rapid transit and an objective weighing of those benefits against the associated costs.

Such a careful evaluation of the impacts of BART requires comprehensive planning, for many of the positive and negative changes produced by the system will not be easy to detect against the background of continuing and complex changes in the Bay Area. Casual observers may be tempted to attribute to BART some things that would have happened anyway. Reports of benefits must be weighed against the equally important computations of the costs, both monetary and nonmonetary, of achieving those benefits. Some people may gain from the presence of BART in a very obvious way, while other people may actually lose in a way that goes unnoticed. There is a need for a thorough identification and measurement of the impact of the new rapid transit system, an objective evaluation of its benefits and costs, and an accounting of the manner in which they are distributed over the entire population.

BART is also of great interest to other metropolitan areas across the country that are considering investments in improved transportation, and to the Federal Government, which is providing financial aid for local transportation improvements, urban development, and environmental protection in urban areas throughout the nation. Thus, to guide future decisions, both in the Bay Area and across the nation, there is an acute need for accurate information on the consequences of the BART and similar investments.

We in the Department of Transportation and our sister participating agencies are committed to fulfilling this need, partially through the BART Impact Program.

DOT and others began planning for a thorough assessment of BART impacts as construction of the first lines of the system neared completion in 1972. This resulted in the formal establishment in mid-1972 of the BART Impact Program that had been informally initiated in late 1971.

The three overall objectives of the program are stated in slide 1[1] as three incisive WHAT, WHY, and HOW questions. The WHAT question is a challenge to identify and quantitatively measure what the impacts of the system have been on travel conditions, economic activity, land use and urban development, public policy, environmental quality, and other aspects of life in the Bay Area.

The WHY question seeks to determine the reasons why these impacts occur and why the anticipated impacts did not occur or occurred in a different way than anticipated.

The HOW question addresses one of the issues raised by your subcommittee, applicability to other cities. We call this transferability and are continuously

[1] See slide 1, p. 184.

seeking to determine how the BART-derived knowledge can best benefit other metropolitan areas in the nation. We need to know how it might influence Federal and local policies, guidelines and procedures and, specifically, *how* it might be utilized in improving rapid transit systems, including BART, throughout the country and the world.

On slide 2,[2] the six specific major impact areas that we are investigating are identified. Together, these areas of investigation encompass the many facets of life in the Bay Area. As I'll explain more fully later on, our research approach includes the formulation of in-depth WHAT, WHY, and HOW questions in each area, the establishment of hypotheses to test the answers, and the gathering of appropriate data to provide the basis for quantitatively and qualitatively evaluating the hypothesized impacts during each phase of our comprehensive five-year program.

We recognized at the start that the program phases must be keyed to the various stages of construction and operation of the BART System. Accordingly, we defined three time phases for our impact program: (1) The *Pre-BART Phase* preceding September 1972, when service began on the first BART line; (2) the *Transitional Phase* covering the time between September 1972 and the time when reliable, seven-day 20-hour per day operation of the full BART System is achieved; and (3) the *Operational Phase* following the advent of full service operations. We have completed the Pre-BART Phase and are now in the Transitional Phase. Before describing our early observations, I'd like to describe briefly our accomplishments in the Pre-BART Phase, our current activities in the Transitional Phase, and our plans for the Operational Phase.

1. *Pre-BART Phase.*—The principle activities during this phase were the collection of important perishable data on pre-BART conditions (mainly travel behavior, environment, and land use) and on the development of the basic program design. Data collection took place during 1972. The pre-BART data have been edited and compiled for subsequent comparison with data to be collected during the subsequent phases. The data are also being analyzed to produce useful information on pre-BART conditions for use by the BART impact assessment team and other interested researchers and policy-makers.

2. *Transitional Phase.*—Some additional data are being collected during the transitional phase to provide early evidence of BART's impacts, especially its effects on travel behavior and the environment. We felt it was essential to proceed without delay to measure the initial impacts of the partially operative system. Doing so provides for the first of a series of impact assessments which, collectively, will establish impact trends over time and permit us to validate and revalidate the answers to our basic WHAT, WHY, and HOW questions. We recognize, of course, that the initial impact assessment data will not be a fair reflection of the capabilities of a fully operative system. Accordingly, we will make the necessary allowances in our interpretation of the data.

Working during the Transitional Phase is also being devoted to updating and refining the existing preliminary Program Design document into a multi-year Strategic Plan. For this fiscal year, and every subsequent year, a detailed Operations Plan will be developed detailing the work planned for the year. Last year, we were able to lay out a relatively detailed research design in two of the major impact areas—(1) Transportation System and Travel Behavior, and (2) Environment. Consequently, we were able to bring contractors on board to further refine our research approach, to lay out a work plan and schedule, and to proceed with the planned data collection and analysis.

In the four impact areas (Land Use and Urban Development, Economics and Finance, Institutions and Life Styles, and Public Policy), our last year's work indicated a need for further detailing of the research design; hence we are presently developing a detailed research design in each of these four areas.

During this Transitional Phase we are also working closely with the Bay Area Rapid Transit District (BARTD) to ensure that the necessary data about BART operations, ridership, and other aspects of the System are preserved and made available for use in assessing BART impacts. A liaison position in the District's staff is being funded by the BART Impact Program to ensure that this need is met without distracting the staff from their duties or imposing an additional financial burden on the District.

3. *Operational Phase.*—Plans for the Operational Phase call for activation of assessments in the remaining four impact areas by the award of contracts to qualified organizations, and that collection of data in each of the major impact

[2] See slide 2, p. 184.

areas, at a time when the BART System has been in full operation long enough for ridership to respond to its availability.

As these data are analyzed and interpreted, reports on the findings will be disseminated to interested public officials and technicians across the country. The main conclusions will be published in popular form for the mass media and concerned citizens. The results of all of the individual studies will be synthesized in a final report that will provide an objective evaluation of the full spectrum of BART's benefits and costs, and an appraisal of the way in which elements of this spectrum are distributed among population groups, geographic areas, and economic sectors.

I am pleased to report that the BART Impact Program has received great interest, technical and financial support, and day-by-day participation by a number of Federal agencies. Within DOT, my office, UMTA, FHWA, and various other offices within OST, including the Transportation Systems Center (TSC) in Boston, have actively participated in the program. HUD's Office of Policy Development and Research has technically guided and financially supported the research in many areas, particularly the Land Use and Urban Development, Environment, and Public Policy areas. The NSF has funded complementary research efforts by grants to University researchers, who are working in close cooperation with us and whose projects we regard as integral parts of our research plan. The NSF will be a major sponsor of the future Economics and Finance and Institutions and Life Styles efforts. The EPA has closely followed the ongoing work and has agreed to participate more directly in the Environment area and to support several of the other areas.

The State of California's Department of Transportation (CALTRANS) has actively participated in our pre-BART data collection efforts, beginning in the spring of 1972 with the collection of data on traffic volumes and vehicle occupancy along routes within BART corridors. They will continue to provide similar data collection support during the remainder of the program.

The overall organizational structure for managing the program is shown in Slide 3.[3] I serve as the chairman of the program's Policy Committee. Other members of the Committee are, as shown, representatives of the sponsor organizations at the Assistant Secretary level. The purpose of the Committee is to review program progress and to provide overall policy direction.

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The Fremont Line was opened in September 1972;
The Richmond Line was opened in January 1973;
The Concord Line was opened in May 1973;
The West Bay Line was opened in November 1973; and that the
Transbay Line is scheduled to be opened in September 1974.

[3] See slide 3, p. 185.
[4] See slide 4, p. 185.

After all lines are operational, 20-hour-a-day service will begin probably in November 1974 and weekend service will start in January 1975. This schedule of openings and the hours of service provided have had some ramifications on the BART Impact Program as I alluded to a moment ago. Despite this, we have been able to collect and analyze the data required to get a sound and accurate picture of the region, its inhabitants and their travel patterns *prior* to the provision of BART service. Pending the opening of the Transbay line, we have been collecting and analyzing initial impact assessment data in the area surrounding the opened facilities. The main "after" data collection and analysis activities will begin once the Transbay line is opened, as I have said previously.

PRELIMINARY IMPACTS OF THE BART SYSTEM

With this background and my cautionary statements in mind, I would now like to discuss what has been learned to date on the impacts of the BART System. For purposes of organization I am dividing my comments into the six major impact areas mentioned earlier. In each case, I shall attempt to highlight the particular items to which you referred when you invited us to testify here today—namely:

(1) Cost data, service and performance characteristics and information on ridership.

(2) Socio-economic characteristics of present and potential users.

(3) Anticipated diversion of auto users.

(4) And, impact on land use patterns.

I might emphasize again that San Francisco, and most other metropolitan areas in the country, are in a constant state of change caused by a wide variety of reasons, ranging from public policy to private market forces. It becomes a very difficult technical problem, then, to determine the *exact* role that the BART system has played in the change in the Bay Area. We recognize this and have taken steps to minimize the uncertainty in this area. We are doing so by the careful use of data from control subareas in the region and by a program of comparing BART impacts to observed impacts of similar systems in other nations of the world.

At this point in time we are getting two general types of "early results." The first type is from our work in the Pre-BART Phase and the current Transitional Phase. From our home interview and workplace surveys, our acquisition of "hard data" such as traffic counts and data on economic activity, and our continued acquisition and analysis of impact-related data, we are able to identify changes and effects that appear to have been caused, at least in part, by the development and operation of BART. It is premature however to label these results as "BART impacts," because they were obtained within the context of a partially operating system that is awaiting the opening of its critical line—the Transbay line. Moreover, the presently operating links are only in this "start up" period. The East Bay links were opened in late 1972 through early 1973 and the San Francisco to Daly City link opened just last November. From the point of view of our long term research design, we view these early results as important clues to the magnitudes of potential impacts. In statistical parlance, we formulate these as hypotheses to be tested as part of our formal scienifically rigorous impact assessment program. Because of this, we refer to these early results as "to-be-tested impacts." I ask you to keep this in mind.

The second general type of early results are those that have been emerging from sources other than our program. These sources stretch back to the early planning days of BART and include published material in both the technical and nontechnical literature plus the first hand observations of planners, transit operators, public officials, researchers, transit users, newspaper and magazine reporters, interested citizens, and many others. Indeed, as part of our program, we have reviewed about 100 technical and planning reports and approximately 4,500 newspaper and periodical articles. Collectively, they represent an extremely wide diversity of anticipated and actual impacts, arguments as to the magnitude of impacts, how good or bad they are, and who ultimately might reap benefits from and bear the burdens of BART. Thus, these too are merely clues as to BART impacts, again placing them among the to-be-tested impacts.

With the opening of the Transbay line about six months away and adding some time for the system to settle down, we estimate that we are about a year away from being able to properly evaluate both types of to-be-tested impacts. Nevertheless, let me review some preliminary findings to date.

1. *The Transportation System and Travel Behavior Study.*—This is the first of the two impact areas we have underway this year. It is a 15-month initial assessment project with two primary goals. First, it will identify and fully document the total Bay Area transportation system. This overall system includes BART, local feeder transit service, and the related highway system. We need to have an accurate account of the physical and performance characteristics of the overall system as a first step in the identification and measurement of the BART impacts.

The second goal of the project is to develop the necessary scientifically sound impact measurement tools and then apply them to the various impact hypotheses that we and others have formulated.

Ideally, I would like to be able today to show you a complete analysis of the profile of the total transportation system and its users in the San Francisco Bay Area, both before and after the opening of BART. However, this is not possible as I've previously pointed out; while we have the complete picture "before" BART, we have only partial information "after" BART. Nevertheless there are some interesting observations to be made at this point about the characteristics of the systems, as they affect to the users. I'm referring of course to the time and cost of such usage.

A comparison in this regard in the Fremont and Concord corridors is shown in Slide 5.[5] Here, the travel time and fares for typical trips from Hayward to Oakland and from Walnut Creek to San Francisco are examined. Note that before the opening of BART's Concord line, the peak-hour trip took 58 minutes and cost $1.56 to make by automobile (including tools and parking costs) and it took 71 minutes and cost $1.19 to make by the bus system. In lieu of the Transbay line's opening, express bus service has been dovetailed with present BART service. As shown in the slide, this combined "BART and bus" mode takes 56 minutes and costs $1.29. Since neither the highway system nor the bus system has been radically changed since BART opened, the above-referenced times and costs have remained about the same. Using current projections for travel time and fares for the Transbay line, this same trip can be made on a fully operational BART, including getting through the departure and destination stations, in about 43 minutes at a cost of $1.25. The time savings here are likely to be attractive to most travelers. The fares for all three transit modes are in the same ballpark, all roughly 25 cents less than that for the auto.

The lower table in Slide 5[5] gives similar data for Hayward to Oakland trips along the Fremont corridor. The "BART and bus" mode is not required since BART serves both cities. The typical choice of mode of travel here is probably determined by each traveler's value judgments regarding travel time and fare. If he does not mind the time investment, he might opt for the bus because of the fare savings. The choice between his auto and BART will probably not be decided by the 20 cent fare saving offered by BART. More likely, he will weigh the relative *inconveniences* of making the trip by each mode. For example, if he uses his automobile to get to the Hayward station, he might elect to use his car for the entire trip. Alternately, since parking at the Hayward BART station may be relatively more convenient than at his Oakland destination, he might opt for BART.

The travel time and fare statistics for the other corridors served by BART are relatively consistent with those presented in Slide 5.[5] Over time, it is our assessment that the BART sytsem figures will remain about the same, but the travel times for highway and bus modes will increase because of increased congestion. This assessment, of course, will be another one of our to-be-tested impacts.

On the travel behavior side, some interesting observations on the shift of travelers to BART have been made, as shown in Slide 6.[6] The upper table in the slide presents the results of an analysis conducted by CALTRANS in support of the BART Impact Program.

In the Concord line corridor, it was estimated that before the opening of BART, 79 percent of the trips were by auto and the remaining 21 percent were by bus. Since the opening of BART, these percentages have shifted as follows: 75% by auto, 15% by bus, and 10% by BART. This shift away from auto

[5] See slide 5, p. 186.
[6] See slide 6, p. 186.

and bus is expected to be more pronounced when BART becomes fully operational.

As regards this shift at the present time, a recent survey conducted by BART indicates, as shown in the lower portion of Slide 6 [6a], that over 50% of those riding BART previously drove their autos while over 30% previously rode the bus. Another 13% represented new trips. Similar observations have been made in other corridors in the area. Indeed, it has been determined that the proportion of BART riders who have been lured from their autos is considerably higher than projections made in the planning stage, which had been regarded by some observers as optimistic projections.

We expect that once the Transbay line is open that the full regional story may well be more significant, particularly in regard to auto diversion. We believe this is likely because the time and cost savings for San Francisco bound East Bay riders are more significant for this trip than for trips solely within the East Bay area.

There are other indications as well, that BART is having an effect on travel behavior. On Slide 7 [7], we have shown some "before" and "after" traffic volume figures for two selected parallel freeway routes. Past experience has shown that vehicle traffic on these routes has gone up about 3% per year over the past 10 years. The results presented in Slide 7 [7] suggest that the tide has been stemmed in the peak periods while, in the off-peak periods, the parallel freeways have seen pleasing reductions in the rate of increase of vehicular traffic. As I've noted earlier, these changes should not be "tagged" as BART impacts; rather, they become one of the to-be-tested impacts that will be examined as part of our program.

Before I leave the subject of transportation, let me briefly describe the profile of current BART ridership. The data presented in Slide 8 [8] was derived from a BARTD survey of BART riders who reside in the Alameda and Contra Costa counties. BARTD also surveyed the residential neighborhoods from which the BART riders originated, thus providing the two profiles shown in the slide. The BART riders are seen to be concentrated in the 18–34 age group, nearly equally divided by sex, predominantly white (76%), only 10.4 percent do not own an auto, and 93.5 percent have at least a high school education. Compared to their neighbors, they are less transit dependent, have completed more formal education, and are slightly younger. As the program progresses, we will be refining these and similar transportation-related figures, comparing them with the pertinent costs, further pinpointing the transportation effects of BART.

2. *Environment.*—The second impact area on which we have recently initiated a major impact assessment project. It is also a 15-month initial assessment effort to identify and measure the effects of BART and BART-induced travel changes on neighborhood environment quality (noise levels, visual and other environment qualities) and on the regional environment (notably air pollution). Of prime importance are the effects of these impacts on people, including the various socio-economic groups, who live near or adjacent to the system. It is equally important to determine their perceptions, attitudes, and behavioral responses to these impacts. Early observations are more difficult to make in the environment area than in the preceding area, primarily because they normally require a much longer time to make themselves known.

We have, however, some early clues to environmental impacts. One is the positive environment impact associated with the linear parks under portions of the elevated structures. While it is difficult to show this impact, except visually, it is nevertheless a real one. Beneath the elevated structure of BART through El Cerrito there was constructed a 2.7 mile linear park, which is now being utilized by the young and old alike for pleasure and recreation. The beauty and usefulness of this park, and others like it on the system have also sparked both neighborhood and home improvement projects in the area. Some idea of this is shown in several of the photos on the collage.

In the area of train noise, we have done some preliminary work. Our surveys indicate that noise initially was and continues to be irritable to persons living directly on the line, particularly when they are not inside their homes. Also, the level of irritability is about the same as that associated with a typical diesel truck.

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[6a] See slide 6, p. 186.
[7] See slide 7, p. 187.
[8] See slide 8, p. 187.

Since energy consumption is closely related to the quality of the environment, we have prepared Slide 9 [9] to illustrate and compare the relative BTU expenditure rates for each mode of travel. It is clear that shifts from autos to either transit buses or BART will benefit both the environment and conserve our disappearing energy resources. Once BART becomes fully operational, it is anticipated that its energy consumption rate will decrease significantly as patronage continues to rise.

3. *Land Use and Urban Development.*—The first of the four remaining impact areas for which we are developing study designs in preparation for full scale impact assessments. The focus of the study design and the full scale project in this area is to identify and measure the impacts on the distribution of population, activities, and buildings within the metropolitan area and on the character of urban development and its design.

And while we have not completed our study design as yet, let me share with you several of the claimed BART impacts that have been published in the Bay Area press.

(1) Through 1971, the values of new commercial construction started in the 10 years since BART construction was announced in downtown San Francisco had exceeded $1 billion;

(2) all of the large new buildings are located within five minutes of a transit station;

(3) Oakland has launched a $165 million city center adjacent to its downtown station;

(4) to date, there is not much evidence of BART-induced increased real estate values near non-downtown stations; and

(5) few suburban stations are causing significant changes in development patterns or real estate values, except where strong zoning measures have been advanced in dynamic communities.

I've presented these to illustrate their role in our program. Each provides a *clue* to a potential BART impact. Our approach is to challenge such observations and, where further analysis appears fruitful, to place them in the category of to-be-tested impacts of the BART system. I might add that the college contains some photographs that illustrate some of the physical change in land development near the BART system.

4. *Public Policy.*—The second of the four impact areas in which a study design project is underway. The project's objectives are to examine both the Federal and local impacts on public policy and, where indicated, relate them to other BART impact areas. Investigation of the local public policy effects of BART and its bond issues and taxes will focus on the policies of governments functioning in the Bay Area, including policies relating to transportation, urban development, and public finance.

Two interesting comparisons in this area have been noted. First, many communities with BART service have been stimulated to make BART-related policies and plans but few have made explicit decisions reflecting community desires about development around BART stations. By way of contrast, communities without BART service have been stimulated to conduct assessments of the most desirable policy interrelationships between potential extensions of BART service and their presently contemplated community growth plans.

5. *Institutions and Life Styles.*—The third impact area for which a study design is presently underway in preparation for the full scale assessment project. The objective of the project is to assess the impacts of BART on social institutions, patterns of social behavior, and the quality of life, with special attention to specific population groups. The assessment process for this impact area is also one of bringing together or integrating the observed impacts in the other five areas into a total impact on the institutions and life styles of the residents in the various neighborhoods of the Bay Area.

[9] See slide 9, p. 188.

Early observations have noted that BART has provided a focus about which neighborhood groups have been able to coalesce in the formation of political and social communities. Moreover, because of the new vistas in mobility that it offers, BART may accelerate the shift of middle class residents from the central city. On the negative side, increasing land values near the developed BART station areas may force the poor to move away. However, it is much too early to confidently predict the impacts in this area.

6. *Economics and Finance.*—The fourth study-design-then-full-scale-assessment project. Here, the project investigates impacts of the BART system—and the bond issues and taxes that financed it—one the regional economy and on specific economic sectors, including the impacts on employment, productivity, and income levels.

We have just begun the study design work and have very little to add to the economic and financial activity presented to you today by the BARTD representatives. Our expectations are that BART will continue to stimulate the regional economy and will continue to increase its productivity. As before, such conjectures will be formally translated into to-be-tested impacts and appropriate data acquisition and analysis techniques used to measure the actual impact.

Lest you feel that all of the impacts from BART might be positive, given that this is the general nature of my preliminary report today, let me hasten to add that I have said precious little about costs, damages, those left unserved, etc., and have not reported on regionwide impacts by and large. This is because this information is not yet available. Only when it is, will the full impact story be known.

## CLOSING STATEMENT

In closing, let me briefly touch on two areas we believe the Impact Program has identified that need additional attention if we are to improve the effectiveness of urban transportation expenditures.

The first area concerns the integration of rapid transit services with other transportation services in an urban area. Our studies in the Bay Area and elsewhere have indicated that such integration must begin with feeder bus service and parking facilities easily accessible to an area's freeway system. We are continuing to stress the importance of this matter in our planning grant programs and we find agreement with the concept among State and local officials and transportation experts. The main problem is who provides the service and what are the economic consequences. Our Unified Transportation Assistance Program (UTAP), now before committees of the Congress for consideration, would, of course, help integrate different types of transportation investments under a single program structure so as to encourage States and localities to interrelate the planning and operations of different modes of transportation.

The second area concerns the integration of land development actions with those of the rapid transit system. We have seen in the BART Program, and in others as well, that the more active a community is in promoting sound land development around a transit station, or a transit line, the more rational that development is and also that it contributes to the usage of the transit system. While many have been preaching this from a philosophical point of view for some time, we frankly have been less than successful in achieving significant local action. And as you know, land development decisions have been traditionally a function of local government. To help alleviate the situation, where local officials desire to take positive action, we are continuing to broaden our planning assistance programs to permit detailed studies of land development potentials of transportation system improvements.

This concludes my formal presentation this morning. I thank the committee for their kind attention and I am available to respond to questions and/or comments.

# OBJECTIVES OF THE BART IMPACT PROGRAM

- WHAT ARE THE IMPACTS OF BART ON VARIOUS ASPECTS OF LIFE IN THE BAY AREA?
- WHY DO THESE IMPACTS OCCUR?
- HOW CAN THE NATION OBTAIN THE FULLEST POSSIBLE BENEFITS FROM THE BART EXPERIENCE?

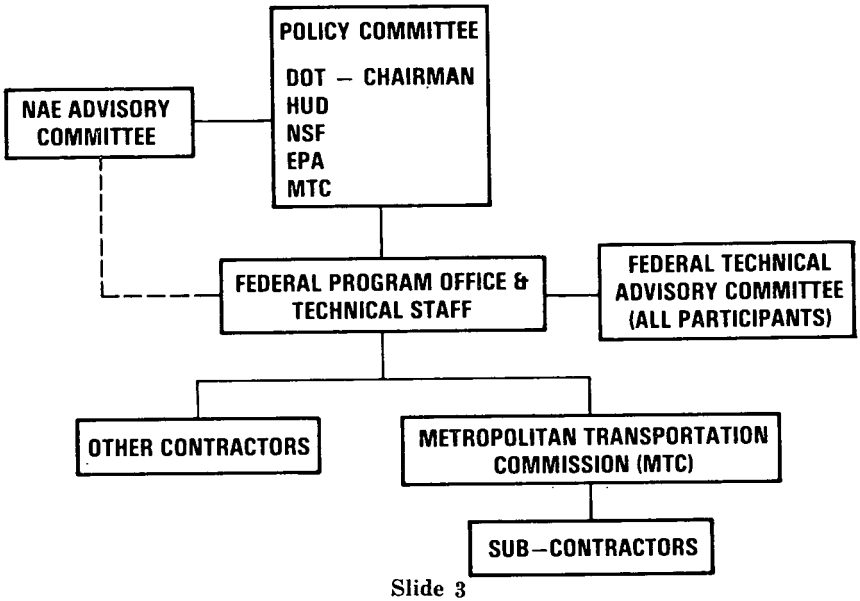
Slide 1

# THE AREAS OF INVESTIGATION

- TRANSPORTATION SYSTEM AND TRAVEL BEHAVIOR
- ENVIRONMENT
- LAND USE AND URBAN DEVELOPMENT
- ECONOMICS AND FINANCE
- PUBLIC POLICY
- INSTITUTIONS AND LIFE STYLES

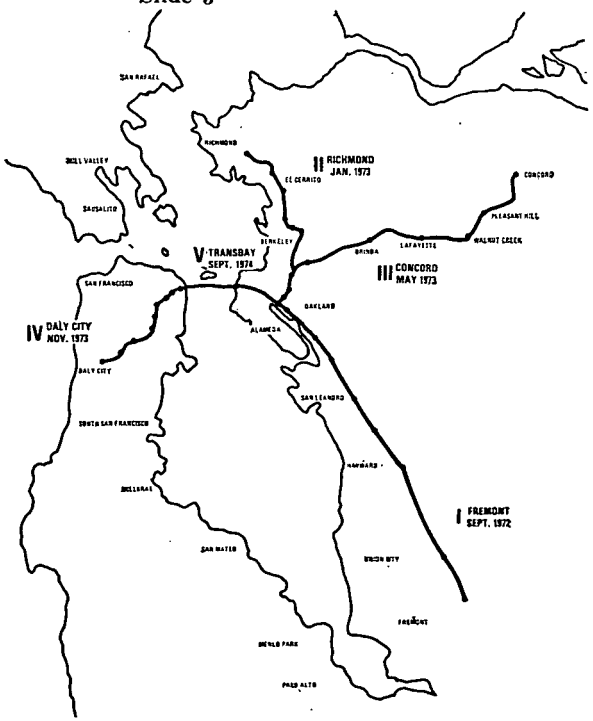
Slide 2

# ORGANIZATION FOR BART IMPACT PROGRAM




Slide 3

# PHASED OPENING OF BART




Slide 4

# COMPARISON OF PEAK TRAVEL TIME AND FARES

## A. WALNUT CREEK TO SAN FRANCISCO (CONCORD CORRIDOR)

| MODE | TIME (MINUTES) [1] | FARE (DOLLARS) [2] |
|---|---|---|
| AUTO | 58 | $1.56 |
| BUS | 71 | $1.19 |
| BART AND BUS | 56 | $1.29 |
| BART (PROJECTED) | 43 [3] | $1.24 |

## B. HAYWARD TO OAKLAND (FREMONT CORRIDOR)

| MODE | TIME (MINUTES) [1] | FARE (DOLLARS) [2] |
|---|---|---|
| AUTO | 31 | $ .97 |
| BUS | 51 | $ .54 |
| BART | 32 | $ .74 |

[1] INCLUDING ACCESS AND WAIT TIMES
[2] INCLUDING TOLLS, PARKING COSTS, AND COST OF TRAVELER'S AUTO TO TRANSIT STATION
[3] ESTIMATED FOR TRANSBAY LINK

Slide 5

# PRELIMINARY IMPACTS OF BART ON TRAVEL MODES

## A. TRAVEL MODES USED IN THE CONCORD LINE CORRIDOR

| MODE | "BEFORE" BART (PERCENT) | "AFTER" BART (PERCENT) |
|---|---|---|
| AUTO | 79% | 75% |
| BUS | 21% | 15% |
| BART | 0% | 10% |

## B. PREVIOUS TRAVEL MODES OF BART RIDERS

| PREVIOUS MODE | PERCENT |
|---|---|
| AUTO | 54% |
| BUS | 32% |
| NEW TRIPS | 13% |

Slide 6

# IMPACT OF BART ON NUMBER OF AUTO TRAVELERS ON SELECTED PARALLEL FREEWAYS

| PARALLEL FREEWAY TO | VOLUMES[1] | | | |
|---|---|---|---|---|
| | PRE-BART | | WITH PARTIAL OPERATIONS | |
| | PEAK[2] | OFF-PEAK[2] | PEAK[2] | OFF-PEAK[2] |
| FREMONT TO OAKLAND LINE (18 MO. PERIOD) | 21,228 | 64,530 | 21,502 | 65,362 |
| WALNUT CREEK TO SAN FRANCISCO LINE (5 MO. PERIOD) | 25,172 | 40,722 | 24,785 | 43,102 |

[1] DAILY AVERAGE NUMBER OF PERSONS DURING PERIOD; ASSUMES 1.2 PERSONS PER AUTO
[2] PEAK IS 6:00 TO 9:00 AM; 21 HOUR OFF-PEAK

Slide 7

# PROFILES OF CURRENT BART RIDERS AND THEIR RESIDENTIAL NEIGHBORHOOD[1]

| | SEX | | AGE | | | | ETHNIC GROUP | | |
|---|---|---|---|---|---|---|---|---|---|
| | MALE | FEMALE | UNDER 18 | 18-34 | 34-64 | OVER 65 | WHITE | BLACK | OTHER |
| BART RIDERS | 49.4 | 50.6 | 3.1 | 61.9 | 31.6 | 3.4 | 76.0 | 11.7 | 12.3 |
| NEIGHBORHOOD | 48.5 | 51.5 | 10.0 | 35.4 | 43.3 | 11.3 | 83.3 | 12.4 | 4.3 |

| | EDUCATION | | | | AUTO OWNERSHIP | | | |
|---|---|---|---|---|---|---|---|---|
| | NON-HIGH SCHOOL GRAD | HIGH SCHOOL GRAD | SOME COLLEGE | COLLEGE GRAD | 0 | 1 | 2 | 3 OR MORE |
| BART RIDERS | 6.5 | 25.5 | 40.3 | 27.7 | 10.4 | 39.7 | 36.3 | 13.6 |
| NEIGHBORHOOD | 35.3 | 33.6 | 15.5 | 15.6 | 13.8 | 45.1 | 34.1 | 7.1 |

[1] ALL FIGURES ARE PERCENTAGES.

Slide 8

# ENERGY CONSUMPTION RATES BY MODE

| MODE | CONSUMPTION[1] |
|---|---|
| AUTO[2] | 16,200 |
| BUS | 4,400 |
| BART | 5,200 |

[1] BTU'S PER PASSENGER-MILE.
[2] AT 13.6 MILES PER GALLON.

Slide 9

Chairman MOORHEAD. The subcommittee would now like to hear from Mr. William Howard.

Mr. Howard, you may want to summarize your prepared statement, as Mr. Clement did. If you do, without objection the prepared statement will appear in the record.

Mr. HOWARD. Thank you.

**STATEMENT OF HON. WILLIAM HOWARD, DIRECTOR, TRANSPORTATION OPERATIONS, MINISTRY OF TRANSPORTATION, ONTARIO, CANADA**

Mr. HOWARD. In listening to Mr. Clement speak here it has become quite obvious that rather than read the statement I have provided, which gives a lot of the details associated with our GO transit service, it probably might be just as well left unsaid here today because we wish to discuss some of the differences, the similarities and the dissimilarities between our two systems. I would like just orally, without reading any prepared statement, give a little bit of the background of our GO transit system and then maybe some comparisons, if I may, with the two systems and get into the general discussion as to some of the impacts that we have had and that BART has had in our respective areas.

Chairman MOORHEAD. Did you have a formal impact study?

Mr. HOWARD. We have not, Mr. Chairman, had any formal impact study which has been completed. We have started a land use impact study which has not yet been completed, but we have not done anything other than the land use impact study.

Chairman MOORHEAD. Based on your experience you have a pretty good idea of what has occurred.

Mr. HOWARD. I would think so.

Chairman MOORHEAD. You may proceed.

Mr. HOWARD. Just to give some background, I think that during our discussions here we have to keep one very important thing in mind, and it is what I would like to call the "gestation period" when comparing BART and GO transit.

GO was thought of, designed, implemented and operating in a 2-year period. BART, I think, took considerably longer than that and may account for some of the differences, some of the problems associated with the two operations.

Just to give you a geographical setting, back in 1964, the Ontario government was looking at the Toronto-centered region and realized if we continued to develop our transportation policies along the line that we were in those days, strictly related to expressways and arterial roadways within the city, that by the year 2000 we would be in deep trobule, and we had no other form of transportation for the suburban communities surrounding Toronto.

The Toronto Transit Commission (TTC) was serving the metropolitan area quite adequately with our subway system and with trolley buses and streetcars and bus services but the suburban areas surrounding Toronto had no adequate transportation to the CBD.

As a result of this we developed what we call the Metropolitan Toronto and Regional Transportation Study, and one of the results of this study was the realization that we had a network of rail lines feeding into the heart of metropolitan Toronto which probably could support an extensive commuter rail network. As a result of this the government of Ontario gave us the go-ahead in 1965 to develop the first line, a 44-mile line along the lakeshore serving 22 miles in either direction into the heart of Toronto, and authorized an estimated yearly deficit of $2 million once this service became operative.

The government negotiated with the Canadian National Railways to run the service, and I think this is one of the biggest differences between our operation and the BART operation. We made use of an existing right-of-way and existing technology to develop the GO transit rail system.

The Canadian National Railways, who owned the rights-of-way, agreed to allow the Ontario government to make use of the rights-of-way for a rapid rail service, and this service was developed and became operative over a 2-year period, because we used existing technology. Although we designed the system from the ground up, and built new equipment, designed new equipment, to attract people out of their automobiles basically we were looking at the certain things that people had, automobile commuters had, in the corridor, and the system was developed around this concept to get people out of their automobiles.

The corridor itself had many similarities to the bay area. The CBD in Toronto was the large focal point for all of these commuters from the various suburban communities outside of the Toronto area from distances of 25 and 30 miles in either direction.

These people were primarily automobile-oriented commuters. There was no rail service of any kind. There was a limited bus service feeding these communities. And so they were primarily automobile-oriented.

Some of the immediate results of the introduction of the GO rail system in May 1967—and we can get into the further details in mak-

ing comparisons later. But the people who used GO at the outset ranged all the way from 60 to 70 percent of former automobile commuters, and we were able to achieve from the communities of 22 miles distance from the CBD as high as 45 and 50 percent of the total travel trips into the downtown area.

I think that these figures are quite high in comparison to what we have seen in BART.

The fact that we were able to go ahead with existing technology and utilizing existing rights-of-way and build the system at grade rather than an elevated or underground system, accounted for a lot of the low capital investment required for GO transit. We were able to introduce the 44-mile section of GO for approximately $25 million, which is less than $0.5 million a mile for the complete system including rolling stock.

We were able to achieve this because of the fact that the right-of-way was in. We had to put in improvements in the way of track and signals. We had to build new rolling stock. But the fact that we utilized an existing right-of-way made it possible to implement a system at a reasonable capital investment.

The government accepted an operating deficit at that time, based on estimated patronage of approximately $4 million a year, of a $2 million annual operating deficit.

The service has now been in operation since 1967 and we have just now reached that $2 million annual operating deficit. It operated at considerably lower than that in spite of the fact that the patronage on the rail service is now in the neighborhood of $6 million rather than the $4 million estimated.

This, too, has been achieved because we were able to implement a service using the know-how of people who have been in the business for many years, railway employees, and the fact that throughout our country, as well as yours, railway service is deteriorating and people are being put out of work in the normal operating of railways. We felt that this was a way to utilize existing expertise by putting in a service which required only existing expertise in how to run a railroad.

I must admit that how to run a railroad has not been too satisfactory in most quarters these days, but we have been able to come up with a reasonable operating cost and experience reasonable operating deficits because of this.

The experience on GO transit has been sufficiently satisfactory to allow the government of Ontario to make a decision just 2 years ago to expand the service, and once again from the date of go-ahead to the date of implementation we were 2 years, and as of April 29, just several weeks ago, we introduced a new 22-mile section in GO transit to the Northwest part of Metro.

Almost the day this was opened it was announced that we would implement another 22-mile section to the northeast part of metropolitan Toronto. We have set a target date of January 1976, which is less than 2 years away, for the next leg of the GO transit operation.

I think that it is quite obvious from this that the Ontario government has been quite satisfied that we have found a good alternative to the automobile in public transportation, that we have found a way to do it without the high cost associated with new technology, with special rights-of-way, with all of the other things that have been asso-

ciated with some of the more exotic forms of public transportation that have come about recently.

This does not say that we are not interested in new technology. We have found that our subway system operating in metropolitan Toronto with its capacities of aproximately 40,000 passengers per hour does an excellent job in high density areas. We can provide with bus services the demand for up to 6,000 to 10,000 passengers per hour but there is a gap in the middle that has not been satisfied, the gap in the range that can be provided by systems like BART. For this reason we are developing in Toronto a test track to test a GO urban system which will be a magnetic levitation, linear induction propulsion system. We are spending something like $25 million to build a 2-mile test track. We hope to have this test system operative within the next 2½ years, and in the meantime we are going ahead to plan a 53-mile network of system for the Toronto area as well as systems for our two other major metropolitan areas in Ontario, Hamilton and our capital, Ottawa. We feel that if we can prove this technology feasible we can build a system in the range of $15 to $20 million a mile, or half of what it costs to build a conventional subway system, but still many more times what it costs to utilize existing rights-of-way and to utilize conventional technology to build a rapid commuter rail system such as the GO transit presently is operating.

I just might move into some of the areas of impact that Mr. Clement spoke of. I have already mentioned the impact on the automobile user. We feel that we have been quite successful in attracting people from their automobile into public transportation. The figures that we do have indicate that a high percentage of our riders were former automobile users.

We have a marked notable increase in land use and development within walking distance of all of the stations on GO transit.

This has been particularly notable in areas that formerly were completely single family dwellings along the railway right-of-way. These areas, the municipalities through which the GO rail service travels and which have GO rail stops, have rezoned and have allowed high rise development within areas of stations. I think one of the most notable things, not just on our GO rail system but also on the TTC subway system—those who have been to Toronto you will have noticed this impact along our rapid transit rail lines—and this has been a very marked development over the past few years.

You must forgive me, Mr. Chairman, for not having any graphic aids with me today. In fact, because it is the silly season up in Canada and we have just gone through an air strike and a mail strike, and since I left home we have lost our Canadian Government. I had nothing to do with that. It wasn't the fact I left Canada the federal government fell.

Anyway, because we did have a little bit of problem with communication between myself and your people down here as to what was expected of me, I have not arrived with any visual aids to help me. In fact, I was not really quite sure why I was here. [Laughter.]

But this has nothing to do with the lack of communication at this end, it is strictly a lack of communication once we get north of the Canadian border. But I think we have all of our problems settled for a while, except for an election. [Laughter.]

As I mentioned, the land use impact has been quite dramatic all along our rail transit line and I think that some of the things that are extremely noticeable, I might take one community and use it as an example, and this is the community of Pickering also known as Bay Ridges.

It has received fame for other reasons because we implemented there the first major Dial-A-Bus program in the world, in 1970, as a feeder to our GO rail station. But prior to the 1967 introduction of the GO rail system, this was a community, a new community. It started developing in about 1963, and by 1967 the homes in this area, as I say, primarily single family dwellings, were being sold on a gimmick basis. They gave away everything including the kitchen sink for you to buy a home in the Bay Ridges area. It was almost impossible to sell homes and to attain a decent price for a home in the Bay Ridges area.

The introduction of the GO transit rail service in 1967 had an impact on this community, and later in 1970 with the introduction of the Dial-A-Bus service to serve the community as a feeder to the rail service as well.

It had a further dramatic impact and I can just tell you in the past 10 years there has been more than 100-percent increase in the price of homes in the Bay Ridges community.

This is pretty well the pattern along the rail line that has been served by GO transit in the communities both east and west of metropolitan Toronto and it is already becoming evident in the areas where we have just implemented service, the area northwest of Toronto. People are now advertising their homes as GO-commuter homes and people are moving to these areas.

Although it is not the ideal situation in the eyes of local people who are afraid of these communities becoming dormitory communities becoming dormitory communities of the city of Toronto, people do and have and will move to the area and utilize a good fast reliable rail service to get to their employment in the downtown Toronto area.

Service and performance is one of the impacts that you asked us to speak on and GO has achieved an enviable record during the past 6 years of rail operation. We have operated between 97 and 95 percent on time performance over that period of time. When you consider that we are operating a rail service not on an exclusive right-of-way, sharing tracks with other train movements. both freight and passenger services, that on the one section of track between Toronto and Oakville, where we operate 57 GO trains a day, there are over 100 scheduled trains a day operating on that section of track. We have been able to achieve with a minimal capital investment by utilization of signals and additional trackage, quite a high capacity on that rail line and have been able to operate very effectively and with a high degree of ontime performance on a shared right-of-way.

I have already mentioned the cost data. I would like to maybe just mention some of the differences between automobile commuting and rail commuting as we have found it. I was interested in Mr. Clement's figures on the cost of automobile commuting. I don't know what he used to put into those figures but they seem mighty low to me when he made his comparisons of the Oakland area into the downtown area of automobile versus rail. He mentioned the cost of parking and the cost of tolls and so on and so forth. I don't think he included in there the cost of running the car because it seems to me to be very low.

Chairman MOORHEAD. Do you want to comment?

Mr. CLEMENT. We had included all costs.

Mr. HOWARD. You must be able to operate a car a hell of a lot cheaper in Oakland, Calif., than we can in Toronto, Canada. Our comparison of the cost to the riders themselves are considerably wider spread than what has been indicated by the previous speaker. The total round trip, for instance, from a distance of 22 miles on GO transit is $1.90, 95 cents each way. The cost of parking alone in downtown Toronto for one day now exceeds $4. So I think it is quite obvious that we have the great saving between automobile commuting and commuting by GO transit in the Toronto area, probably more significant than what has been indicated in the BART experience.

Chairman MOORHEAD. What about time, auto versus GO transit?

Mr. HOWARD. The running time from Oakville, a distance of 22 miles, down to Toronto is 37 minutes. During the peak hour for the same distance, from Oakville to downtown Toronto would be in the neighborhood of 1 hour and 15 minutes.

The traveltime on the Gardner Expressway, which is the main freeway leading into downtown Toronto, is about 3 miles per hour once you get into the inner core.

So we do have a distinct advantage over the automobile in this corridor.

Like other areas we operate parallel to the freeway system. There are some other areas here in the United States that have a similar situation and as a selling feature we instruct our engineers to open that throttle wide open when they are going by the Gardner Expressway.

Mr. Chairman, I have spoken here pretty well off the top of my head in giving you some of our experiences. I think probably I will just shut off for now until we get back into making some discussions and comparisons on the two systems.

Chairman MOORHEAD. Well, thank you very much, Mr. Howard. Your prepared statement, without objection, will be made a part of the record. I think you did an excellent off-the-top-of-the-head job here.

I wasn't even sure what I was going to get from Mr. Clement, and I am not sure he was sure what he would come up with. You have a system that has been in operation for a longer time and are most generous to give us the benefit of your thoughts. It is a great help to the subcommittee.

[The prepared statement of Mr. Howard follows:]

PREPARED STATEMENT OF HON. WILLIAM HOWARD

GO TRANSIT

(A behind-the-scenes look at the Ontario government's mass transit operations)

THE BEGINNINGS OF A COMMUTER SYSTEM

GO Transit, Ontario's government-sponsored rail and bus commuter service, carried more than 8.4 million people to and from Toronto last year, averaging about 34,000 [1] passengers every working day. The system is now in its seventh year of operation.

The success of this experiment in public transportation rests in large measure with the foresight and planning by the province during the early 1960's.

Ontario recognized the need for a comprehensive review of transportation planning in 1962 and initiated the Metropolitan Toronto and Region Transporta-

[1] 21,000 rail: 13,000 bus.

tion Study (MTARTS), one of the first large-scale approaches to urban transportation planning undertaken in Canada.

Some 3,200 square miles was involved in the study, which extended to the neighboring cities of Hamilton, 40 miles west of Toronto, Oshawa, 30 miles east, and Barrie, 60 miles to the north of Toronto.

Estimates place population growth in this region at 6.5 million by the year 2000, and Metro Toronto alone now has a population of more than two million people.

Located on the north shore of Lake Ontario, Toronto is a focal point for one of Canada's more extensive industrial and commercial concentrations. And it is a city endowed with universities, strong as a financial centre and capital of the Province.

In 1965, based on MTARTS recommendations, Premier John Robarts gave the go-ahead for an east-west commuter rail service along the Lake Ontario shoreline between Oakville and Pickering, a distance of 42 miles. The Ontario Department of Highways (now the Ministry of Transportation and Communications) had responsibility for implementation and administration of the new service.

Total capital of the project, including upgrading of existing Canadian National trackage, construction of servicing facilities and purchasing of equipment was $24,000,000.

This is in contract to the $16-million per mile cost to Toronto's elevated Gardiner Expressway through the downtown core, and $7-million per mile cost of the 12-lane Macdonald-Cartier Freeway by-pass across the northern half of the city.

Trains began operating on a limited basis in May 1967, and by September of that year, the GO Transit commuter rail service was in full operation. Daily passenger volume has risen past the 17,000 mark by January of 1968. In the past few years rail passenger volume has risen about four percent each year. Since the Toronto Transit Commission introduced its single fare system in Metropolitan Toronto, there has been a decrease in rail ridership from the inner stations (served by TTC). However, the number of passengers travelling longer distances by rail has increased.

Canadian National Railways operates the GO Trains under contract to the Ontario Government along the Canadian National right-of-way. In effect, CN runs the day-to-day operations while the government specifies the type of service, fares, schedules and other policies, supplies capital, and reimburses the railway for any operating deficit.

In giving its approval for the rail experiment, the Province expected to face an annual operating subsidy of up to $2-million a year. Last year the rain operating deficit amounted to very nearly that figure.

### GO RAIL EQUIPMENT

GO equipment consists of twelve diesel electric locomotives, 84 coaches, nine self-propelled cars and five auxiliary power control units (APCU).

The coaches are lomocotive-hauled in trains of up to ten cars each and operate on the push-pull principle eliminating the time-consuming necessity to run locomotives round the train at terminal stations.

The twelve 3,000 horsepower locomotives were built by General Motors Diesel Ltd., of London, Ontario. Four of them were delivered in 1974. Top speed is 83 miles per hour. Eight of the locomotices have a built-in auxiliary generator which supplies heating, lighting and air conditioning power for up to ten coaches.

Hawker Siddeley Canada Ltd. produced the coaches and self-propelled cars at its Thunder Bay plant. Specially designed for GO Transit, these cars are constructed extensively of aluminum, continuing the pioneering use of this material by Canadian rapid transit equipment designers.

Great reductions in weight have been achieved by using aluminum without sacrificing capacity or safety. The coaches are 40 per cent lighter and the self-propelled cars 20 per cent lighter than conventional equipment.

The 85-foot long coaches can accommodate 94 passengers each and have thermostatically-controlled air conditioning, heating and ventilating systems. Thirty of them were built in 1973–74. Eight coaches are equipped with operative cabs for push-pull operation.

There are also nine self-propelled cars in the GO Transit fleet. These are similar to the coaches but have built-in underfloor engines for operation independent of a locomotive, in trains of two of more cars. They are especially suited

to off-peak requirements when long trains are unnecessary, but can be combined in multiple units of various lengths to supplement locomotive-hauled trains during rush-hours. Each self-propelled car is equipped with a single 330 horsepower Rolls Royce traction engine and has a top speed of 80 miles per hour.

Styling and comfort are believed to play an important role in luring the motorist away from his automobile, and consequently a great deal of consideration was given to the decor and interior appointments of the coaches and self-propelled cars.

Five auxiliary power control units (APCU) were converted in 1974 from passenger locomotives of the Ontario Northland Railway. Each APCU contains a generator to provide lighting, heating and cooling for up to 12 coaches, and is equipped with an operating cab for push-pull operation.

In addition to two-way radio communication with train dispatchers, a commuter administrative centre, and a maintenance department, GO Transit equipment boasts a versatile on-train communications system capable of providing private inter-crew communication, announcements to the passenger areas, and means for addressing commuters on platforms through externally-mounted speakers on both sides of each car.

### LAKESHORE RAIL SERVICE

GO Trains currently serve 13 stations in the Oakville-Pickering corridor, and an additional three beyond Oakville to Hamilton, on a limited basis only. Nearly 4,700 free parking spaces are provided for GO Transit commuters and stations are located close to major arteries to provide easy access for people in the area. Parking facilities are constantly under revision.

Passenger convenience was a prime consideration in devising GO Transit schedules. Trains run 19 hours a day Monday through Saturday and 16 hours on Sundays. During rush-hour periods on weekdays, trains run at 20 minute intervals, and in off-peak periods a basic hourly service operates.

Union Station in Toronto is the focal point of GO's commuter rail system. Here passengers have direct access to the city's extensive bus and railway grid, operated by the Toronto Transit Commission. The Ontario Government subsidizes 75 per cent of the cost for subway construction in Metro Toronto and grants subsidies of 75 per cent of the purchase by municipalities of buses, streetcars, trolley buses and related facilities.

### GO FARES

GO Transit's fare structure takes into account that commuter fares should be competitive with automobile commuting costs to Toronto, yet not undercut other forms of public transit. Minimum fare is 70 cents for trips between stations up to 13 miles apart, and is based on a 4.6 cent per highway mile cost above that, reducing to 4.2 cents for trips over 21 miles in length.

Books of tickets are available which offer the regular commuter a 17.5 per cent saving over the single ticket fare. As well, in 1971 CO Transit introduced the concept of monthly commuter ticketing. Monthly tickets offer passengers a potential saving of a further five per cent over commuter books in addition to convenience and unlimited rides.

Children five years of age and under 12 are charged one half the adult fare. Senior citizens may ride for half-fare during off-peak hours and there are special rates for students and scholars.

### NEW RAIL SERVICES

In the spring of 1974, GO Transit rail service will be introduced between Toronto and Georgetown, 30 miles north-west of Union Station. There will be intermediate stops at Brampton, Bramalea, Malton, Weston and Bloor Street. Start-up service on this route will consist of three morning trips into Toronto and three evening return trips on weekdays only, although provision is being made for eventual growth of the service.

To accommodate the Georgetown service, Canadian National Railways track and signalling systems were upgraded, parking lots and station facilities were provided, and reconstruction of the CNR bridge over Highway 27 was advanced.

A Richmond Hill to Toronto GO Train service will be operational in late 1975 or early 1976 depending on how soon line improvements can be completed and equipment delivered. The Federal Government awarded $10-million to the

Province to assist in the start-up of this latest commuter rail service. These funds will be used to obtain rolling stock needed to operate the initial three morning and evening rush-hour trains on the route.

The Richmond Hill GO Train service could eliminate 5,000 daily passenger trips by automobile and relieve pressure on the Don Valley Parkway and downtown Toronto parking areas.

### BUSES JOIN GO TRANSIT

For several years following its introduction, the east-west rail commuter service constituted the prime component of GO operations. Then, in 1970, GO Transit took another important step towards expansion and integration of the regional transportation system with the addition of a bus commuter service.

This service began in September 1970, linking the City of Oshawa on the east and the City of Hamilton on the west of Toronto with GO Transit rail facilities at Pickering and Oakville, the two outer stations on the rail route. The expansion also included a bus commuter service north from Toronto.

This means that commuters living in Hamilton and Oshawa have easy access to extising GO Transit rail stations via bus. Commuters in the town of Newmarket, Aurora, Oak Ridge, Maple, King City and Richmond Hill are linked by GO Bus service to Toronto's subway, the main bus terminal, and GO Transit rail service at Union Station. There is also a rush-hour GO Bus service from the City of Barrie, 60 miles north of Toronto. It takes approximately 70 coaches to provide GO Bus service in all three corridors.

Gray Coach Lines, a wholly-owned subsidiary of the Toronto Transit Commission, operates the GO Bus service for GO Transit using buses owned by the Ontario Government supplemented by their own coaches.

In January 1972, the routes of Travelways of Canada between Richmond Hill, Thornlea and Toronto were added to the GO System. On April 28, 1974, this service will be altered to provide shuttle buses between Richmond Hill and the new Finch Subway Station. Travelways will operate the service for GO Transit at 10 and 15 minute frequencies during rush-hours and hourly in off-peak periods.

### DIAL-A-BUS IS BORN

GO Transit introduced the first experimental Dial-A-Bus commuter service in Canada in July 1970. Operated by the Ministry of Transportation and Communications, the srevice provided commuters in the Bay Ridges area, 20 miles east of Toronto, with door-to-door taxi service from their homes to the GO Transit rail station at Pickering. Before Dial-A-Bus, residents had no municipal transportation. They had to drive, walk or call cabs.

Under the new system, commuters only had to telephone a special dispatcher, give their address, time of the train they wished to catch, and they were picked up by one of five 11-passenger minibuses. Reservations could be made on a weekly or daily basis up to one hour before train time.

In addition to the regular commuter feeder service, local residents could also use the minibus service in off-peak periods to take them to local shopping centres in Bay Ridges or anywhere else in the Bay Ridges area.

The experiment proved successful and following completion of the Province's demonstration period, Pickering Township took over the administration and operation of the system in January 1973.

Since then, Dial-A-Bus has been expanded to cover a larger area of Pickering Township rather than just the original test area and there has been a considerable increase in ridership. New buses were purchased recently with the aid of the 75 percent Ontario Government subsidy. Dial-A-Bus continues to service the GO Train at Pickering.

### GO'S LATEST DEVELOPMENTS

Also administered by the Ontario Government is GO DIAL-A-BUS, an experiment in public transit now operating in selected areas of Metropolitan Toronto, and GO-URBAN, a new intermediate capacity transit system under development at the Canadian National Exhibition grounds.

GO DIAL-A-BUS picks up passengers at their homes when called an hour in advance and delivers them to a pre-determined subway station, a fixed-route TTC bus or a shopping plaza. Homebound passengers board GO DIAL-A-BUS at these pre-determined terminal points for the return trip. Passengers may also travel from one zone to another in their area during off-peak times.

GO DIAL-A-BUS is now operating on an experimental basis in the York Mills and Armour Heights areas. On March 18, it will commence operation in the Downsview area and later this spring the East Willowdale area will be serviced by GO DIAL-A-BUS. The Toronto Transit Commission operates the service for the Ontario Government.

The Ontario Government believes GO DIAL-A-BUS can bring public transportation to many people not now adequately served by regular subway, streetcar and bus lines. It believes, too, that DIAL-A-BUS will persuade many more people to leave their cars at home.

GO–URBAN will operate on an elevated guideway and will be powered by linear induction motors. Special cars will be levitated above the guideway by a set of electric magnets. Each car will have a seating capacity of 12 with standing room for eight more passesgers. The system will be computer-controlled and is to be installed mainly on existing rights-of-way such as rail and hydro corridors.

Some of the advantages of GO-URBAN are : it is cheaper to build than subways ; it will move people in urban areas without increasing the already excessive stresses on roadways ; it will not disrupt the community environment ; and it will be noise and emission free.

The GO-URBAN Transit Demonstration System at the CNE will be completed in 1975. Use of GO-URBAN as an operational Revenue System has been proposed for the three large urban areas of Ontario : Metropolitan Toronto, Ottawa and Hamilton.

PROBLEM AREAS

Like any other system, GO Transit has its difficulties. Crowded GO Trains during morning and afternoon rush-hours is one of them.

Jammed-in-riders obviously aren't satisfied customers so GO Transit is seeking solutions to give everyone a more comfortable ride.

New coaches were purchased recently to help alleviate the rush-hour crush. Staggered working hours that would spread out and level off severely congested morning and afternoon peaks are also being encouraged among downtown employers by the Ontario Government.

Parking lots are a dilemma. Already GO Transit probably provides more *free* on-line commuter parking per passenger than any other rail commuter service in North America.

But many of the lots are becoming overcrowded as more people choose not to take their cars into Toronto's congested downtown core. This is the main aim of GO Transit—to lure people out of their cars. But parking lot expansion is difficult—often the land just isn't available near GO stations and building multi-storey facilities is costly. (Simply maintaining the existing lots run into thousands of dollars yearly.)

Alternatives are being sought. Kiss 'n ride facilities exist on all lots. If more commuters used this method of getting to the station they would leave their cars free for other members of the family to use during the day. It could sometimes even eliminate the need for a second car.

Car pools are making news. Two, three or four commuters sharing the ride to the station save on gas as well as parking space. Local buses to the GO station are another good bet. And the lost are of walking should not be overlooked.

Performance can't always be predicted. GO Transit has encountered operational problems, weather problems and mechanical failures—all relatively easy to rectify but time consuming. This means passengers have sometimes had to wait for a late train or bus.

Changes in procedure have been recently implemented to spare commuters this inconvenience.

There are long range improvements in the works too. One example is the installation of a public address system at all GO Rail stations to allow information of any changes in service to be passed on to waiting passengers.

### IS GO TRANSIT A SUCCESS?

Surveys indicate that GO Transit has had a significant effect in attracting people to areas outside of Toronto. Communities such as Pickering and Oakville have mushroomed, temporarily easing the pinch on Toronto's housing supply. Residential and commercial developments that have convenient access to GO stations have been stimulated in other areas as well.

But more important, many suburban commuters now leave their cars at home and use public transportation. This was one of the main aims of GO Transit. As

Premier John Robarts said in announcing the project in 1965: "The problem that we face is that the main highway routes in this particular metropolitan area (Toronto) are becoming strained with overcapacity traffic during only about four hours a day, and at other times they have surplus capacity.

"What we are looking for is a better use of our transportation dollar through a balanced use of all modes of transportation in this rapidly developing area."

Certainly many trips in and out of Toronto today are still being made by automobile, but the fact remains that GO Trains are running at capacity during rush-hours, and the percentage of trips being converted to public transit is only limited by the capacity of the rail service.

In November 1972, Premier William Davis announced a six-point plan aimed at the continued improvement of public transit in Ontario. Called GO A NEW WAY, it includes GO-URBAN, GO DIAL-A-BUS, and 75 per cent subsidies to municipalities for the purchase of buses, streetcars, trolley buses and related facilities as already mentioned.

In addition, the Ontario Government will subsidize up to 75 per cent feasibility studies into staggered hours. Flexible or staggered working hours would ease the rush-hour crush now being experienced on existing public transit and on major arteries.

Subsidies of 50 per cent will also be granted to municipalities that implement or expand computer controlled traffic systems—a valuable aid in increasing road capacity.

"As a means of solving our urban transportation problems, expressways are not only too expensive for the traffic moved, but because of their accompanying intrusion, noise and air pollution, they have become unacceptable in residential areas," said Premier Davis when he announced GO A NEW WAY.

"In addition, in urban areas, they do not usually work efficiently since they tend to attract and encourage the use of automobiles to the point that they quickly become jammed over their capacities. The province will shift emphasis from urban expressways to a variety of transportation facilities which will put people first."

Is GO Transit a success?

The answer is obvious.

### TORONTO AREA TRANSIT OPERATING AUTHORITY

On February 11, 1974, Premier William Davis released a report recommending establishment of the Toronto Area Transit Operating Authority to co-ordinate transit services in the area encompassed by Metropolitan Toronto and the regional municipalities of Peel, York and Durham.

Following the approval of Metro and the regional councils concerned, Mr. Davis said legislation to establish the authority could be introduced in the next session of the Legislature. He said he would like to see the authority begin operations by the middle of 1974.

In assuming responsibility for inter-regional transit, the Toronto Area Transit Operating Authority would acquire the assets and liabilities of GO Transit and administer GO Transit inter-regional services.

For GO passengers and employees, the new reporting structure is not going to cause any hardship. It will be service as usual, except for improvements. One day soon passengers may be able to buy a single ticket—for local transit to the GO station, for GO Rail to Union Station, and for TTC subway to their office.

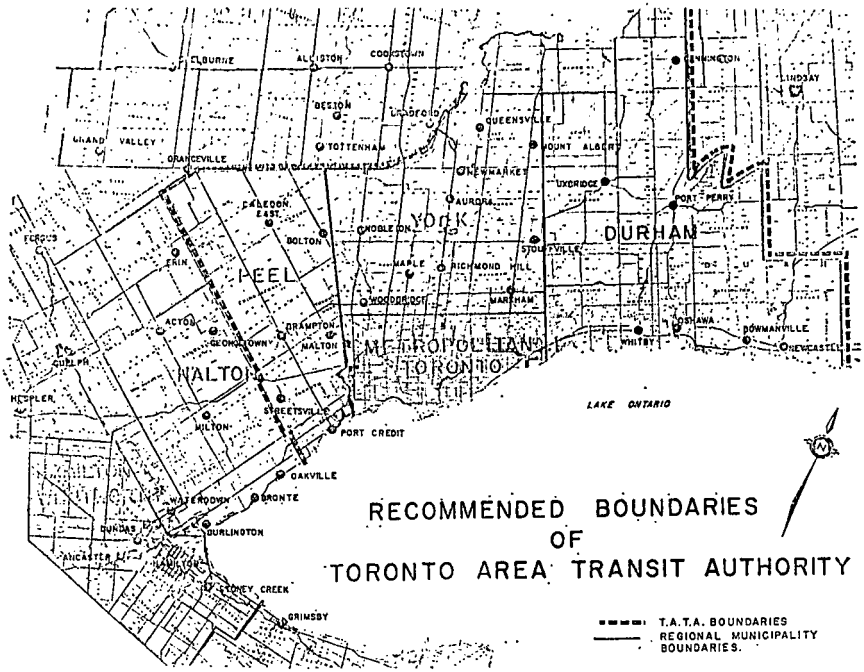



EXHIBIT 1

Chairman MOORHEAD. We would now like to hear from Mr. Willard H. Wattenburg.

Mr. Wattenburg, I hope that you can do as the other two witnesses have done, summarize your prepared statement; and without objection, your prepared statement will be made part of the record.

Mr. WATTENBURG. I most certainly will.

## STATEMENT OF WILLARD HARVEY WATTENBURG, CHIEF SCIENTIST, COMPUTER SYSTEMS DIVISION, COMPREHENSIVE HEALTH SERVICES, INC., SAN FRANCISCO/BERKELEY, CALIF.

Mr. WATTENBURG. Mr. Chairman, I would first of all like to set the stage here for the purpose of my remarks. I am trying to follow what I think is the interest of your subcommittee.

BART truly should be a magnificent system. That is the main thing that troubles so many of us in the bay area. I was one of those who promoted the concept and think it is sorely needed. I have become one of the many taxpayers very much disturbed that for over 6 years, of course, we have had to sit on the freeways, as Mr. Howard so aptly described, and be denied this system.

I am often described as a BART critic, but I think you will find in my statement and the documents I will submit to your subcommittee later on that I don't feel that is a fair statement. I have been a critic of the management for over a year and have had to be the main technical leader of moving them to avoid serious problems, and when they refused to do so actually design the solutions and help them fix those problems.

As such, I think "purely critic" is somewhat of a misnomer. But I will leave that to the subcommittee's judgment.

My main purpose, sir, is to suggest to Congress and to your subcommittee some things that I think are of immediate necessity right now to try to avoid the kinds of problems and the impressions that have been created by BART for the benefit of mass transit in this country.

BART, among the technical communities, the knowledgeable people, scientists, technologists, and those who support me, the very well-known men who encourage me to get involved in this, find it somewhat ludicrous for what has happened in terms of representing our great technological resources in this country.

And in California we know quite clearly the attitude in mass transit has soured substantially. Probably the true tragedy of BART is not the delay and the excessive costs that continue to mount, but the sour taste in the minds of the people who should be encouraged to promote more mass transit.

We have now in California an initiative to try to divert large amounts of the highway funds to mass transit for other areas such as Los Angeles, but even in Los Angeles now there seems to be such a concern about getting into a BART-like transit system that the last I heard buses are the most favorable concept. That we believe to be the tragedy.

To set the stage for the rest of what I will say and suggest, the State Legislature of California, one which I think many respect as a professional legislature, has spent 2 years of evaluating the claims and proposals of the BART management, waiting, investigating, very, very thoroughly, and recently completed a series of 10 hearings and investigations. The legislative analyst's office of the State of California, the equivalent of the General Accounting Office of the United States, recently issued a report that sufficiently disturbed the key members of the California Legislature that they took the extraordinary action of signing a resolution to the effect there would be no more State tax moneys for the bay area rapid transit district, even if it must stop, until the management is changed and responsible fiscal and project management is found.

That, sir, is why I am here.

At this point, the item I would like to focus on is simply this. The responsibility of the U.S. Department of Transportation, because at the present time the U.S. Department of Transportation is in a position to subvert the wisdom of the California Legislature by continuing to supply funds to this same management, and that is BART's only recourse at this point and they are receiving those funds under circumstances which I believe border on being illegal.

I will describe one that I think is relevant to the subcommittee and I have brought the documents with me from the State legislature inquiries which I would like to submit to your subcommittee. The whole purpose, I will restate again, is to do what I think to be the

most reasonable and rather unemotional thing for even a taxpayer to request, and that is that Congress would immediately have the General Accounting Office review these investigations and the present funding applications that are now being approved by friends of BART in UMPTA without any auditing or knowldege of the details of what has happened and what is now happening. This has been shown in the last 3 weeks.

Well, I guess I should describe to you the sequence of events that account now for why BART is dead in the water and will be for 2 years, 2 years more before you see any routine full scheduled operation. They will get across the Transbay tube sometime next year, probably in, I would guess, February or March.

September 1974 as shown to you in Mr. Clement's report here is facetious, to be kind. I have to remind this subcommittee, if you are not familar with it, that this is the 12th such projection for the beginning of routine Transbay service.

The first, the State legislature was promised in 1969, and then came a series of six projections thereafter, and when the technical problems were disclosed and fully disclosed to BART and solutions offered them and they refused them, their projection then was September 1973. That went to December 1973. That went to January 1974, that went to July 1974. It is now September 1974. And yet, sir, in the hands of the U.S. Department of Transportation people is a recent change order that is critical, it depicts the technical problems. That change order implements the specific solution I gave to BART last fall and the contractor there will not guarantee to complete this installation until the end of October 1974, and it is at least 2 months after that before the State PUC will approve any operation without testing, and yet still you have testimony here before you, as the State legislature did for years and years—they just blew their lid a few months ago—it is going to be September 1974.

This is what I and many other responsible scientists and public officials and a great majority of the people in the bay area are absolutely disgusted with.

To bring you up to date, it will be about 2 years before it achieves the best it can achieve in routine operation, but because of now known technicalities or optimism in certain design features of the system it will probably never achieve the operating schedules that were promised. It will achieve some good operations but it is at least 2 years away.

There will be a champagne flight, as we have come to call it in the bay area, of trains going through the Transbay tube, that is how they have been used in the past for officials and visiting dignitaries, but to run the trains in any way that the Southern Pacific Railroad or Penn Central Railroad runs, is not possible until beginning next year, and there is so much to be checked out it is at least another year after that. This then will be 6 years after the reasonable starting date. It is the comparison with other systems such as Toronto and the Lindenwold Line in Philadelphia which so many people in the bay area have seen and ridden on that and that causes this concern.

Now, the history of this one is as follows: In September 1972, shortly, there was a hearing at the State senate in Sacramento on the subject of why the accident in Fremont, in which one of the transit vehicles went off the line.

At that hearing I was requested by the State legislative analyst office, the equivalent of your General Accounting Office, to try to arbitrate differences of opinion between the State's engineers and BART's engineers. The State's engineers found some superficial criticism of the automatic train control system, very superficial compared to what is known now.

The BART management response was to defy the State legislative analyst office and prove they were incompetent. I was called in to testify for the State after reviewing the documents. When I looked at the design of this most critical electronic control system, and you realize BART cannot do anything without it, I was appalled. Appalled because I am one of the six men who, let's say, founded this technology of the use of the digital computers and digital circuitry in critical control systems to safeguard human lives, such as in the Apollo project. At least half of the critical backup and safeguard electronics were missing. It was a naive design. Everything would work like clockwork but nobody thought about what happens if something goes wrong. I warned BART at that point as politely as possible in writing, with a solution or approach that should be embarked upon immediately with the suggestion that they get outside experts in immediately.

The response at this point was to attack my character. The BART general manager brought in representatives of the contractors, scientists on the contractor's staffs, who represented to the State legislature that we outside scientists did not understand this system because "there were only 10 men in the world who understood this most sophisticated electronic design."

That is how I became involved in this.

I saw a defiance of elected authority and misrepresentation of technology that I found appalling, and many other scientists, colleagues of mine, who heard about this encouraged me to stay in there.

From that point the management refused to even ask an outside expert anywhere to come in. They formulated their own solution to their technical problem of the electronic system not working. It was a problem that the conductivity between the wheels and the rails had been assumed to be something very nice and simple and they designed a system around it and Mother Nature wasn't that kind.

Well, they came up with a solution that most of the technical world now knows about as a buzz word, wheel scrubbers. Their solution was to install iron wheel scrubbers on all of these half-million-dollar very sophisticated transit cars to scrape the rust off the wheel so the electronic system could work. They refused to budget and acknowledge the existence of a problem or look at an alternate solution that would not have cost more than $3,000 for almost 1 year until that folly came to a brutal end when the State public utility commission issued a cease-and-desist order stating they would not even test the results any more.

In October of 1973, BART panicked. In a sense they were dead in the water, no solution, no schedules. At that point the board of BART, a long-time strong supporter of the management, with six others, asked me if I would help. I offered them a solution and explained it to them and this came about with encouragement and help of many other well-known scientists around the University of California and AEC laboratories. At that point I began working with the BART staff, the assistant general manager and chief engineer. And I suggested

that they call in a corporation called Stewart-Warner Electronics Co. in Chicago, Ill., which was the only contractor in BART to deliver electronic equipment that was working on time as scheduled, as promised, because they happen to have the key to a solution to the train control problem. Their electronics could be used to oversee the Westinghouse train control equipment that did not work, or something similar to it could be installed.

Stewart-Warner Corp. spent approximately 2 months with the BART engineers in meetings which I attended and at times had to unofficially chair, and developed a solution for BART using small microcomputers that would be installed in each of the stations to oversee the electronic equipment that was already there that wasn't working properly.

Stewart-Warner submitted a fixed-price guaranteed proposal to BART to install that equipment beginning early December 1973 on a panic basis with their best crews, and I remind the subcommittee, as you will see in the documents I will give you, Stewart-Warner is fairly well respected by the Pentagon for doing similar work so well you never hear about them. That is rare. And I have had a great deal of experience in that, if you look at my credentials. As a member of the U.S. Scientific Advisory Board I have been through the aerospace game for many years.

They submitted that proposal on a Friday afternoon, fixed price, $800,000, to install it in 6 months with their best men.

They were sent home that afternoon by the BART management and its new chief engineer, who was formerly an engineer with DOT. On Tuesday morning the following week I was invited to the office of the chief engineer with the assistant general manager, who is running the show really, and was essentially told all right, you win, you are right technically, but stay out of our hair as far as how we are going to do this, and they announced the decision to me at that point and I walked out.

Their decision, in their infinite wisdom, was they would give to their existing contractor, who had been unable to solve this problem, a $1.3 million change order valued on their own judgment. This is not through negotiation.

Five hundred thousand more than a fixed price bid and proposal which they had, and that is what they intended to present to the board and the board was panicked. The board was told this is Christmas vacation, nothing will happen for a month, we can't get this done by July, if you don't sign it now—the same cycle that has been used for over 10 years with this same board and the same legislature. And they approved, open ended, a $1.3 million change order for the existing contractor who got up at the same meeting and stated that they would not be responsible for this equipment and if they were asked to install it. They would put it in but would give no guarantees.

Now, this is May 1974. That change order was finalized last week and, as I understand, UMTA approved the funds with full knowledge of these conditions disclosed to them 3 weeks ago. That grant from UMTA to correct these technical deficiencies is a coverup in the minds of many because it has allowed the BART management and one small group of contractors to avoid having to litigate, discuss or allow outside experts or contractors to look at these conditions.

Now, 3 weeks ago, two engineers for the first time from UMTA showed up and asked a reasonable question after all of the millions that they have given this district with no auditing, no scrutiny and no technical evaluation that they can point to to show you or the public knows about.

Those two engineers were sufficiently disturbed when they discovered these documents of the original Stewart-Warner proposal, the competence of that company, that they were the designers of the solution, and that they were sent home, and never negotiated with, they refused to approve it while they were there. They came back to Washington. In that meeting, however, in the BART board meeting that morning Mr. Stokes, the general manager gloated. (I am sorry to get personal in this case, you need to know the one case that is indicative of the whole cycle) that these young engineers from Washington had been misled with misleading documents and he has just had a telephone call 2 hours earlier from a high official at UMTA who said there would be no problem in having the change order approved, and he mentioned Mr. Premo's name, and this is on the public record. The grant, I understand, last week was approved.

This is the one thing that probably infuriated the California State Legislature and when the legislative analyst began looking at the contracting mechanism throughout the two phases of rolling stock and electronics in BART, you find the same kind of situations time and time and time and time again.

They have never been audited, they have never been reviewed by outside experts, never had the benefit of any technological know-how or project management which has come outside of that crew and UMTA. What I am calling for by describing that one incident to you—it is probably a 3-hour job for any qualified General Accounting Office representative, the type I was familiar with in the Pentagon days, to give you a quick look at the reasonableness of this because somebody is responsible for this.

Now, that gets to my main point, is that I have seen entirely too much of an old boys' club in this game for what little involvement I have had in it. It is a very tight club between some members of the U.S. Department of Transportation somewhere, the administrators of some transit district, most specifically BART, and there is no concern that causes the reasonable checks and balances of audits or technical reviews of any of these things that have proved to be so ludicrous on the facts.

This system is dead in the water today out of personal arrogance and just bland ignorance, not a technical problem. It took 2 weeks to solve the technical problem because it truly is, sir, a very simple electrical engineering assignment to design the solution to that problem.

Now, that is the core of my statement to you. There were other incidents such as this when engineers, responsible men, tried to point this out 4 years ago and were summarily fired. A consultant hired by the board of directors after the first alarming report in September of 1973, was hatched with the aid of someone in the U.S. Department of Transportation. He foretold what is now happening to the trains in January 1973. He issued a report. The board hired him because they didn't know who to believe, management or the State. He issued his report pointing out in the rolling stock, the cars, over 100 had

been delivered and warranties were running, that the quality control and the definciencies in these were such that the expected failure rate would probably be greater than 20 percent, which is appalling in the field.

It is well known the failure rate is over 50 percent of the cars that go out on the track any day to keep 22 cars on the track, which is a fifth or one-tenth of what is needed to run the operation. They probably have to field as many as 50 and 60 cars during the day to keep 22 running out there.

That man, when he issued his report, was attacked by the management, and the BART board president was taken to Washington and in a discussion here in Washington with some official of the U.S. Department of Transportation, the BART board president was told that the board consultant, Mr. Robert Prophet, a respected engineer and scientist for Douglas Aircraft Co., was incompetent. The board president came back in this board meeting in the open and said fire him. When the San Francisco Chronicle queried the board president and DOT as to who said this and where, the answer at the BART end was this would disturb delicate negotiations with our friends in DOT, and on the DOT end, at the Secretary's level, we never heard of Mr. Prophet.

But, nevertheless, Mr. Prophet was destroyed and what he could have done to save a year's $100 million loss to that transit district. That has happened time and time again and there has been enough of it.

I think I am here and I have stayed in this for one reason only: I have nothing to lose. Nobody can take my job away from me. But that is not true of the average scientists or engineers who have seen and witnessed and been involved in this thing, if they work in industry or even in the academic community now, there is intimidation that I consider very serious.

So that is what I am asking this subcommittee to take into account. That cycle. But first and foremost, the verdict has been rendered by the State of California. And the BART management at this point, which is being looked upon as indicative of the kind of management they may inherit in other transit districts on the peninsula and in Los Angeles and elsewhere, at the present time is continuing the same policy in the same defiant stance with the aid of Federal funds from UMTA. That is the only hope.

[The prepared statement of Mr. Wattenburg follows:]

PREPARED STATEMENT OF WILLARD HARVEY WATTENBURG

BART: HOW TO DISCOURAGE MASS TRANSIT IN THE UNITED STATES

Mass transit in the United States could well replace the space program as the next great national endeavor to draw the attentions and exploit the talents of our vast technical resources. But rather than benefitting from the knowledge and experience gained in this country's past ventures into high technology, mass transit has already, in some places, fallen prey to all the familiar evils of the military/industrial complex of the early 60's. I am one of many scientists and engineers who knew first hand the price we paid to gain the knowledge we now refer to as "space technology." I am also one of many who have long found it less than amusing to hear representatives of the Bay Area Rapid Transit System mindlessly attempt to excuse the oversights, ignorance and incompetence that has led to the deplorable state of that project today. To them, all delays are due to unavoidable or unforeseen

problems which are encountered by all miracle workers who are forging new frontiers. I believe I represent many in the scientific and engineering professions in this country who look upon what has been allowed to happen at BART and condensed for years as an insult to our technical accomplishments in this country.

There is no new or mysterious technology in the Bay Area Rapid Transit System. Of that which does not already exist in working form elsewhere in the world, there is only misplaced technology sorely misunderstood and defiantly defended by a public relations oriented management that has now received the censure of the State of California after refusing for years to even acknowledge the warnings of responsible experts and an informed press.

You must consider some of the specifics of this unfortunate experience which has absorbed a billion and half dollars of local tax monies and over a hundred million of federal funds to date without significant auditing or evaluation on the part of the government agencies which supplied these funds. There are simple reasons why this transit system, represented to be the "first new transit system in 60 years," has in fact been the laughing stock of serious minded technical people in mass transit throughout the world, with the possible exception of numerous friends of the BART general manager who occupy public positions that would seem to demand a greater degree of awareness and concern on their part. The events and circumstances of which I will speak are all matters of record in the public files, in carefully researched press reports, or in the record of recent legislative hearings by the State of California that resulted in strong censure of BART management.

The single most important contribution I could make to mass transit at this time is to encourage Congress to seek an immediate investigation by the General Accounting Office of BART's use of federal funds. The state investigations have already done most of the work required to evaluate BART's contract management. I was disturbed to discover last week that engineers from UMTA (Department of Transportation) were not aware of circumstances surrounding BART's latest request for $1.3 million dollars to correct deficiencies in the train control system and yet high DOT officials and personal friends of Mr. Stokes have given routine approval. Mr. Stokes is now seeking millions more from DOT to circumvent the wisdom of the state legislature which has taken the extreme position of refusing more money to a local agency until management is changed.

There is clearly a tight circle of friends among the administrators of mass transit districts, the transit industry and some high Department of Transportation officials.

First the motives of my involvement. I initially became involved in the Bay Rapid Transit System at the request of the Legislative Analyst of the State of California, A. Alan Post, in November 1972. His office is equivalent to the General Accounting Office that serves Congress. At that time, the management of the Bay Area Rapid Transit System was in the process of attacking the integrity of the Legislative Analyst office. This was BART's response to a state report that forewarned of many of the problems and costly delays that have actually taken place. I was called by the Legislative Analyst as an expert witness to support some rather conservative technical criticisms of the automatic train control (ATC) electronics installed in the BART system. In the course of reviewing the technical documents describing that system, I became alarmed at glaring deficiencies in the design and reported as much to the State Legislature during my testimony. I gave the Legislature predictions in writing of technical problems that would delay startup of that transit system by 18 months to 2 years and cost the taxpayers of the Bay Area one to two hundred million dollars in lost revenues and service unless they were corrected immediately. At the same time, I offered free to BART technical solutions to these problems. The solutions now being implemented 18 months later by the BART management are essentially those rejected out of hand by them in late 1972. The BART general manager's response to these disclosures and criticisms was to personally chaperone representatives of the contractors to the State Legislative hearings. The contractor representatives and Mr. Stokes proceeded to attempt to discredit all critics, dismiss both the criticism and the suggestions as politically oriented, and promise the Legislature that BART would be running full schedule by September, 1973 if they, the Legislature, "would get off our backs."

Circumstances to date have shown every one of BART's promises and technical representations to the Legislature in 1972–73 to be false and misleading.

I did not take lightly the blatant technical misrepresentations which were presented to the State Legislature. With the encouragement of officers of the

State of California and highly respected members of the scientific community, I continued to pursue the BART activities at their public hearings throughout 1973 and to the present time. This has required a substantial amount of my own time, but it was given without expectation of business or future involvement in the mass transit industry. I do not intend to give up until such time as there is a measure of responsibility in at least this one transit district for which I and so many other local taxpayers have paid so much and received so little.

A resume of my past technical activities and government service is attached to this statement so that you may evaluate my competence in the areas in which I will discuss. I will note here that I was once considered worthy of influencing the major technical decisions in critical areas of the Apollo project. I was asked to solve major problems in the electronics of the space vehicle. I later served with Dr. Edward Teller and others on the U.S. Air Force Scientific Advisory Board in the review and evaluation of this country's most critical and essential defense systems. I do not feel immodest in discussing the technical merits or lack thereof of some rather parochial earthbound spaceships which today, in spite of seemingly unlimited amounts of money and intolerable amounts of time, cannot as yet be trusted to carry passengers through a clean hole bored beneath San Francisco Bay.

The first and foremost cause of the gross abuse of mass transit funds in BART is the BART management, or more properly stated, the absence of experienced, competent management. Neither the general manager nor any of the top staff throughout the construction phase of this system had any prior project management experience in the critical areas which were supposed to have distinguished this transit system from those built 60 years ago. When the first operational problems became apparent in 1972, it also became apparent that what was thought to be BART management was in fact one of the world's best financed public relations organizations. That situation has not substantially changed to date. The technical and project management of this district was handed over almost entirely to an outside engineering firm whose billings absorbed approximately 10% of the investment in this transit system (130 million dollars plus). This engineering firm is properly classed as one of the contracters for the district, yet there is abundant and appalling evidence that it was in fact running the district in terms of the key technical and contract management decisions that account for the status of the district today. That same firm is not one of the candidates for law suite by the district and yet, to date, BART management is still staunchly defending all significant actions by that engineering firm and the contractors responsible for the inoperative equipment and train control electronics. BART management will say otherwise, but it has been the general manager's firm policy that no legal action should be taken or seriously threatened against these contractors who have held a virtual technical sit-down strike until they were paid and promised more money before they would fulfill the contract requirements that are necessary for the system to run.

If there is truly any exceptional resource developed in the Bay Area Rapid Transit System which could be of value to any other newly forming transit agency, it is the super slick public relations department, personally guided by the general manager who began his career with the district as a publist and continued to rely upon that talent alone for the management of the district. Fair credit should go to the public relations effort of 15 years ago which gained public support for this most needed transit system. Unfortunately, what no one seemed to understand along the way was that neither the laws of physics nor the dictates of common sense will ever be superseded by glib tongue. But the BART organization, nevertheless, has proven that the masters of a local agency with unlimited sums of money can legally subvert and defy elected authority and responsibility. This has now been recognized in the State of California where 20 of the 26 legislatures from the Bay Area have issued an ultimatum to the directors of BART informing the district that it must find responsible management before it will be allowed to spend any more state or local tax monies. Six of the twelve directors who are long time personal friends of the general manager have indicated that the state can go fly a kite as far as they are concerned.

The general manager and his team are once again maneuvering to secure enough federal funds to "tide them over this crisis". They were successful in a similar effort last year when they paid for contract overruns and oversights with millions from UMTA. This grant was supposed to be for capital equipment. Hence, the federal government is in a position of subverting the legislative mandate of the State of California for responsible fiscal management of tax monies. And, if the past is any example, the U.S. Department of Transportation

(DOT) will supply these funds in the name of mass transit when in fact they are doing no more than paying for burial of mistakes that should be exposed as warning to other agencies that will soon be requesting tens of billions of dollars from the federal treasury.

I do not believe that there is a single high official in the U.S. Department of Transportation who has personally investigated and personally understands either the technical or the management causes of the inoperative status of the Bay Area Rapid Transit System. And yet, these high officials, through the act of giving money, are blessing the past and present decisions made by the management of BART.

The absence of experienced and/or involved management at the district level allowed major technical decisions to be made by the contractors themselves. The engineering contractor was supposed to be responsible for all such decisions, but in the case of critical components such as the automatic train control, it is now quite clear that the design decisions and even the detailed specifications were left up to the contractor who sold the system to BART. BART ignored all tested and proven designs and bought a paper design on the basis that if was "space-age and computer controlled". This phase of the BART design and construction guaranteed an outcome similar to what you would expect if the Pentagon had simply drawn a chalkline on an airfield to outline the size of the C–5A and then allowed Lockheed to fill in all the details that they, Lockheed, considered sufficient to justify their low bid.

It is now known that there was only one man in the entire engineering contractor organization was who supposed to be competent in the field of train control electronics. Hundreds of other engineers vere very busy designing the stations, the railways, the excavations and the tunnelling, most of which speaks well for the money spent since the engineers who designed these portions were experienced and competent in their fields. My first meeting with the engineer in charge of the train control electronics indicated that he had never personally set his hands on the type of electronics purchased nor had he ever had any prior experience with electronic systems of this nature. Incidentally, that meeting and subsequent discussion was witnessed by two well known scientists from the University of California, Berkeley. The meeting was arranged at the suggestion of BART management in mid-1973.

Unfortunately, it is also apparent that the contractor's technical team which designed, supposedly tested, and installed this now famous train control system had not tackled a problem of this nature in the past. They built and installed a system with a basic conceptional flaw which is equivalent to designing a theoretically unsinkable ship which, unfortunately, turns out to weight more than an equal volume of water. The entire train control design concept, as actually installed and in place at BART, relies upon a handbook quotation for the electrical conductivity between the wheels and the rails of the transit car. They discovered, after installing $20 million of electronic equipment, that the handbook editor had not consulted mother nature. This most critical parameter for proper operation of the train control and protection system had never been tested under operating conditions before the equipment was finalized and installed. In late 1972, BART and its contractor suddenly discovered that they were the proud owners of what we who design sophisticated electronic systems affectionately call "a gold-plated shovel with a rope handle." You can just imagine the challenge this presented to the public relations teams supported by our tax dollars within BART and its cost-plus engineering contractor.

The above were essentially the conclusions reported to the State Legislature in late 1972 by the state's investigators, a special consultant, the BART Board of Directors hired, Mr. Robert Profet of Douglas Aircraft to advise them. BART management told the legislatures to get off BART's back, told me to go to hell and told the Directors' special consultant to go to Washington, where he was promptly set up for a hatchet job with the aid and support of some friendly official in the U.S. Department of Transportation. A few weeks after Mr. Profet filed his first alarming report, which foretold a small part of what has actually happened, BART management strongly denied his report, recommended that he not be retained, and somehow encouraged the then Board president, Mr. Chester, to relate in public session how he, Chester, had been told by a DOT official that Mr. Profet was incompetent and did not know what he was talking about. Subsequent attempts by the press, in particular the San Francisco Chronicle, to substantiate this official and rather surprising criticism brought forth a statement from DOT to the effect that they, DOT, would in no way challenge the technical criticisms of the BART system made my outside consultants or

technical critics such as myself. Furthermore, the Secretary of Transportation commented that he had never heard of Mr. Profet, the BART Board consultant who was terminated at the general manager's insistence. But evidently some official in DOT had supported the general manager's self-serving opinions of Mr. Profet in the presence of Mr. Chester during a meeting in Washington. The Board president begged off from identifying this official with the excuse that this would jeopardize delicate negotiations between BART and the U.S. Department of Transportation.

The quality control analysis and warnings made by Mr. Profet have turned out tobe the prophetic and amply substantiated by the operating status of the BART equipment during the past year. This was one of the slickest hatchet jobs I have ever seen in my career. Some well paid official in the U.S. Department of Transportation was responsible for this, or some well paid official in the BART organization is a disgusting liar. There are BART officials who, on the record, have qualified on numerous occasions for this title.

It is difficult to overlook the coincidence between this incident and one which occurred around 1970. Two years before the technical problems with the train control system became apparent with the Fremont accident in 1972, two conscientious and competent BART engineers became alarmed and took it upon themselves to report to the BART Board certain technical deficiencies in the "space-age" train control system. They had detected these deficiencies during their work with the train control electronics at the contractors plant. These engineers were personally fired by the BART general manager. They were unable to obtain jobs for almost two years thereafter. If there be any reason why I'm appearing before you today on my own time, it is to show some respect for these men who paid dearly for their sense of responsibility. I understand the Institute of Electronic and Electrical Engineers (IEEE), one of the largest technical societies in the world, is now investigating the injustice that was dealt these men.

So finally we get to the point that all the dirty linen is flapping out in the wind after the Fremont accident and the State Senate hearings in late 1972. BART management has chosen to stand with the contractors and defy any and all critics. BART management craftily eliminated the BART Board's consultant hired to arbitrate the issues and inform the Board. Suddenly, BART management with its engineering contractor and the train control contractor come up with the quicky solution to the train control problems. They promise to correct the few minor troubles that remain and have the system in full operation by September, 1973. The solution to the design flaw in the train control electronics is to install iron wheel scrubbers on all of the super-sleek-space-age-transit vehicles. These wheel scrubbers will scrape the rust off the wheels which in turn will polish the rails which in turn provide good conductivity and thereby allow the fickle electronic system to behave as predicted by the sliderule calculations of some junior engineer who designed the system to begin with.

The wheel scrubber idea may seem humorous to some now, but this was the dedicated effort of the best engineering minds of the Bay Area Rapid Transit System, its engineering contractor, the train control contractor and all the non-existent outside experts which they steadfastly refused to consult under any conditions. They were warned by those who volunteered their technical opinions that this scheme was mindless and was doomed to fail. Nevertheless, it was the only seriously considered technical effort on the part of the BART district for almost nine months. The California State Public Utilities Commission finally notified BART in September, 1973 that the state PUC would no longer even consider the test data from the few experiments that BART was able to conduct up to that time with wheel scrubbers installed on the transit vehicles. It was only at that late date, one year after the initial warnings given BART management, and BART management's glorious promises to the State Legislature, that the general manager would even consider alternate solutions. Up to that time, BART had not spent even a few thousand dollars to explore and have ready alternate solutions. However, they had been spending millions of dollars of local tax monies and federal funds obtained from DOT to substain the district and supposedly carry out these corrective actions. DOT officials were fully aware of what was going on and being supported by the federal funds they supplied to BART. They sent their engineers from the Cambridge Research Center to BART early in 1973. None of them cast a serious shadow of doubt or offered a public word of wisdom on the BART problems or activities.

Why were there no warning from the DOT engineers sent to study the train control problems in early 1973? It is interesting to note that the head DOT

investigator, Mr. William Rhine, was offered a job by the BART general manager at some time during 1973. Mr. Rhine became BART's new Chief Engineer in October, 1973.

In October, 1973, the defiant numbers on the BART Board of Directors, including the then President of the Board, Mr. Chester, were willing to listen to suggested solutions for the train control problem. I explained and demonstrated a scheme to the Board of Directors which utilized existing small computers in the local stations along the BART system to supplement and back-up the train control electronics. The Board encouraged pursuit of this proposal and, at my suggestion, invited Stewart/Warner Electronics, Chicago, Illinois, to send their top engineers to BART for the purpose of meeting with the BART engineers and refining a solution to the train control problems. Almost instantly, BART's engineering contractor and other consultants came forth with proposed electronic solutions of their own. However, it should be remembered that these same groups had insisted that no additional back-up electronics would be needed and that the wheel scrubber scheme would be adequate.

By early December, 1973, BART had had the collected wisdom of Stewart/Warner Electronics, its engineering contractor, a group of scientists from the University of California, engineers hired by the State Legislature and its technical critics. A back-up electronic system utilizing micro-computers to double check the Westinghouse train control electronics was recommended to the BART Board.

Now comes the lulu. BART management, in its infiinite wisdom, decided that the additional electronic back-up system required could best be installed by the existing contractor, Westinghouse Electric Co. However, the design I suggested and now actually being installed was refined and specified by Stewart/Warner Electronic Co. engineers who have enjoyed an enviable record in this field for many years. Furthermore, Stewart/Warner provided BART with a fixed-price proposal of less than $800,000 for the installation of the complete back-up system within 6 months time. BART management without negotiation with other contractors decided that the job was worth 1.3 million dollars to Westinghouse because "an unspecified amount of system engineering would have to be done to complete the task". No negotiations with Stewart/Warner were undertaken or attempted by BART management, nor was the Board of Directors of BART informed of the fixed-price proposal and delivery schedule submitted by Stewart/Warner Electronics before they were summarily sent home by BART management one week before the decision to give to Westinghouse was recommended to the BART Board of Directors. All of this recently came out in State Senate hearings. The embarrassing documents which substantiate this absurdity are a matter of record. They were obtained under subpoena by the State Senate Committee, Senator Alfred Alquist, Chairman of the Senate Public Utilities Incorporations Committee.

Now over 5 months after Stewart/Warner was prepared to commence work immediately, BART is finally prepared to sign a contract change order with Westinghouse for the implementation of the same solution and Westinghouse is of late quoting October, 1974 for installation of the train control back-up electronics. At least another two months will be required to test the additional electronics and obtain approval from the California Public Utilities Commission. In the meantime, BART represents a dead loss of $10 to $12 million a month to the taxpayers in operating expenses, investment and lost revenue.

These are but a few of the absurdities that I have witnessed take place and fought with all the rhetoric and technical know how at my command. I successfully predicted the outcome of each and every one of these foolish endeavors and put such predictions in writing well in advance. To date BART management and the defiant six Board members will still reject without comment any warning or technical prediction that is offered to them by anyone outside their inner circle. The idiocy that they have encouraged and blessed can only be dressed in the trimmings of reality by assuming an unseen strategy is being followed. And indeed there is. I recognized this quite early in the game just as would anyone who was around during the days of the statutory rape of the virgin generals in the Pentagon by the Aerospace Industry.

The primary objective of the BART management has been to avoid at all costs any public or legal confrontation over the train control boondoggle which would place any of the BART management, engineering contractor, or Westinghouse people under oath. Dirty linen will be flapping in the wind in all directions if some authority begins investigating the origins of the decisions to purchase this

untested and untried train control system and the interrelationships between BART management, its engineering contractor and Westinghouse. I have no knowledge on any illegal acts or money changing hands anywhere. However, as was well learned in the Pentagon days, men in high positions can ill afford embarrassment that jeopardizes their careers. This I believe is the primary incentive that explains all this foolishness. I would not be surprised to find, a few years from now, that members of this inner circle have all moved jobs within the circle. BART's engineering contractor has already moved to other districts and most of the other contractors will be there in one form or another.

I hope that the embarrassment suffered by all levels of government over the BART boondoggle will encourage some thinking along the same lines that brought safeguards in the military and space age procurement programs. It seems to me that this should be one of the primary concerns of the U.S. Department of Transportation. Right now DOT has the difficult job of explaining why millions of dollars of federal funds were supplied to BART to construct a test track and test the various automatic train control systems to be considered. Why was a train control system that had not been tested on that facility selected by the Bay Area Rapid Transit System? Why are federal funds still being used to patch up this glaringly deficient train control system even as late as 1974? What has DOT done to assure that this kind of thing will not happen again in the future with the vast sums of money that are now being administered by DOT? This country went to the moon on schedule because experienced, competent men in the National Space Agency thought about these problems before they occurred. The taxpayers of this country deserve to know that they will be able to get across town without paying twice for this kind of experience.

NASA established independent scientific and technical advisory groups which reported directly to NASA headquarters on the feasibility and reliability of the equipment which was purchased by the Space Agency. It occurs to me that the Department of Transportation would be well advised to take this same route before billions of tax dollars are handed over to local adminstrations, each of which may reinvent the wheel in the course of building its own transit system.

I got a glimpse of the problem within DOT just last week. An engineer from DOT arrived in the Bay Area to review BART's request for federal funds to pay for the $1.3 million change order to Westinghouse for the train control fix. The DOT engineer, Mr. Jack Anderson, became alarmed after asking a few questions concerning the events surrounding this change order as I have described it above. At a BART Board meeting, I commented to the Directors that BART management might have some difficulty in convincing DOT that this was proper use of government funds. I suggested that BART might not have fully informed DOT of all circumstances, in particular the fixed-price proposal from Stewart/Warner Electronics. Mr. Stokes, the BART general manager immediately responded that "he had just learned in the past two hours that some young members of the DOT team had obviously been misinformed and given misleading documents". Then, obviously for the benefit of BART directors and the public, the general manager tossed out the names of some high DOT officials who would most assuredly correct these misinterpretations. One mentioned was Mr. Primo. The visiting DOT engineers who were attending the public Board meeting were sufficiently intimidated to flee the scene. I don't think I'm alone in my curiosity as to who runs the U.S. Department of Transportation? It appears that they run whenever Mr. Stokes growls.

This then, gentlemen, is why I long ago dubbed BART as the "West Coast Watergate on Wheels". And incidently, you should not feel too slighted by Mr. Stokes' refusal to testify before you today. With the strong support he has enjoyed in Washington, he has had no qualms about snubbing the most respected authorities in the State of California.

Chairman MOORHEAD. Thank you.

The major purpose of this subcommittee is not an auditing committee but if we are going to judge a system so that we can encourage its use in other cities we should know if defects have been found and management makes this system look worse than it should. You have made some charges that do involve the Department of Transportation. I want to afford Mr. Clement an opportunity, if you so desire to make a comment. Our main purpose is not to investigate the Bay Area Rapid

Transit System except as it would reflect on future situations in other cities and recommendations that this subcommittee would make to the Congress.

Mr. CLEMENT. Well, Mr. Chairman, I assure you it is certainly not our intent to have that kind of forum here either. I can honestly say I will have to defer to our Urban Mass Transit Administrator, Mr. Herringer, on all of the specifics of the point that Mr. Wattenburg has made. I am totally unfamiliar with them. My role here, as you know, is to be a spokesman relative to the BART impact program and doctor, I honestly am not aware of the specifics that you make.

Chairman MOORHEAD. Fine.

Mr. Wattenburg mentioned Mr. Premo in his testimony and you said you had a Mr. Premo with you. I don't know whether they are the same Mr. Premo.

Mr. CLEMENT. They are the same.

Chairman MOORHEAD. I would only say that I would afford him the opportunity to make a comment, but he should feel no obligation to do so.

Mr. CLEMENT. I beg your pardon. He is not here. I thought he was going to be here but he had to go to New York today with Mr. Herringer.

Chairman MOORHEAD. I think we should take Mr. Wattenburg's statement and give it to Mr. Herringer with the opportunity to set the record straight, as he sees it; and I will place the response in the record at this point.

[The following response by Mr. Herringer, with attachments, was subsequently supplied for the record:]

RESPONSE OF HON. FRANK C. HERRINGER TO CHAIRMAN MOORHEAD'S INVITATION FOR COMMENTS ON WILLARD HARVEY WATTENBURG'S TESTIMONY

DEPARTMENT OF TRANSPORTATION,
URBAN MASS TRANSPORTATION ADMINISTRATION,
*Washington, D.C., September 4, 1974.*

HON. WILLIAM S. MOORHEAD,
*Chairman, Urban Affairs Subcommittee,*
*Joint Economic Committee,*
*Washington, D.C.*

DEAR MR. MOORHEAD: I appreciate the opportunity to offer comments on the remarks of Dr. Willard Wattenburg before your Committee, specifically as they relate to Federal funding of the new Bay Area Rapid Transit District (BART) system in the San Francisco region.

Essentially Dr. Wattenburg expresses concern about the lack of reliability of the new BART system and the nature and extent of Federal review of BART actions.

While I agree that BART has experienced a number of problems in bringing its total system into full operation, BART is making considerable progress in resolving its technological obstacles. In fact, BART is expected to initiate through service between Oakland and San Francisco next month. Once this critical segment of the regional BART system is in service, the Bay area should be able to begin realizing the full benefits of its rapid transit system, paid for in large measure (80%) with non-Federal funds.

Following are comments on points raised by Dr. Wattenburg:

GAO AUDIT OF BART

The prerogative for initiating a GAO audit rests, of course, with the Congress. I can assure you, however, that UMTA has closely monitored the use of Federal funds provided to BART under its capital grant program. We review grant requests, contracts for construction and equipment purchases and requisitions

for payment. The several audits by both DOT and GAO of BART have revealed no inappropriate use of Federal funds.

DOT REVIEW OF BART ACTIONS

Dr. Wattenburg cites examples of supposed "coersion" of UMTA employees during a visit to San Francisco. I would point out that the engineer with whom Dr. Wattenburg spoke had only recently joined UMTA and was in the Bay area for a routine orientation visit to BART, as well as to the San Francisco Municipal Railway (MUNI) property. Moreover, at the time of his visit the $1.3 million change order cited by Dr. Wattenburg was still under consideration and review in Washington and had not, as Dr. Wattenburg implies, been given "routine approval" by DOT officials.

On the broader subject of high-level review of the BART system, several of my staff and I have followed developments relative to the BART system as they occur. In order to better ascertain the nature of certain technological problems being experienced by BART and other rapid transit systems, the Department's Transportation Systems Center evaluated BART's automatic train control and system safety. We shared our conclusions with BART and continue to monitor their progress closely.

I am unable to comment in any way on Dr. Wattenburg's references to Mr. William Profet, since I am not acquainted with this situation.

$1.3 MILLION CHANGE ORDER

Dr. Wattenburg alleges possible laxity in UMTA's review of a $1.3 million change order executed between BART and Westinghouse Electric Company. UMTA devoted considerable time and effort to a thorough evaluation of the request. The proceedings of UMTA's Third Party Contract Review Board, which was established specifically to deal with matters of unique technical, contractual, and financial complexity, are attached and serve to document the basis for our decision to concur in BART's selection of Westinghouse to implement the change order.

Considerable interest was evidenced in the Bay area following your May 13 Subcommittee hearing. I am attaching a copy of remarks made by Dr. B. M. Oliver, Vice-President of Research and Development for the Hewlett-Packard Company and a former consultant to the California Legislative Analyst. Also attached are comments by John C. Beckett, Chairman of the Metropolitan Transportation Commission, the nine-county transportation planning agency for the San Francisco Bay area. These remarks are in marked contrast to those offered by Dr. Wattenburg before your Subcommittee.

Once again, I appreciate this opportunity. Please let me know if I can be of further assistance.

Sincerely,

FRANK C. HERRINGER.

Attachments.

DEPARTMENT OF TRANSPORTATION,
URBAN MASS TRANSPORTATION ADMINISTRATION.
*May 9, 1974.*

Subject: Third-Party Contract Review Board (CA-03-0069).
From: Third-Party Contract Review Board.
To: Acting Associate Administrator for Capital Assistance.

The Third-Party Contract Review Board received and reviewed a proposed contract amendment between BART and Westinghouse Electric Corporation. The review was completed on May 9, 1974. The following individuals, including all members of the Board, participated.

Sallyanne Payton—Acting Chairman.
W. H. Boswell—Member.
W. H. Lytle—Member.
R. Lopez—UCA Representative.
J. Anderson—UCA Representative.

The proposed contract is a fixed-price amendment to an existing contract. Total cost of the amendment is $1.3 million. The scope of services include a train control and communications system for the BART.

Based on data submitted, discussions with BART management and the attached letters, the Board concurs in the amendment.

SALLYANNE PAYTON.

DEPARTMENT OF TRANSPORTATION,
URBAN MASS TRANSPORTATION ADMINISTRATION,
*May 9, 1974.*

Subject: Synopsis of Third-Party Contract Amendment Between BART and Westinghouse (CA–03–0069).
From: UAD–7.
Thru: Associate Administrator for Administration, UAD–1.
To: Acting Chairman, Third-Party Contract Review Board, UCC–1.

1. *Amount of Contract.*—$1.3 million.

2. *Type of Contract.*—Negotiated fixed-price amendment to a formally advertised contract.

3. *Scope of Services.*—Installation of a Train Control and Communications system for the BART.

4. *Comments.*—There are a number of aspects of this amendment that need to be discussed in order that a decision can be made on a reasonable basis. The most important aspect of the amendment is the fact that it deals with services that are essential to the through-tunnel operation of the BART system and, as such, a delay in implementation is estimated to cost the system $1.5 million per month in lost revenue. A second item is the fact that an individual purporting to represent a citizen's group has alleged that a firm other than the selected contractor proposed to perform the necessary services at a lower cost. As a result, the amendment is a part of or is intended to be a part of a taxpayer's suit against BART. A third factor is the lack of a definitive cost-and-price analysis and no limitations on profit. As a matter of fact, the original submission of the $1.4 million amendment. A fourth factor is the fact that a great portion $900,000 of labor. While other elements had a lesser profit, this was the bulk of the $1.4 million amendment. A fourth factor is the fact that a great portion of the work has already been accomplished.

As a result of the issues noted above, more than a day of intense negotiations were conducted with the BART Assistant General Manager for Operations, et al. Those issues have now been resolved to the extent that I feel they can be resolved without adversely affecting completion of the work and thereby making the issues more important than the work.

While BART did bring in Stewart Warner for an evaluation of a different approach to implementing a train control system, and Stewart Warner made several other suggestions for accomplishing the job, BART management recommended to their Board of Directors, and the Board approved the train control work as an amendment to an existing contract with Westinghouse.

Being able to review the actions after the fact, I can see many actions by BART that could have been handled differently. However, they were irreversible at this stage and the only viable solution was to obtain written statements from BART officials of their intent at the time and an opinion from BART counsel that all their actions on the amendment were legal and met the requirements of the State of California.

The two attached letters cover the issues involved and should document the Board minutes to show the following:

1. There was a management decision by BART that a sole-source procurement was the only feasible method by which the train control system could be accomplished in the manner in which it was required and within the time constraints. The sole source was justified by BART on the basis that Westinghouse had installed the original control system and they were still working. To bring anyone else in would delay the project and weaken the case against Westinghouse which contends that the control system was a part of the original contract.

2. That Stewart Warner's relationship to the control system, i.e., they were technical advisors, not bidders or proposers.

3. That much of the work has now been accomplished and it is not possible to go back and renegotiate the profit at this stage. However, since the engineering hours have been analyzed and found to be reasonable and the original contract was negotiated downward from $1,483 million to $1.3 million, the profit is no longer as unreasonable as first submitted. In fact, if the estimates are realistic, the profit could fall within UMTA guidelines.

The above comments, along with the attached letters, give a brief summation of the actions to date. I recommend approval of the amendment as the most feasible approach to successful accomplishment of the needed services.

W. H. LYTLE.

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT,
*Oakland, Calif., May 9, 1974.*

Subject: Project No. CA–03–0069, Contract No. 1Z2011, Automatic Train Control and Communications, Change Order No. 176—Westinghouse Electric Corp.

URBAN MASS TRANSPORTATION ADMINISTRATION,
*Department of Transportation,*
*Washington, D.C.*

GENTLEMEN: In answer to the following questions raised by UMTA, i.e.:

1. It has been alleged that a proposal was made by a firm other than Westinghouse purporting to offer to perform the services for considerably less than Westinghouse's offer.

2. A memorandum from Stewart Warner Corporation Burns to Potter indicated that 'proposals' had been made and discussions held with BART that would adequately accomplish the needed changes to the system.

While BART negotiated a professional services' contract with Stewart Warner Corporation, the contract and the alleged "proposals" were in no way considered to be an attempt by BART to obtain competitive bids for the needed services. Instead, the services performed by Steward Warner Corporation and the information furnished was intended to provide information on the feasibility of alternative technical solutions.

Given the background information furnished by Stewart Warner Corporation and others, BART reviewed the alternatives and decided that the urgent need to implement the modification together with the fact that Westinghouse was responsible for designing and installing the basic system would make it impractical to award a contract to some other contractor.

Another aspect of the contract questioned by UMTA is the reasonableness of costs and profit associated with the change order. The costs have been reviewed in detail and our engineers have determined that the estimated hours are reasonable for the tasks involved. In addition, the original change order cost proposal was $1,483,724. That figure has been negotiated down to $1.3 million. This reduction, with the estimate that the engineering hours are reasonable, places the estimated profit within limits acceptable to UMTA.

An effort has been made to include a 12% "limitation on profit" clause in the change order, but it is my opinion, based on the statement of the Westinghouse-BART Train Control Project Manager yesterday, that insistence on the inclusion of this clause would result in breakoff of negotiations and a failure to obtain the needed services from Westinghouse. In an effort to avoid further delay, and be responsive to UMTA concern for the total cost, we have negotiated a clause in the change order with Westinghouse providing for refund should labor hours or materials and equipment costs prove to have been overestimated.

A clause authorizing UMTA to audit the costs is included in the change order. We believe that an appropriate cost-and-price analysis has been made, the price is fair and reasonable, and that proper contractual safeguards are provided.

Very truly yours,

LAWRENCE D. DAHMS,
*Assistant General Manager—Operations.*

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SAN FRANCISCO BAY AREA
RAPID TRANSIT DISTRICT,
*Oakland, Calif., May 8, 1974.*

Subject: Project No. CA–03–0069, Contract No. 1Z2011, Automatic Train Control and Communications, Change Order No. 176—Westinghouse Electric Corp.

URBAN MASS TRANSPORTATION ADMINISTRATION,
*Department of Transportation,*
*Washington, D.C.*

GENTLEMEN: You have asked whether the District had an alternative to requiring Westinghouse Electric Corporation to perform the work involved in furnishing & installing the Sequential Occupancy Release System by means of the subject Change Order to BART's contract with that Company.

An alternative would have been to draft specifications describing the work so that competitive bids could have been invited by advertisement in accordance with Section 28990 of the California Public Utilities Code[1] which requires in relevant part:

The . . . construction of facilities & works, when the expenditure required exceeds three thousand dollars ($3,000), shall be by contract let to the lowest

[1] All citations are to that code.

responsible bidder. Notice requesting bids shall be published at least once in a newspaper of general circulation, which publication shall be made at least ten (10) days before bids are received.

PB–T–B, the District's professional engineering consultant, advised BART by letter dated December 5, 1973 that:

If it is necessary to public bid this work, it will require 6–9 months to prepare contract documents, advertise and award a contract for this work.

"Proposals" relating to this work which were submitted to the District by Stewart-Warner Corporation prior to December 12, 1973 when the District authorized the preparation of a change order requiring this work of Westinghouse under that Company's existing automatic train control contract with BART were not acceptable as a legal matter since (1) they were not submitted in response to an advertisement for bids for this work as is required by Public Utilities Code Section 28990 (above), and (2) they lacked definiteness and certainty in terms of describing the work to be done and the conditions governing performance.

We have reviewed the Change Order No. 176 to the District's contract with Westinghouse Electric Corporation and confirm its legality under State and local law. Section 28990 does not detract from the legality of the Change Order.

Very truly yours,

MALCOLM BARRETT,
*General Counsel.*
THOMAS JACKSON,
*Associate General Counsel.*

Mr. WATTENBURG. I hope you appreciate I was not trying—my purpose is I think the impact is the most important thing and the impact, to summarize again, the impact on other people that this has had that probably is more significant than any superficial studies of BART now while it is in this transient state, particularly of ridership and effect on communities.

The impact and effect of support for mass transit elsewhere is my final statement as I believe that is the serious problem and on this end and the Federal Government end, that I have seen almost nothing of the controls and the scrutiny and the planning and the guidance that characterize our space program, which is so often used as an analogy of this great frontier being faced in mass transit. That is what concerns me. We would still be trying to get out of Huntsville, not only the Cape Kennedy or Moon, we would still be trying to get out of Huntsville if the show was run the way the mass transit funding has been given to BART in a particular way and there is so much technology and so many qualified personnel that could form these same review groups at the funding agency level that are independent of local politics. That is what I am pleading for, sir.

Chairman MOORHEAD. Are you familiar with or have you studied any other system such as the Washington Metro system?

Mr. WATTENBURG. I have many friends from the Space Agency in my military days who were involved in the Washington, D.C., system I have not studied it. I simply have not had time. To be fair, I have only been able to spend about 4 or 6 hours a week on this subject, but the most telling indictment is that in 4 or 6 hours a week, if you are marginally competent in this field you can figure out everything that the BART people have done for the last month and are going to do for the next 2 months.

Chairman MOORHEAD. Mr. Clement, are you doing any other impact studies? When I say you, I mean the Department. For example, Washington, D.C., or any bus system?

Mr. CLEMENT. Yes, sir, some is being done under the UMTA R.D. & D. program, so-called research, development, and demonstration program. The specifics of what is being done here in Washington I can't speak to, I would be glad to submit for the record the steps that are being taken in connection with the system here.

I was interested in Mr. Howard's comment about Dial-a-Ride. We have among other demonstrations a Dial-a-Ride project not in connection with a transit system. If you would like I will submit a description for the record.

Chairman MOORHEAD. Yes; maybe you could make those very brief descriptions, just enough so that we can decide whether we want to go into them in further detail.

Mr. CLEMENT. When would you like this, Mr. Chairman?

Chairman MOORHEAD. Within 30 days.

Mr. CLEMENT. All right.

[The following information was subsequently supplied for the record:]

Over the past few years, primarily through UMTA's Transit Technical Studies Program and other DOT planning programs, DOT has fostered a number of studies of the METRO System. The attached exhibit presents a summary listing of current METRO studies. These studies include both short and long range planning and technical studies at the regional and subregional levels.

While these past and ongoing studies address the *predicted* impact of the METRO System, the Department has also sponsored and will continue to sponsor data collection and analysis efforts essential to the quantitative *measurement* of the impacts of the METRO System on the environment, travel behavior, land use and urban development, and many other aspects of life in the Washington Metropolitan area. We have met several times with local officials on this matter as we jointly gear up for the METRO opening. The METRO impact activities will closely parallel and build upon the findings of the BART Impact Program.

EXHIBIT

SUMMARY OF ACTIVITIES IN STUDYING THE WASHINGTON METRO SYSTEM

| *Program Element and Project* | |
|---|---|
| *1.0 Long Range Regional* | |
| *1.2* Transit | |
| 1.2.1 Adopted Regional System Additions | WMATA/COG. |
| 1.2.2 Study of Transit Benefits to the Community | WMATA. |
| *2.0 Multimodal Subregional* | |
| *2.1 Station Impact Studies (SIS)* | |
| 2.1.1 Montgomery County | M-NCPPC. |
| 2.1.2 Prince Georges County | M-NCPPC. |
| 2.1.3 Northern Virginia | NVPDC. |
| 2.1.4 District of Columbia | D.C.OPM |
| 2.1.5 Federal Interest | NCPC. |
| 2.1.6 Coordination | MWCOG. |
| 2.1.7 Rockville | Rockville. |
| 2.1.8 METRO Extension Impact Study | M-NCPPC/NVPDC. |
| *2.2 Station Access Studies (SAS)* | |
| 2.2.1 Montgomery and P.G. Counties | MD. DOT. |
| 2.2.2 Interim Access—Silver Spring Station | Mont. Cty. DOT. |
| 2.2.3 Virginia | VDH/NVTC/COG. |
| 2.2.4 District of Columbia | DCDHT/DCOPM. |

*3.0 Short Range Regional*

*3.1 Transit*

| | | |
|---|---|---|
| 3.1.1 | Improvements to the Existing Transit System. | MWCOG. |
| 3.1.2 | WMATA Technical Services_____ | WMATA. |
| 3.1.3 | Bus Transit for the Elderly and Handicapped. | WMATA/COG. |
| 3.1.4 | Transit Impact in Public Safety__ | MWCOG. |
| 3.1.5 | Overall Program Coordination and Administration. | MWCOG. |
| 3.1.6 | Education and Training Requirements. | MWCOG. |

*4.0 Short Range Subregional*

*4.1 Transit*

| | | |
|---|---|---|
| 4.1.1 | Study of New and Expanded Transit in Northern Virginia. | NVTC. |
| 4.1.2 | Transit Cooridor Study in C.C____ | D.C. OPM. |
| 4.1.3 | Internal Transit for Greenbelt, Md. | Greenbelt. |
| 4.1.4 | Transit Improvement Study in P. W. County. | Prince Wm. County. |
| 4.1.5 | Internal Transit for Bowie, Md___ | City of Bowie. |
| 4.1.6 | University Transportation Study_ | MWCOG. |
| 4.1.7 | Bus Lane Studies, Md. DOT_____ | MD. DOT. |
| 4.1.8 | Bus Lane Study—D.C_____ | D.C. DHT. |
| 4.1.9 | Dial-A-Ride _____ | Arl. DOT/Arl. Pub. Ut. Comm. |
| 4.1.10 | Crystal City People Mover Feasibility Study. | Arl. DOT. |
| 4.1.11 | Commuter Rail Improvement Program. | Md. DOT. |

Chairman MOORHEAD. Congressman Widnall.

Representative WIDNALL. Thank you.

First of all, I want to join in thanking you all here on the panel for the information you are giving us. It is the very important beginning of some of the new work we are doing in connection with our own mass transit problems throughout the United States.

Mr. Wattenburg, I think what you have said is so important. I feel it is incumbent upon the Congress to get into this, not only at this hearing, but to get down to the bottom of it, including who is establishing the policy and what the policy has been. The situation which you have described this morning is most disturbing to those of us concerned with solving the problems in the transportation system.

Mr. Howard, I have just one question. You have mentioned the operating deficits of your system. Of course, such deficits are greatly affected by labor costs of running any rapid transit system. Could you compare for us the average labor cost of running your system with the labor cost that we might have in running comparable sytsems in the U.S. metropolitan areas?

Mr. HOWARD. Mr. Chairman, Congressman Widnall, I would just have to speak in generalities here at this point.

As you know, we are talking about operating a conventional rail system with the GO transit system whereas the BART system is not a conventional system but an automated system which is supposed to be low labor intensive. I do not have at this point the operating statistics, the operating costs for the existing BART operation, so I cannot tell you at this point how successful they have been in achieving a low-

labor intensive system. My understanding is they have not been too successful. Because of the problems that have been associated with the operation there has been an introduction of a labor element that was not anticipated in the original concept.

The labor intensivity of our rail operations that GO Transit have undertaken, we have been able to achieve, even though we are operating conventional systems, through negotiations. I think Philadelphia is a very good example on the Lindenwold line of what can be done if you get in on the ground floor utilizing existing rail lines and negotiating. In fact, Lindenwold has been able to go even further than we have in Canada at the present time through eliminating a great deal more of the labor associated with a rail transit system. But we have been able to tell the railway people that if they will negotiate with us we can come up with a make-work program to provide employment for railway people who under the present trend probably would be without employment in their particular line of endeavors, before too long. They are willing to negotiate with us and cut back on such things as the number of men on a particular crew, or consist, and this sort of thing, enabling us to take certain duties away that have been traditional on railways, away from railway people, such as ticket collections and this sort of thing, and thereby cut down on the numbers of crew required on a particular train.

So when we start comparing what we are operating in more or less a conventional mode with what is anticipated for BART, and what is being operated by the Lindenwold people, it is very difficult to come up with a comparison, but we do know in comparison to other conventional rail systems that we are able to get a decided decrease in operating costs by the direction we have taken.

Chairman MOORHEAD. Would the gentleman yield?

Representative WIDNALL. Yes.

Chairman MOORHEAD. I have a table which makes a comparison between the TTC, not the GO system, and BART, daily passengers, TTC, 600,000; BART, 220,000; total staffing, TTC, 1,500; BART, 2,114. These are people; they do not translate into dollars.

Without objection, I would like to insert this table into the hearing record at this point.

[The table follows:]

COMPARISON OF TTC AND BART

| | Toronto TTC | BART |
|---|---|---|
| Daily passengers | 600,000 | 220,000 |
| Miles of double track | 28 | 71 |
| Transit cars | 410 | 450 |
| Number of stations | 47 | 34 |
| Number of car miles | 30,000,000 | 41,700,000 |
| Total staffing | 1,500 | 2,114 |
| Operations | 600 | 630 |
| Maintenance | 700 | 1,073 |
| Administration | 124 | 233 |
| Security | 6 | 99 |
| Engineering | 70 | 80 |
| Operating expenses | | $60,000,000 |
| Revenues | | 38,300,000 |
| Operating surplus (deficit) | | ($21,700,000) |

Mr. HOWARD. If I may, I think that what we are arriving at is some kind of a conclusion that, and I think your comparisons of the TTC operation with BART are probably closer related than comparison of our GO transit rail system with the BART operation—whereas BART, not just in the operation of their trains but in the collection of fares, et cetera, have the lastest in technology in the development of automatic fare collection systems and this sort of thing, whereas once again the Toronto Subway System which you are comparing is a conventional rapid transit system utilizing conventional methods, utilizing conventional fare collection procedures, and more or less operating in the old mode. As you can see, under present operating circumstances the labor content is considerably lower on a comparable basis as to what is operating. It is certainly not an indication on my part that I am adverse to advancement and new technology in rapid transit, will all due respect to Mr. Wattenburg, I think we have a real place for this type of new transit in our future in North America, but all I am saying is that we can find conventional modes that will operate just as satisfactorily and under the existing circumstances probably much more satisfactorily. Whether this has to do with management or technological advancements or technological problems or whatever it is, I do not want to make a decision at this time, but I still think that we can and in many places, probably in the United States where there are comparable situations, put in transit systems without all of the latest developments in technology and operate quite a satisfactory system on an economical and sound basis.

Representative WIDNALL. I think it is quite apparent from what you have said that one of the reasons for your fine experience up to now has been the ability to utilize existing trackage and existing lines. We are not able to do that in a number of places where it would be physically possible, such as the New York metropolitan area. There are so many diverse interests and views and positions taken by local municipalities that we are getting nowhere fast and all the costs are just accumulating week by week and month by month. The New York City area is a natural for the type of operation which you are now using. There are a lot of existing rights-of-way and fine trackage at the present time in the New York area. But what was the key to your whole assembling of this? Do you have any different rights of condemnation or different control?

Mr. HOWARD. I think the key probably goes back to what I said at the outset of my statement when I spoke of the gestation period in comparing what happens in Toronto and what happens in BART. We have regional government in the Province of Ontario. The number of jurisdictions to be dealt with in implementing a 44-mile rail system, for instance, along the lakeshore, east and west of Toronto, were four. I think the number in comparable distance in BART would be something like 44. I am not quite sure. I am not sure about the figures. But I know there are a large number of jurisdictions which have to be dealt with and resulting litigation and all sorts of problems which make it very difficult to implement anything. Regional government has enabled us to get away from this sort of thing in Ontario. We have, as you probably are aware, the city of Toronto which a number of years ago became the municipality of Metropolitan Toronto and brought together a number of former communities into the municipality of To-

ronto under one government. The adjacent surrounding areas of Toronto have now been regionalized in regional municipalities and as a result the number of jurisdictions with which one had to deal in implementing service of this nature have been reduced to a minimum. I think this has been a key to our ability to probably get things done in a hurry up there because of the lack of jurisdictional bodies.

As a further step we are now in the Toronto area forming an area transit operating authority to encompass not just Metropolitan Toronto but the three adjacent regions for a total area of approximately 1,200 square miles under one operating authority. And this will be implemented probably about July of this year. It has only taken since an announcement to proceed with the feasibility of such an authority in September of last year, approximately 3 months to prepare a report and approximately 3 months to sell it, if you may, to the various jurisdictions involved, and another 2 months to get it implemented, so we will have a regional operating authority operating in less than 8 months from the date of inception. This may answer some of your questions.

Representative WIDNALL. I would think it would.

Mr. Clement, what will the total cost of BART be when completed? Do you have any estimates yet?

Mr. CLEMENT. No, I do not. I will see if Mr. Bouchard has. Do you know?

Mr. BOUCHARD. For the existing system, the current cost estimate is about $1.5 billion.

Mr. CLEMENT. $1.5 billion.

Chairman MOORHEAD. Mr. Wattenburg wants to make a comment.

Mr. WATTENBURG. Congressman Widnall, could I contribute a little on that subject? The existing system of BART of which there is a great deal more to be done that no one talks about, probably will cost upward of $200 million more to make it perform and serve as it was promised because feeder systems are missing, maintenance costs——

Representative WIDNALL. Does that include finishing the tunnel?

Mr. WATTENBURG. No; the tunnel is finished but there is $1.6 million in it now. A good portion of the operating loss is really fixing and maintaining and building portions that are yet to be done, and so it will probably be something between $1.75 and $1.9 billion before it is through. I am sure they will take serious exception to that, officially.

Representative WIDNALL. What are the annual operating costs projected by BART?

Mr. CLEMENT. I do not know.

Mr. WATTENBURG. Could I volunteer a suggestion?

Representative WIDNALL. Yes.

Mr. WATTENBURG. Well, you can calculate this. That they lost $10 million to $12 million a month for every month they do not operate, and that means there is somewhere between, well, excuse me, that figure is twice too high; $6 to $8 million for every month they do not operate. I believe their latest budget is between $50 million and $60 million operating budget at the present level of operation, which is one-quarter of full scheduled operation.

Representative WIDNALL. BART was originally planned so it could meet expenses out of the fare box.

Mr. WATTENBURG. It was represented but the official policy is to vehemently deny that any transit system in the world can run without major Government subsidy. That is vehemently denied and strongly contended by those who are crying for Government subsidy money, but it was sold on the basis it would run out of the fare box. It was sold to the legislature three times and sold to the Government. It was sold to us and I think we are all well aware it probably will not happen but not to the extent that it has not happened. The projected deficit now is $100 million for the next 3 years, full scheduled operation deficit with full income.

Representative WIDNALL. How do the capital costs of constructing a system like BART compare to the cost of putting in place alternate systems, bus, minibus and so forth, capable of moving the same numbers of people?

Mr. WATTENBURG. There have been a number of studies in California and there are a number continuing that show that there are very reasonabe alternates. I know there is very strong feeling in the Los Angeles area that they just simply cannot afford a BART-like mass transit system because of what can be done with buses and that is rather depressing to those who believe there should be European-style transit, let us say, Canadian-style right now we would be very happy with in the United States. But the capital expenses per passenger for BART are frankly horrendous compared to what can be done with vehicle systems which I think are much less pleasing and much less desirable. So it is a tradeoff.

Representative WIDNALL. Can somebody give me the figures as to how the total capital cost of BART, as presently projected, compares with the original cost projections?

Mr. CLEMENT. I can get those for you.

Representative WIDNALL. Would you submit those for the record?

Mr. CLEMENT. Yes, sir.

Mr. WATTENBURG. I can give you estimates, reasonably accurate numbers now.

Representative WIDNALL. Do that and let us get the figures that Mr. Clement has too.

[The following information was subsequently supplied for the record by Mr. Clement:]

Due to unacceptably high outlays for vehicle and track maintenance, initial operating costs are out of line with those anticipated during stable operations. Much of the current operating costs are actually capital improvements (e.g., certain capital equipment replacements and "minor" system improvements), an accounting anomaly necessitated by the wording of the original BART Act. Current FY 1974 operating costs are estimated [1] at $37.3 million; the 1962 Composite Report [2] estimate placed the FY 1976 operating cost at $23.5 million. The current estimate of anticipated stable system operating cost for FY 1976 is $61.3 million, the difference again reflecting the 1962 underestimate of inflation. The impact of a recent costly labor settlement is also behind the higher current estimate. The steep rise from $37.3 million for FY 74 to $61.3 million in FY 76 also reflects the added operational costs of incremental buildup to full system operation with all lines in service and a fleet of 450 cars.

While BART was originally expected to operate at a profit, it is anticipated that the system will operate at an increasing deficit over the next five years, viz:

[1] The Bay Area Rapid Transit District Revised Financial Requirements Report, submitted to the California State Senate Committee on Public Utilities, February 20, 1974. (A copy is included with this response).

[2] The Composite Report, Bay Area Rapid Transit, May 1962, prepared by Parsons Brinkerhoff-Tudor-Bechtel; Smith, Barney and Co.; Stone and Youngberg; Van Beuren Stanbery. (Copy provided with this response.)

*Expected Deficit*

| Fiscal year: | *Millions* |
|---|---|
| 1974 | $11.0 |
| 1975 | 16.6 |
| 1976 | 22.7 |
| 1977 | 25.0 |
| 1978 | 28.3 |

Through fiscal year 1974, actual capital costs are estimated to be $1.56 billion. The original projected capital cost estimated [3] in 1962 was $998 million. The major reasons for this difference include the following:

(1) *Basic system changes*, which included the addition of a major and costly ($30 million) station, the Embarcadero, in downtown San Francisco. Also, in response to local pressure, major system redesigns incorporating station relocations and line reroutings were made. These changes accounted for $200 million.

(2) *Construction delays*, due to a taxpayer suit, awaiting for funding, and labor strikes. These and other unexpected delays increased the pre-operational expenses by about $63 million.

(3) *Redesign of stations* to provide increased mobility to the elderly and handicapped, at a cost of $8.2 million.

(4) *Underestimation*, in the 1962 estimate, of the inflation rate during the construction period. The estimated inflation rate was 3% versus an actual rate of 6%; the difference in cost is estimated at $120 million.

(5) *Short run procurement economizing* in the acquisition of rolling stock. It is estimated that the placement of small orders (100 to 200 cars) over a period of years with increasing costs each year instead of purchasing all 450 cars at the same original price effectively increased the price of the rolling stock from an estimated $73 million to $160 million.

Mr. WATTENBURG. BART is $400 million over projections as early as 5 years ago, mostly stated due to inflation and other unforeseen factors. Counting the tube I think the most believed estimate and the one on which most of the decisions was based was something less than a billion dollars or maybe $50 million over that. But, the State legislature, as I suggested earlier, just summarized and analyzed this situation very thoroughly in reports from the Legislative Analyst Office, A. Allen Post, GAO equivalent of the State of California, which I think your staff members have, in tracing history of this, sir.

Representative WIDNALL. Mr. Howard, you spoke about the increases in value that have taken place around some of the stations up in Canada. Now, how much of that is general inflation? Have not the values been increasing all over?

Mr. HOWARD. They have dramatically in the last 2 years in the Toronto area. Prior to that it was not as dramatic, sir.

I would suggest that of the increase in values associated with the properties adjacent to our rail services, probably 50 percent is associated with the enhancement by the introduction of high speed transit, the other 50 percent by general inflationary trends.

Representative WIDNALL. How do the projected fares for BART, or the fares that are in existence right now, compare with the Canadian experience and the per mile cost?

Mr. HOWARD. I can give you what ours are. We are charging a minimum fare of 70 cents and beyond that it works out to 4.6 cents per mile. I believe our fares are less than in existence or proposed for

[3] The Composite Report, Bay Area Rapid Transit, May 1962, prepared by Parsons Brinkerhoff-Tudor-Bechtel; Smith Barney and Co.; Stone and Youngberg; Van Beuren Stanbery.

BART system because we have a subsidy program. We went into this operation knowing it would be a subsidized operation. We set our fares based on what we thought would be a reasonable fare to attract automobile commuters, taking into account what a normal automobile commuter does admit to in the cost of operating his automobile. There are a lot of things he does not admit to. And using this as a basis we came up with what we thought was a fare that would take people out of their automobile and this would require an operating subsidy and we have continued with that philosophy. We at the present time, in the Province of Ontario have a subsidy program whereby I think it is very important that we do have an operating subsidy to follow up on a capital subsidy program. We pay 75 percent of the cost of all capital required for rapid transit in the Province. This includes subway construction, any municipal transit system, buses, garages, anything to do with municipal transit. We also have a 50-percent operating subsidy for all municipally operated transit systems, and I think it is important that you have a follow-up program that is a controlled subsidy program on top of the capital subsidy program or you might find your capital is not being spent in the way it should.

Representative WIDNALL. When you say a controlled subsidy program, what do you mean by that?

Mr. HOWARD. Before any municipality is eligible for operating subsidy it must have a transit study, which, too, is paid for 75 percent by the Province. The result of the transit study must be agreed to by the Province and must be implemented in order for the municipality to be eligible for operating subsidy. In other words, they cannot continue to operate a system which is badly managed and badly operated and not providing the service to the public and still achieve a subsidy from the Province. They must put in a system, they must make changes to the system as recommended by the subsidized study before they are eligible for any operating subsidies.

Representative WIDNALL. I think that one of the holdups in doing some of the work toward a subsidy program here in the Congress has been the fear on the part of many Members of Congress that you get into lax management with subsidies, the fear that management will believe that they will be able to run to the Government and hold their hands out and get paid whatever the deficits in the operation are. Many Congressmen believe that management will be tighter if there are no full subsidies. We certainly know right now we cannot pay for any of these things through the fare box. Costs have gotten much too high. I think we can benefit a great deal from your own experience and from your own operation as to how you analyze the subsidies, how much you go back each year to review or every 6 months to review, how you make adjustments in the subsidy, and what is really required on the part of those who are managing and operating so that you can intelligently manage the programs without running into exorbitant deficits.

Mr. HOWARD. Yes; I think it is quite important to realize that 80 percent of all of the public transportation in the Province of Ontario is operated in the Toronto-centered region. For this reason, it has become quite necessary to form an area transit authority which will be responsible for monitoring and administering all subsidies, operating subsidies to this area. I think this is where you have to have your controls. You have to have to have a yearly analysis of what is being

achieved, passenger carryings, and the amount of operating deficits in relationship to passenger carryings, and to have a yearly program of approving subsidies on this basis.

Representative WIDNALL. Thank you.

Chairman MOORHEAD. Mr. Clement, I did notice that the BART system seems to require more employees per passenger than the system in Canada or for that matter, than PATCO in eastern Pennsylvania. It was our understanding that since this was such a capital-intensive project and automated, that it would have fewer employees per passenger than the conventional modes that are used in Toronto.

Mr. CLEMENT. Mr. Chairman, my recollection, having come from the bay area, when the planning was being done for BART was just exactly that, and as Mr. Wattenburg has mentioned, there was a lot of sales work being done in order to promote the BART system. At that time it encompassed Marin County and also the county below, San Mateo County. I wish there were someone here from BART District to be able to answer this specific question which you are asking. They are good questions. Unfortunately, I am not qualified to answer them in a context of operating expenses, why the labor input is so much higher.

Chairman MOORHEAD. Is that not something that the BART impact study should be looking into?

Mr. CLEMENT. No; the purpose of the BART impact study is not to look at how the system is being run or managed but what is that system doing on the community and the region? That was one of the points I made very early.

Chairman MOORHEAD. It seems to me the cost of a system has an impact on the people in the region.

Mr. CLEMENT. Only to the extent of the fares, the fare structure.

Chairman MOORHEAD. Fare structure and the subsidy would be affected by labor productivity, would they not?

Mr. CLEMENT. In the long run very possibly. At the moment, however, we are looking at the BART impact study as not what that system is doing internally, that is, many of the points that Mr. Wattenburg has made. They are not being addressed in the context of this BART impact program. They should be and I presume are being addressed by the UMTA, Urban Mass Transportation Administration. The impact study is supposed to be looking at what happens as a result of a new transit system, not what is that transit system, that is, what is it in terms of how it is being managed, staffed, what its performance is, yes, what its fare structure is, yes, and what those impacts are on the community.

Chairman MOORHEAD. In your prepared statement you talk about providing the system with the automatic equipment that permits greatly reduced operating costs. So I thought you were looking into operating cost and I thought you could explain this somewhat anomalous situation.

Mr. CLEMENT. I am not prepared to do that, sir. I want to answer part of your question, though. You asked about the fare structure in Toronto versus BART. I believe Mr. Howard said his minimum fare was 70 cents. The BART fare structure at the moment for your information, is a minimum fare of 30 cents incrementally going up to approximately $1.25 short of the Transbay line being operated. That is the

maximum distance that can now be traveled and the fare is $1.25. So you are looking at incrementally somewhere around 4 to 5 cents a mile for incremental distance traveled on the BART system.

Mr. WATTENBURG. Could I answer one very relevant question you asked concerns the employees, the number of employees in spite of the representations for an automated system?

Chairman MOORHEAD. Yes.

Mr. WATTENBURG. Well, it is very easy, if you just from an overview of what has happened in our technology, military, space programs, computer, elsewhere, as a general rule, any time you find sophisticated technology built by people for high purpose alone who do not understand what they are doing, the technology invariably ends up employing as a general rule at least twice as many people as was promised it would replace. This is the case in BART. For instance, in BART, this is why I am so concerned about UMTA supporting these coverups of a technical deficiency, there is a segment in the electronics that was just entirely unnecessary to the degree that they attempted to go compared to what existed and was tested and refused.

Now, that electronics will have to be replaced in 3 to 5 years, in my opinion, for BART to ever achieve its objectives, and it will be another Morgantown, but that is the kind of concrete that is not so easy to blast out. That is $100 million worth of concrete. In the meantime the maintenance cost of this electronics, and I can only, and I hope you do not think I am being facetious, tell you what my colleagues and I describe these kind of things as: They are called goldplated shovels with a rope handle. In the meantime, the maintenance costs of that electronics is three to five times what the cost should be. There are hundreds of these employees in BART who are required to literally keep the pieces together so that it will run. That is one of the main reasons for the excessive number of employees. This is where sophistication, misdirected, truly is not forging a frontier. It costs you an excessive amount of money, whereas proven equipment—if you look at BART, the main concept, DOT has been persuaded this is the first new transit system in 50 years. That flies in the face of the facts. The Lindenwold Line, if anybody is studying anything with government money they ought to be studying things that are significant. Lindenwold was started after BART and has been running for years before BART and elsewhere in the world. In terms of technology, every significant piece of BART that will still be around 5 years from now has been used long ago elsewhere. It is only the trimmings and the architecture that is in fact new and very exciting. But it has caused trouble that is crippling and that is the kind of mistake that sound project planning and government enforcement and phasing of the kind Toronto has described to you is absolutely essential to keep these people from killing themselves in these districts.

So I am sorry to range that far away but there is the main answer to your question of the employees and average cost of employee is almost $20,000 per employee. That is across the board in BART.

Chairman MOORHEAD. Well, I do notice that Toronto maintenance employees total 700 and the BART maintenance employees are 1,073 for a third as many passengers. That is a significant figure.

The next question I would like to direct to you, Mr. Clement, and then to you, Mr. Howard, to comment to see whether the same experience holds true in Toronto. In your testimony, you state:

Moreover, because of the new vistas in mobility that it offers, BART may accelerate the shift of middle class residents from the central city. On the negative side, increasing land values near the developed BART station areas may force the poor to move away. Then, you go on to say it is too soon to predict this confidently.

Is this good for the central cities of the United States if this happens?

Mr. CLEMENT. I do not know that it is. That is not our intent in making that comment; that is strictly an impact. Exactly what the regionwide results of that impact are, that is one of the things we are going to try to determine. I am not portraying those necessarily as being good or bad impacts. Those are still to be identified and measured or quantified potential impacts.

Chairman MOORHEAD. Did you have any such experience in Toronto after you put in your system, Mr. Howard?

Mr. HOWARD. As far as shifting people, I do not think that we have had. We have had a significant impact in getting suburbanites to move to areas served by rail systems, transit systems. We have also had the effect of stimulating the downtown corridor of Toronto, I think, to a marked degree. I think it is evident to anybody who has been in downtown Toronto in the last few years what has happened there and so it has two effects. It has stimulated growth in the downtown core but not in shifting of residential development, not in moving people out of the downtown core into the suburbs, because we probably have a different situation than what you have here. Toronto was never a residential area in the downtown core at any time for quite a number of years and we have not really noticed any significant shift of people from the downtown core to the suburbs. We have noticed a movement of people, the rapid growth of the Toronto suburbs. People coming into the Toronto suburbs rather than moving into the downtown area. The downtown core has been more or less maintained for industrial development, and when I say industrial development, commercial development rather than industrial development, and the suburbs have grown very rapidly, particularly in the area served by good transit services.

Chairman MOORHEAD. I did notice when I was in Toronto that you can see the high buildings near the transit stations and the lower density between stations.

Mr. HOWARD. Yes, you can stand in the highest building in Toronto and visually see every place that there is a transit system, even though they are buried.

Chairman MOORHEAD. Does the transit system itself benefit financially from that increased land value? Do you try to recoup some income at the stations from concessionaries and the like?

Mr. HOWARD. There is no direct taxation to developers adjacent to the transit system. It has been advocated as recently as 2 weeks ago, the chairman of Metropolitan Toronto advocated that for any future transit lines, before they are a fait accompli, we make sure that the party responsible for putting in the capital has some return on his investment from developers who benefit from the implementation of the transit system. But at the present time there is no direct, although there is an indirect, benefit back to the province as a whole in that all of the municipalities are supported in one way, shape or form, in their municipal tax structure through grants from the province

and the municipalities themselves do benefit along the line, particularly in areas where there has been high rise development.

Some of the suburban municipalities have shown an increase of taxation from some of this high-rise development that has taken place adjacent to the commuter stations and indirectly this benefits back to the Province in that the amount of subsidies required from the Province are not as high. It is very indirectly but there are certainly benefits that come back to the taxpayers in general who are financing all of the transit systems in the Province of Ontario.

Chairman MOORHEAD. Has BART given any consideration to deriving income or financial benefits from increased land values in the immediate area around the station or within the station?

Mr. CLEMENT. I do not think they have title to land beyond that which is being used by the system. Do you know, Doctor?

Mr. WATTENBURG. No.

Mr. CLEMENT. I do not believe so.

Mr. WATTENBURG. No, they have not attempted to get into the real estate business but they benefit indirectly from the land value, the indebtedness to be paid from property taxes, and unless there is more sales tax it may all fall on property taxes.

Chairman MOORHEAD. Mr. Clement, I would like to ask you a question related to slide 8.[1]

Mr. CLEMENT. Yes, sir.

Chairman MOORHEAD. Mr. Howard, I would like to ask you whether your pattern is at all like slide 8,[1] "Profiles of Current BART Riders." Do you, Mr. Clement, have any figures on the average per capita income of BART riders and the neighborhood?

Mr. CLEMENT. Not right here with me, no; but I think the part that is educational there is auto ownership. I can draw conclusions from looking at those statistics that the BART riders tend to be wealthier than those who make up the total neighborhood. They have a higher ownership of automobiles and have higher education. I, therefore, believe we can safely conclude that the BART rider as a group are better moneyed individuals than the neighborhood as a group that they come from.

Chairman MOORHEAD. Mr. Howard, would you have a similar profile in Toronto?

Mr. HOWARD. Just looking over this chart, it appears that we probably are hitting toward the same type of impact on the same type of people, our auto ownership, for instance.

Mr. CLEMENT. It is the bottom right hand corner.

Mr. HOWARD. I think, if I recall, the average auto ownership on our system is 1.3, so we are certainly either in the same range or it looks like we are in the same ball park as far as the socioeconomic group that we are serving. I do not have the figures with me, sir, on the average incomes. I notice here, for instance, that female riders are predominant over male riders on their BART system. We experience the same thing. I think about 60 to 40. Sixty percent female, forty percent male and——

Mr. CLEMENT. Excuse me, the BART ratio is about 50–50.

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[1] See slide 8, p. 187.

Mr. HOWARD. Fine, I see. We do have a slightly higher predominance of female versus male riders. As far as ethnic groups, white, black, we did not have any figures on this at all because we do not have a predominance of blacks in the Province of Ontario. So we really do not have any figures on ethnic origin or color origins. But generally speaking, I would say that the BART experience to date, because the areas that BART are serving at the present time without linking up of the final section, and I might point out that in the fare structures, the 30-cent fare structure was mentioned as a minimum on BART. If we are going to compare fare structures in a total system basis, we probably should talk about the TTC fare structure rather than the total system fare structure. TTC fare structure at the present time is 30 cents for any distance whatsoever, in Metropolitan Toronto. This is probably closer related, although at the present time without the joining up of the final section of the BART system, it has become more of a commuter rail system serving the suburbs instead of a downtown collector, distributor system as it will become more and more as it is completed. In this respect BART is probably closer related now to our GO transit rapid rail service than our TTC service which serves the downtown area, so as one looks at fare structures we have to keep that in mind, we are talking about two systems. In Toronto we are talking about one system with the BART uncompleted system.

Chairman MOORHEAD. The thing that disturbs me is that one of the reasons that people come to the Congress and say that we need subsidies is that we are going to build a transit system to take care of the poor who cannot afford automobiles, the old who can no longer drive, the young who cannot drive, and the disabled, and yet the pattern that emerges from the BART profile is of an entirely different sort of individual. It seems as though we are paying out tax money to subsidize the above-income people in the suburbs to come into the center city and go back to the above-income suburbs in the evening.

Mr. CLEMENT. Mr. Chairman——

Chairman MOORHEAD. Maybe that is a good thing but it disturbs me.

Mr. CLEMENT. Based on the statistics, that is, the impact as we like to think of it, the impact today, you are correct.

Mr. WATTENBURG. Mr. Chairman, could I amplify a little on that for your information, if I could have Mr. Clement's chart up there on the transit system that he had up there. There were a couple of misleading things I think I could point out very quickly to you so you could see precisely where these groups are.

The BART system is constructed mainly to follow the freeway. The main objective of BART has always been to lure the riders off the freeways and now you know where riders on freeways are coming from and where they are going to. But this is a freeway route parallel all the way. This is a freeway route up except this last leg here; this is entirely a freeway route. This, of course, is the main corridor of the San Francisco Bay. This right now is inundated with commuters up this freeway. It is just mobbed, swamped out there, totally choked. Now, the lower income groups happen to live here, across the mountains. In other words, those who own homes and are not in the central city are out in this vast area here, low-cost housing. This one up here.

Chairman MOORHEAD. Could you state the areas you are pointing out?

Mr. WATTENBURG. This would be the San Pablo area. The first one I pointed out would be the Dublin area.

Alameda is an island over here, all residential. The Mission District and Hunters Point area of San Francisco, all of these areas which get access to BART, will have to have bus service. They will be making multiple transfers or this is the feeder system that must be built before they have good convenient access to BART, whereas most of the stations outside of the core city are located within the, say, middle-income and higher suburban area. So on a factual basis, this is a case.

There was a statement made as to how much is underground earlier. The tube is the only main underground portion. There is a small section of Berkeley hard fought by them to stay from splitting the middle of the city and then there are a couple of miles in the Oakland-Berkeley Hills over here. And in downtown, of course, the subway parts of downtown Oakland and San Francisco, but the vast majority is all elevated.

Mr. CLEMENT. Elevated or ground level.

Mr. WATTENBURG. Yes, sir.

Chairman MOORHEAD. Mr. Howard, I have not heard until I read your testimony last night, about the GO urban system. I would like a little explanation of this technology. Is it grade separated, is it rapid transit, what are the sizes of the cars, and so forth?

Mr. HOWARD. To give you some background. While we have been quite successful in putting in conventional technology into our transit systems, we, as I mentioned earlier, felt there was a gap between what you could provide with conventional bus and what you could provide with conventional subway or commuter rail system. But, the high cost these days of putting in, getting up to $40 million and $50 million a mile to construct a subway rapid transit system and bus systems can be effective but only up to a certain point, there is a saturation point over which you cannot handle demand on a bus system, and for this reason we felt that we should look at some type of system that could be developed at a range in the neighborhood of 20,000 passengers per hour and utilizing new technology because of the environment, the things that we are now experiencing in both visual and noise pollution. We felt that we had to look around and see if there was a system which could be applicable to the 20,000-passenger-per-hour range and could be developed at a cost which would be considerably lower than developing a subway system to be put into areas where you could not support a subway system and where demand for the most desirable system would not require a subway system. How we went about this. First of all, when our research team went out and asked for submissions from every known developer of new technology in the field of transit we could find, and we sifted through these, I think we had something like 123 different systems. And we brought these down to nine, which we felt were reasonable. The nine systems ranged from the French aerotrain to the TTI system here in the States, to the magnetic levitation. Most of them using linear induction propulsion, all of them with new advanced form of technology particularly related to the suspension and the propulsion of the train, not necessarily related to

train controls, because as Mr. Wattenburg pointed out, these things have been around for a considerable length of time and all they require is refinement.

We asked the nine to submit to us proposals to develop a test system. The nine all submitted proposals for which a fee was paid by our Government. From these we selected three to submit a specification to build a test track of 2 miles in length at the Canadian National Exhibition ground almost in downtown Toronto on the waterfront. The three that were selected were the Ford people here in the States, the joint firm of Hawker-Siddeley-Canada and the British firm, Tracker Hovercraft who were developing an air cushion system, but then later went to a rubber-tired system.

And the third was the Krauss Maffei people in Germany whose system was a magnetic levitation and linear induction propulsion system. This system had the capabilities under the specification to carry, I think it worked out to 21,000 passengers per hour utilizing a 20-passenger car operating up to six car trains on elevated guideway. And because of the fact that suspension on the system was by magnetic suspension, there was no noise with it and you could develop a guideway which was pleasing to the eye. You can delevop a massive guideway system to support this type of operation. We entered into a contract with Krauss Maffei to build this 2-mile demonstration track at the CNE. It is a circular 2-mile system with four stations with all of the curves you would experience in a normal operation with all of the controls, all of the things that would be in an operating system. In return for this testing of the Krauss Maffei system, we have received the rights to sell the system, if it proves to be successful, throughout Canada, throughout South America and throughout Central America. We have also received a contract that we will get 10 percent of any sales in the United States. So its risk capital, we are investing up to $23 million to test this new technology, but we feel it is very important that we test this in a test place, rather than out in a general public system. to prove that it will work. But we are quite confident that it will. and because of our confidence we are going ahead with the feasibility studies on a 53-mile network of intermediate capacity transit in areas of Toronto, Hamilton and Ottawa, that could not support a rapid transit subway-type system because the costs are too high associated with this type of system.

That in a nutshell is what GO urban is all about.

Chairman MOORHEAD. Thank you very much. I think this hearing has been most helpful to the subcomittee because we are trying to learn something about transit systems in various cities and their impact, economic and otherwise, on the people who live in those cities.

The subcommittee stands adjourned.

[Whereupon, at 12:17 p.m., the subcommittee adjourned, subject to the call of the Chair.]

# PRODUCTIVITY IN URBAN TRANSPORTATION

**WEDNESDAY, JULY 3, 1974**

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON URBAN AFFAIRS
OF THE JOINT ECONOMIC COMMITTEE,
*Washington, D.C.*

The subcommittee met, pursuant to notice, at 10:05 a.m., in room S-407, the Capitol Building, Hon. William S. Moorhead (chairman of the subcommittee) presiding.

Present: Representative Moorhead.

Also present: Ralph Schlosstein, economist; Michael J. Runde, administrative assistant.

## OPENING STATEMENT OF CHAIRMAN MOORHEAD

Chairman MOORHEAD. The Subcommittee on Urban Affairs will please come to order. Today the Urban Affairs Subcommittee holds its fifth and final hearing on improving the effectiveness of urban transportation expenditures. During the course of these hearings we have heard testimony from a Congressman, mayors, Department of Transportation officials, regional government officials, transportation operators and a group of distinguished private experts. The testimony that we have heard has been both perplexing and encouraging.

We have heard testimony about a slowly declining transit industry which now carries less than one-third of the revenue passengers it carried in 1945. Yet, in the last year a small upturn in ridership has occurred, providing hope to those of us who believe that the quality of life in our cities will be improved by a reversal of this decline.

The Urban Affairs Subcommittee is concerned not just with transit but the quality of life in our cities.

We have heard testimony that Federal expenditures in the past have been insufficient to halt or reverse the decline in ridership. Yet, we have heard unanimous agreement that a greater Federal commitment should be and will be forthcoming.

We have heard testimony that Federal expenditures may not have been effective in accomplishing the goals established in urban transportation legislation. Yet, there seems to be an increasing awareness of the need to examine more carefully the performance of Federal urban transportation expenditures.

Finally, we have heard testimony that much of the information necessary for more effective program performance is unavailable or inaccurate. Yet, there appears to be a clear recognition of this problem and a commitment to do something about it.

Today, in our final hearing we will look a little into the future in an attempt to determine how the Federal Government and Federal legislation can contribute to more effective urban public transportation services. We will attempt to ascertain what specific objectives should be included in urban transportation legislation and what strategies will be most effective in attracting more riders to public transportation from their private automobiles.

Finally, we will discuss the relationship between more effective transportation services and the quality of life in the city.

We are fortunate to have with us today Mr. Russell Train, Administrator of the Environmental Protection Agency, and Mr. Louis Gambaccini, vice president and general manager of the Port Authority Trans-Hudson Corp. Mr. Train will speak about the role EPA has played in urban transportation since the enactment of the Clean Air Act. Mr. Gambaccini will present the views of the Institute for Rapid Transit on a national transportation policy.

We will first hear from Mr. Train. Mr. Train, we welcome you to the subcommittee. I have observed your career over the years from the time you served this Nation as counsel to the Ways and Means Committee, the Tax Court, and as the head of the Conservation Fund. Now I think you continue to serve our Nation as head of the Environmental Protection Agency. It is a life of dedicated service for which I am proud to count you as a friend and am pleased to welcome you to this subcommittee.

## STATEMENT OF HON. RUSSELL E. TRAIN, ADMINISTRATOR, ENVIRONMENTAL PROTECTION AGENCY

Mr. TRAIN. Thank you very much, Mr. Chairman. I appreciate very much those kind words of welcome. One often testifies but one does not always get welcomed as graciously.

Chairman MOORHEAD. We do not want to make it too easy.

Mr. TRAIN. Or pleasantly.

I assume your questions will be somewhat more pointed than your introduction and I look forward to that.

I welcome this opportunity to discuss with you the benefits of improved mass transit systems and how they relate to the provisions of the Clean Air Act, particularly those dealing with transportation controls and air quality maintenance.

Today, the primary mode of movement within our cities is the automobile. Statistically, there is slightly more than one passenger car for every two Americans. We place entirely too much reliance on automobile use for intracity commuting and as a matter of public policy we cannot allow this situation to continue. We are faced with energy, environmental, and other social problems that lead to only one conclusion: Increased usage of urban mass transit systems for the balance of the century.

Frankly, I do not know why we stop with the end of the century, but this seems to be as far as our crystal ball in EPA is carrying us.

Mass transit was once our major travel mode, reaching its zenith in the mid-1940's. About that time and extending into the 1950's, we experienced a rapid population boom coupled with an increase in consumer purchasing power. These factors, along with plentiful sup-

plies of gasoline at a relatively low price, led to a greater demand for automobiles and suburban homes. Urban mass transit systems in the main did not expand out into the suburbs as homes and schools went up. The reasons for this are many—some systems were plagued by poor management, some lacked the capital, and some believed consumers would not accept their services if offered. Now in the 1970's we are experiencing considerable governmental interest in urban mass transit. This interest could not be more timely.

The oil embargo of last winter has made us increasingly conscious of automobile fuel economy and gasoline pricing. Today we are faced with the potential of major international balance of payments problems resulting from imported oil which this Nation can ill afford over any extended period of time. In addition, unless we turn to mass transit, we will continue to be in the position of significantly depending on foreign sources for oil.

Currently, automobiles consume over 40 percent of our total petroleum requirements. Although mass transit ridership has reached new lows in the last few years, it is still more than twice as energy efficient as automobiles. As ridership increases this comparison will become even more favorable. Public policy must be aimed at increasing ridership of mass transit.

Greater reliance on mass transit will result in many additional social benefits. It will aid in improving air quality, which I will address in more detail later in this testimony. Also mass transit will reduce noise pollution, diminish traffic congestion, alleviate the social isolation faced by those who do not have access to a car—the young, old, poor, and handicapped, and reduce motor vehicle accidents and injuries.

The ultimate question in any discussion about mass transit is "Will the public use it?" We believe they will if it takes them where they want to go, when they want to go, in an attractive surrounding at an inexpensive cost. I realize that these conditions are not always easy to meet. But in most cases they can be met if there is adequate public commitment. We are under no illusions, however, about the Federal Government's role in supplying mass transit. There will need to be a major commitment for many years to come.

At this point, I believe it would be useful to outline the innovative mechanism the Congress established under the Clean Air Act for dealing with this Nation's air pollution problems and how it relies on the delivery and use of a balanced transportation system.

The act directs EPA to designate air quality control regions and establish air quality standards protective of public health and welfare. The States then are directed to prepare and implement plans which will assure attainment of air quality standards within certain time frames.

EPA has established approximately 250 air quality control regions. We have also established air quality standards for six pervasive pollutants—sulfur oxides, particular matter, nitrogen oxides, carbon monoxide, hydrocarbons, and photochemical oxidants. The last three are primarily associated with automotive emissions.

Initially, the States, in developing implementation plans, placed major emphasis on control of stationary sources. The application of new motor vehicle standards was expected to provide for most of the

improvements needed for attainment of the photochemical oxidant and carbon monoxide air quality standards. However, the Congress recognized when it passed the 1970 amendments that transportation control plans might be necessary by requiring urban areas to "do something about their transportation systems, the movement of used cars, the development of public transit systems, and the modification and change of housing patterns, employment patterns, and transportation patterns generally." [1]

We have identified some 30 urban areas that will need some form of additional controls, that is, transportation controls, if the air quality standards are to be met by the statutory deadlines. In fact, in some communities transportation controls would be needed even if all the vehicles on the road were controlled at the most stringent levels set forth in the law.

The point there, Mr. Chairman, is that I think you have to bear in mind that emission controls, as they are mandated by the statute only, apply to each succeeding generation of new model cars, so it is an incremental improvement and the assumption made here is that all cars somehow would be able to achieve, all cars on the road, the full statutory objectives insofar as emission controls are concerned. And as I point out, even under such assumption we would still need transportation control strategies in some cases.

Chairman MOORHEAD. When the time comes, that all automobiles are under these controls, there will still be emissions that would make it necessary to have mass transit to improve the air quality?

Mr. TRAIN. That is another way of stating it, that is correct, and it is because the population of cars and presumably their congestion would be such that the volume, total volume of pollutants would exceed the ambient air quality standards, to the extent that other strategies involving transportation controls, very heavily based upon a shift of ridership to mass transit would be required.

Chairman MOORHEAD. Thank you.

Mr. TRAIN. The transportation control measures that have been adopted can be divided into seven general categories: One, retrofitting of older motor vehicles with pollution control hardware; two, inspection and maintenance of automobiles; three, improvements in mass transportation systems; four, greater control of stationary sources of air pollution, primarily from gasoline stations; five, parking restrictions; six, highway improvements, including exclusive carpool and bus lanes; and seven, in some cases, when no alternative is available to meet legal requirements, gasoline rationing.

The most controversial measures have been parking surcharges and gasoline rationing. Under the recently enacted Energy Supply and Environmental Coordination Act of 1974, EPA is prohibited from imposing parking surcharges without prior congressional approval. In response to this congressional guidance, EPA last January revoked all surcharges. That was because as you recall, the Congress passed the legislation which was subsequently vetoed, the Energy Emergency Act, which contained the same provision as has been recently enacted and has now been signed into law, in both cases prohibiting the application of surcharges by EPA. However, the States are free to use surcharges if they wish.

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[1] Senate Report 91–1196, 91st Cong., 2d sess., p. 13.

Gasoline rationing has been added to a few plans as the final measure necessary to achieve air quality standards by the statutory deadline. We recognize that severe gas rationing would have major adverse economic and social impacts which far outweigh any benefits in improved air quality. We have recommended to the appropriate House and Senate committees extending the deadline for achieving auto-related air quality standards for communities where severe gasoline rationing has been proposed, provided the community implements all other available measures. We request the support of this subcommittee for that proposal.

It should be noted that once the transportation control measures are in place and air quality standards are attained there are provisions of the act that require the standards to be maintained. Beginning January 1, 1975, proposed major new sources that generate motor vehicle travel, such as shopping centers and sports complexes, will be reviewed prior to construction to insure that they do not cause violations of the standards. The States are also now being required to further refine their plans to insure maintenance of standards for the next decade.

The mechanisms established under the Clean Air Act for achieving and maintaining air quality standards have several major benefits. One, statutory deadlines in achieving standards are essential if we are to provide a healthful environment to our citizens in a timely fashion. Two, control measures such as transportation controls can be tailored to a particular city's unique characteristics. For example, improved traffic flow could be used in some communities while others could restrict parking on certain streets for portions of the day to reduce approximately the same amount of pollution. Three, preplanning for growth and review of new sources prior to construction will insure that the mistakes of yesterday are not repeated.

And I might add hopefully, almost all the transportation control plans call for improvements in urban mass transit systems. Some of them are now getting underway and have been widely accepted by local officials. We recognize that these improvements will not occur overnight nor will they be inexpensive, but their benefits are so monumental and pressing that we should proceed with them as rapidly as possible.

Mr. Chairman, this concludes my prepared remarks. I would be happy to answer any questions you might have.

Chairman MOORHEAD. Thank you very much, Mr. Train. I believe your testimony would not be very welcome in the city of Detroit. It seems to me that you have emphasized how much the automobile is affecting our environment. Particularly I note you give seven transportation control measures. Every one of them has to do with the automobile with the possible exception of item number four, greater control of stationary sources of air pollution, primarily from gasoline stations.

What is that kind of pollution?

Mr. TRAIN. These relate to the escape of hydrocarbon into the atmosphere from the transfer of gasoline from gasoline pumps to the tank of the automobile, and from tank trucks to underground storage tanks. Those would be the two primary sources. In some areas this does represent a very substantial portion of the hydrocarbons in the

atmosphere. The figure of 15 to 20 percent in some localities comes to mind. And it can be controlled relatively easily at some expense but in terms of cost-benefit ratio it is a highly cost-effective way of controlling this kind of pollution. It involves in most cases special technology, fairly simple technology to avoid the escape of these gaseous hydrocarbons into the atmosphere. It is also very cost effective in terms of saving of fuel and energy. That 15 percent of volume of hydrocarbons in the air, if it remains in the gasoline tank, is available for use as fuel rather than as a simple pollutant in the atmosphere.

Chairman MOORHEAD. Is EPA recommending that we require these devices that would prevent the pollution and save those hydrocarbons?

Mr. TRAIN. We are requiring this in a number of the transportation plans for individual cities such as San Diego under the regulatory authority which EPA has. They are either initiated by the community as part of the transportation plan which gets included in the State implementation plan under the Clean Air Act or in the absence of such initiation promulgated by EPA directly. So we do have this authority.

We are presently engaged in trying to determine the best system, the most cost-effective system for use. There are several technologies available.

We have a study underway at the present time which should be completed in August, again heavily centered on experience in San Diego where there has been a lot of experimentation with the systems to determine which is the best system to require. We do have the authority.

But I think you make a point which is well worth emphasizing, and that is that the transportation plans are energy conservative; in other words, at a time when we are concerned about saving energy, reducing energy demand these, the transportation control plans required by the Clean Air Act and promulgated by EPA help serve that purpose very substantially. It is not the reason why the authority was included in the Clean Air Act but it is certainly an ancillary benefit of great importance to the Nation at this time. The transportation plans are a very substantial way of saving a great deal of fuel otherwise in short supply.

Chairman MOORHEAD. Let me tell you, Mr. Train, that the people that I talk to back home say my gosh, we have an automobile. Because of the Clean Air Act and of the devices put on there I get less miles per gallon than I did before, and you force me to do this at a time when gasoline is in short supply. We ought to abandon the EPA requirement and have automobiles that can burn gasoline that will take me farther per mile than the present automobiles with their fancy devices. I get more miles from my 10-year-old car than I get from my 1-year-old car.

What do you say to that?

Mr. TRAIN. I appreciate you asking the question. [Laughter.]

It is true that auto emission control do involve a fuel penalty to date insofar as current technology employed is concerned.

I would only make one correction in your description of the statement that one is apt to hear and I would suggest that you remind your constituents it was Congress, not EPA, who required or set the automobile emission standards.

Chairman MOORHEAD. I will not make that correction because EPA does not have to run for reelection and we do.

Mr. TRAIN. We want to share the responsibility with you.

The average fuel penalty of the 1974 model year American automobile is something over 10 percent, 10 to 11 percent on a sales-weighted-average basis. I underline on a weighted-average basis because the large American automobiles, we refer to as the gas guzzlers, typically involve a penalty of substantially more than that, up to as much as around 18 percent or so as compared to an uncontrolled car, say pre-1968. For the average person driving such a car today, this is an important penalty in terms of fuel economy.

Small cars, it is worth noting, actually still show a fuel improvement over past years and this is important to bring out because it tends to emphasize the fact that it is the weight of the car which is the most significant factor in affecting fuel economy far beyond the effect of emission controls.

As you know, there are other factors beyond weight, such as air-conditioners and automatic transmissions, which have substantial effects; and in some cases, even more on fuel economy than emission controls. However, we do recognize that the current generation of cars definitely do have a fuel penalty resulting from the use of emission controls.

As we go into this next model year of 1975, I think around 80 percent of American cars will be equipped with the catalytic converter. The emission levels will be about 50 percent more stringently controlled than the 1974 cars, and yet at the same time, because of the use of the catalytic converter, we will be achieving substantially improved fuel economy in those cars as compared to the 1974 cars.

We had estimated last year an average improvement in fuel economy of around 7 percent. Our initial preliminary testing would suggest that this saving is going to be substantially higher. So I think that the American public can look forward to the 1975-model-year cars as being substantially more efficient fuelwise, and more satisfactory in terms of engine performance, than the 1974 cars.

Chairman MOORHEAD. What we are trying to establish here in this hearing is that transportation is more than just getting people into mass transit; it has a bearing on our whole urban living experience. The objective of getting people out of their automobile into a less polluting, energy conserving vehicle.

I suppose we have to examine whether new technology is going to eliminate all pollutants from automobiles and hence eliminate the need for mass transit from an air quality environmental standpoint.

Mr. TRAIN. I would doubt that that day would ever come. It seems to me that it is pretty hard to conceive of any internal combustion engine that is not going to produce some level of exhaust pollutants. As we move into alternative technologies, conceivably an electric-battery-driven automobile would not produce pollutants at the point of the automobile itself. It might in a powerplant however.

Now, I would think it would be a very safe generalization that mass transit will always have substantial advantages in terms of environmental quality. You said air quality. I would assume that in the terms of air quality itself that one could assume for planning purposes, that for the forseeable future mass transit would have substantial advan-

tages. There are also, of course, a whole range of associated environmental advantages in terms of reduced noise, reduced congestion, better patterns of urban land use and urban growth, that can be directly associated with mass transit, and I think that these are advantages which we should keep very much before us. At the same time, I think to keep the problem in perspective, no matter what we do in terms of mass transit it probably is only going to be serving a relatively small proportion of the Nation's population, I do not think we can expect 50 percent of the urban population of the country will use mass transit. We are talking about relatively small shifts. We certainly are not talking about doing away with the automobile. I think what we are talking about is providing an available alternative in areas where this makes sense, and I mention that because I think it is important to keep that kind of balance so it does not look as if we are talking automobile versus mass transit. It is just not that simple, as you well know.

Chairman MOORHEAD. You are familiar, probably, with some of the writings of Wilfred Owen of the Brookings Institution, particularly the integrated cities concept. In this concept the places that you live and work and shop are close together so that it reduces the necessity for travel. This would be, would it not, an improvement not only in air quality but quality of life generally in urban areas?

Mr. TRAIN. I do not think there is any question about it.

Chairman MOORHEAD. You mentioned the fact that people moved out into the suburbs but mass transit for various reasons, did not move there too. Should we not be thinking about more planned development outside of metropolitan areas rather than in unplanned sprawl which leads to the greater automobile use, which leads to pollution and other problems?

Mr. TRAIN. I am not sure which leads to the other but the result is certainly a typically rather unplanned and environmentally disadvantageous pattern of land use all over the United States. I would say that we need very clearly throughout the country much more effective rational regulation and guidance of land use, including transportation systems. I believe from the standpoint of our own particular statutory objectives in EPA for the reduction of air, noise and water pollution or whatever it might be, that these should be an integral objective, not the sole objective, plainly, but an integral part of comprehensive land use control and planning at the local State and regional level, and that this must be associated with strong transportation systems planning, that these have to go together. We recognize this more and more so that we do not in undertaking the measures such as I have described in terms of transportation control plans, be single-minded in terms of seeking an air quality objective without at the same time taking into account the other requirements of effective local and regional planning in the field of transportation needs, and economic and social requirements and so forth.

We are developing, I think, in EPA a stronger capability as well as a recognition in this area of the importance of working closely with the Department of Transportation, with the State and local governments. and I have recently set up a task force of EPA, State and local officials to work specifically in the area of land use and growth to help us really tie these various concerns together more

effectively and also help EPA be more responsive to the local needs which are hard sometimes to perceive from Washington with our own sole perspective, unless we do build in somehow, into the planning and decisionmaking mechanism, this representation from State and local government. This we are doing.

I am not sure, I think I have gotten far beyond your question.

Chairman MOORHEAD. Well, I have enjoyed the way you have gone on.

I would like to ask a question for the record.

You say that EPA has established 250 air quality control regions and that you have identified 30 urban areas that will need some form of additional controls.

For the record, could you give us the regions and the 30 urban areas?

Mr. TRAIN. I will submit those for the record.

[The following information was subsequently supplied for the record:]

PART 81—AIR QUALITY CONTROL REGIONS, CRITERIA, AND CONTROL TECHNIQUES

SUBPART A—MEANING OF TERMS

Sec.
81.1 Definitions.

SUBPART B—DESIGNATION OF AIR QUALITY CONTROL REGIONS

81.11 Scope.
81.12 National Capital Interstate Air Quality Control Region (District of Columbia, Maryland, and Virginia).
81.13 New Jersey-New York-Connecticut Interstate Air Quality Control Region.
81.14 Metropolitan Chicago Interstate Air Quality Control Region.
81.15 Metropolitan Philadelphia Interstate Air Quality Control Region (Pennsylvania-New Jersey-Delaware).
81.16 Metropolitan Denver, Colo., Intrastate Air Quality Control Region.
81.17 Metropolitan Los Angeles Air Quality Control Region.
81.18 Metropolitan St. Louis Interstate Air Quality Control Region (Missouri-Illinois).
81.19 Metropolitan Boston Intrastate Air Qaulity Region.
81.20 Metropolitan Cincinnati Interstate Air Quality Control Region.
81.21 The San Francisco Bay Area Intrastate Air Quality Control Region.
81.22 Greater Metropolitan Cleveland Intrastate Air Quality Control Region.
81.23 Southwest Pennsylvania Intrastate Air Quality Control Region.
81.24 Niagara Frontier Intrastate Air Quality Control Region.
81.25 Metropolitan Kansas City Intrastate Air Quality Control Region.
81.26 Hartford-New Haven-Springfield Interstate Air Quality Control Region.
81.27 Minneapolis-St. Paul Intrastate Air Quality Control Region.
81.28 Metropolitan Baltimore Intrastate Air Quality Control Region.
81.29 Metropolitan Indianapolis Intrastate Air Quality Control Region.
81.30 Southeastern Wisconsin Intrastate Air Quality Control Region.
81.31 Metropolitan Providence Interstate Air Quality Control Region.
81.32 Puget Sound Intrastate Air Quality Control Region.
81.33 Stuebenville-Weirton-Wheeling Interstate Air Quality Control Region.
81.34 Metropolitan Dayton Intrastate Air Quality Control Region.
81.35 Louisville Interstate Air Quality Control Region.
81.36 Phoenix-Tucson Intrastate Air Quality Control Region.
81.37 Metropolitan Detroit-Port Huron Intrastate Air Quality Control Region.
81.38 Metropolitan Houston-Galveston Intrastate Air Quality Control Region.
81.39 Metropolitan Dallas-Forth Woth Intrastate Air Quality Control Region.
81.40 Metropolitan San Antonio Intrastate Air Quality Control Region.
81.41 Metropolitan Birmingham Intrastate Air Quality Control Region.
81.42 Chattanooga Interstate Air Quality Control Region.
81.43 Metropolitan Toledo Interstate Air Quality Control Region.

§1.44 Metropolitan Memphis Interstate Air Quality Control Region.
§1.45 Metropolitan Atlanta Intrastate Air Quality Control Region.
§1.46 U.S. Virgin Islands Air Quality Control Region.
§1.47 Metropolitan Oklahoma City Intrastate Air Quality Control Region.
§1.48 Champlain Valley Interstate Air Quality Control Region.
§1.49 Southeast Florida Intrastate Air Quality Control Region.
§1.50 Metropolitan Omaha-Council Bluff's Interstate Air Quality Control Region.
§1.51 Portland Interstate Air Quality Control Region.
§1.52 Wasatch Front Intrastate Air Quality Control Region.
§1.53 Southern Louisiana-Southeast Texas Interstate Air Quality Control Region.
§1.54 Cook Inlet Intrastate Air Quality Control Region.
§1.55 Northeast Pennsylvania-Upper Delaware Valley Interstate Air Quality Control Region.
§1.57 Eastern Tennessee-Southwestern Virginia Interstate Air Quality Control Region.
§1.58 Columbus (Georgia)—Phenix City (Alabama) Interstate Air Quality Control Reegion.
§1.59 Cumberland-Keyser Interstate Air Quality Control Region.
§1.60 Duluth (Minnesota)—Superior (Wisconsin) Interstate Air Quality Control Region.
§1.61 Evansville (Indiana)—Owensboro-Henderson (Kentucky) Interstate Air Quality Control Region.
§1.62 Northeast Mississippi Intrastate Air Quality Control Region.
§1.63 Metropolitan Fort Smith Interstate Air Quality Control Region.
§1.64 Huntington (West Virginia)—Ashland (Kentucky)—Portsmouth-Ironton (Ohio) Interstate Air Quality Control Region.
§1.65 Joplin (Missouri)—Northeast Oklahoma Interstate Air Quality Control Region.
§1.66 Southeast Minnesota-La Crosse (Wisconsin) Interstate Air Quality Control Region.
§1.67 Lake Michigan Intrastate Air Quality Control Region.
§1.68 Mobile (Alabama)—Pensacola-Panama City (Florida)-Southern Mississippi Interstate Air Quality Control Region.
§1.69 Paducah (Kentucky)—Cairo (Illinois) Interstate Air Quality Control Region.
§1.70 Parkersburg (West Virginia)Marietta (Ohio) Interstate Air Quality Control Region.
§1.71 Rockford (Illinois)—Janesville-Beloit (Wisconsin) Interstate Air Quality Control Region.
§1.72 Tennessee River Valley (Alabama)-Cumberland Mountains (Tennessee) Interstate Air Quality Control Region.
§1.73 South Bend-Elkhart (Indiana)—Benton Harbor (Michigan) Interstate Air Quality Control Region.
§1.74 Northwest Pennsylvania-Youngstown Interstate Air Quality Control Region.
§1.75 Metropolitan Charlotte Interstate Air Quality Control Region.
§1.76 State of Hawaii Air Quality Control Region.
§1.77 Puerto Rico Air Quality Control Region.
§1.78 Metropolitan Portland Intrastate Air Quality Control Region.
§1.79 Northeastern Oklahoma Intrastate Air Quality Control Region.
§1.80 Clark-Mohave Interstate Air Quality Control Region.
§1.81 Merrimack valley-Southern New Hampshire Interstate Air Quality Control Region.
§1.82 El Paso-Las Cruces-Alamogordo Interstate Air Quality Control Region.
§1.83 Albuquerque-Mid-Rio Grande Intrastate Air Quality Control Region.
§1.84 Metropolitan Fargo-Moorhead Interstate Air Quality Control Region.
§1.85 Metropolitan Sioux Falls Interstate Air Quality Control Region.
§1.86 Metropolitan Sioux City Interstate Air Quality Control Region.
§1.87 Metropolitan Boise Intrastate Air Quality Control Region.
§1.88 Metropolitan Billings Intrastate Air Quality Control Region.
§1.89 Metropolitan Cheyenne Intrastate Air Quality Control Region.
§1.90 Androscoggin Valley Interstate Air Quality Control Region.

81.91 Jacksonville (Florida)—Brunswick (Georgia) Interstate Air Quality Control Region.
81.92 Monroe (Louisiana)—El Dorado (Arkansas) Interstate Air Quality Control Region.
81.93 Metropolitan Norfolk Intrastate Air Quality Control Region.
81.94 Shreveport-Texarkana-Tyler Interstate Air Quality Control Region.
81.95 Central Florida Intrastate Air Quality Control Region.
81.96 West Central Florida Intrastate Air Quality Control Region.
81.97 Southwest Florida Intrastate Air Quality Control Region.
81.98 Burlington-Keokuk Interstate Air Quality Control Region.
81.99 Arizona-New Mexico Southern Border Interstate Air Quality Control Region.
81.100 Eastern Washington-Northern Idaho Interstate Air Quality Control Region.
81.101 Metropolitan Dubuque Interstate Air Quality Control Region.
81.102 Metropolitan Quad Cities Interstate Air Quality Control Board.
81.104 Central Pennsylvania Intrastate Air Quality Control Region.
81.105 South Central Pennsylvania Intrastate Air Quality Control Region.
81.106 Greenville-Spartanburg Intrastate Air Quality Control Region.
81.107 Greenwood Intrastate Air Quality Control Region.
81.108 Columbia Intrastate Air Quality Control Region.
81.109 Florence Intrastate Air Quality Control Region.
81.110 Camden-Sumter Intrastate Air Quality Control Region.
81.111 Georgetown Intrastate Air Quality Control Region.
81.112 Charleston Interstate Air Quality Control Region.
81.113 Savannah (Georgia)—Beaufort (South Carolina) Interstate Air Quality Control Region.
81.114 Augusta (Georgia)—Aiken (South Carolina) Interstate Air Quality Control Region.
81.115 Northwest Nevada Intrastate Air Quality Control Region.
81.116 Northern Missouri Intrastate Air Quality Control Region.
81.117 Southeast Missouri Intrastate Air Quality Control Region.
81.118 Southwest Missouri Intrastate Air Quality Control Region.
81.119 Western Tennessee Intrastate Air Quality Control Region.
81.120 Middle Tennessee Intrastate Air Quality Control Region.
81.121 Four Corners Interstate Air Quality Control Region.
81.122 Mississippi Delta Intrastate Air Quality Control Region.
81.123 Southeastern Oklahoma Intrastate Air Quality Control Region.
81.124 North Central Oklahoma Intrastate Air Quality Control Region.
81.125 Southwestern Oklahoma Intrastate Air Quality Control Region.
81.126 Northwestern Oklahoma Intrastate Air Quality Control Region.
81.127 Central New York Intrastate Air Quality Control Region.
81.128 Genesee-Finger Lakes Intrastate Air Quality Control Region.
81.129 Hudson Valley Intrastate Air Quality Control Region.
81.130 Southern Tier East Intrastate Air Quality Control Region.
81.131 Southern Tier West Intrastate Air Quality Control Region.
81.132 Abilene-Wichita Falls Intrastate Air Quality Control Region.
81.133 Amarillo-Lubbock Intrastate Air Quality Control Region.
81.134 Austin-Waco Intrastate Air Quality Control Region.
81.135 Brownsville-Laredo Intrastate Air Quality Control Region.
81.136 Corpus Christi-Victoria Intrastate Air Quality Control Region.
81.137 Midland-Odessa-San Angelo Intrastate Air Quality Control Region.
81.138 Central Arkansas Intrastate Air Quality Control Region.
81.139 Northeas Arkansas Intrastate Air Quality Control Region.
81.140 Northwest Arkansas Intrastate Air Quality Control Region.
81.141 Berkshire Intrastate Air Quality Control Region.
81.142 Central Massachusetts Intrastate Air Quality Control Region.
81.143 Central Virgina Intrastate Air Quality Control Region.
81.144 Northeastern Virginia Intrastate Air Quality Control Region.
81.145 State Capital Intrastate Air Quality Control Region.
81.146 Valley of Virginia Intrastate Air Quality Control Region.
81.147 Eastern Mountain Intrastate Air Quality Control Region.
81.148 Eastern Piedmont Intrastate Air Quality Control Region.
81.149 Northern Coastal Plain Intrastate Air Quality Control Region.

81.150 Northern Piedmont Intrastate Air Quality Control Region.
81.151 Sandhills Intrastate Air Quality Control Region.
81.152 Southern Coastal Plain Intrastate Air Quality Control Region.
81.153 Western Mountain Intrastate Air Quality Control Region.
81.154 Eastern Shore Intrastate Air Quality Control Region.
81.155 Central Maryland Intrastate Air Quality Control Region.
81.156 Southern Maryland Intrastate Air Quality Control Region.
81.157 North Central Wisconsin Intrastate Air Quality Control Region.
81.158 Southern Wisconsin Intrastate Air Quality Control Region.
81.159 Great Basin Valley Intrastate Air Quality Control Region.
81.160 North Central Coast Intrastate Air Quality Control Region.
81.161 North Coast Intrastate Air Quality Control Region.
81.162 Northeast Plateau Intrastate Air Quality Control Region.
81.163 Sacramento Valley Intrastate Air Quality Control Region.
81.164 San Diego Intrastate Air Quality Control Region.
81.165 San Joaquim Valley Intrastate Air Quality Control Region.
81.166 South Central Coast Intrastate Air Quality Control Region.
81.167 Southeast Desert Intrastate Air Quality Control Region.
81.168 Great Falls Intrastate Air Quality Control Region.
81.169 Helena Intrastate Air Quality Control Region.
81.170 Miles City Intrastate Air Quality Control Region.
81.171 Missoula Intrastate Air Quality Control Region.
81.172 Comanche Intrastate Air Quality Control Region.
81.173 Grand Mesa Intrastate Air Quality Control Region.
81.174 Pawnee Intrastate Air Quality Control Region.
81.175 San Isabel Intrastate Air Quality Control Region.
81.176 San Luis Intrastate Air Quality Control Region.
81.177 Yampa Intrastate Air Quality Control Region.
81.178 Southern Delaware Intrastate Air Quality Control Region.
81.179 Aroostock Intrastate Air Quality Control Region.
81.181 Down East Intrastate Air Quality Control Region.
81.182 Northwest Maine Intrastate Air Quality Control Region.
81.183 Eastern Connecticut Intrastate Air Quality Control Region.
81.184 Northwestern Connecticut Intrastate Air Quality Control Region.
81.185 Northern Washington Intrastate Air Quality Control Region.
81.187 Olympic-Northwest Washington Intrastate Air Quality Control Region.
81.189 South Central Washington Intrastate Air Quality Control Region.
81.190 Eastern Idaho Intrastate Air Quality Control Region.
81.191 Appalachian Intrastate Air Quality Control Region.
81.192 Bluegrass Instrastate Air Quality Control Region.
81.193 North Central Kentucky Intrastate Air Quality Control Region.
81.194 South Central Kentucky Intrastate Air Quality Control Region.
81.195 Central Michigan Intrastate Air Quality Control Region.
81.196 South Central Michigan Intrastate Air Quality Control Region.
81.197 Upper Michigan Intrastate Air Quality Control Region.
81.199 East Alabama Intrastate Air Quality Control Region.
81.200 Metropolitan Columbus Intrastate Air Quality Control Region.
81.201 Mansfield-Marion Intrastate Air Quality Control Region.
81.202 Northwest Ohio Intrastate Air Quality Control Region.
81.203 Sandusky Intrastate Air Quality Control Region.
81.204 Wilmington-Chillicothe-Logan Intrastate Air Quality Control Region.
81.205 Zanesville-Cambridge Intrastate Air Quality Control Region.
81.213 Casper Intrastate Air Quality Control Region.
81.214 Black Hills-Rapid City Intrastate Air Quality Control Region.
81.215 East Central Indiana Intrastate Air Quality Control Region.
81.216 Northeast Indiana Intrastate Air Quality Control Region.
81.217 Southern Indiana Intrastate Air Quality Control Region.
81.218 Wabash Valley Intrastate Air Quality Control Region.
81.219 Central Oregon Intrastate Air Quality Control Region.
81.220 Eastern Oregon Intrastate Air Quality Control Region.
81.221 Southwest Oregon Intrastate Air Quality Control Region.
81.226 Lincoln-Beatrice-Fairbury Intrastate Air Quality Control Region.
81.230 Allegheny Intrastate Air Quality Control Region.
81.231 Central West Virginia Intrastate Air Quality Control Region.

81.232 Eastern Panhandle Intrastate Air Quality Control Region.
81.233 Kanawha Valley Intrastate Air Quality Control Region.
81.234 North Central West Virginia Intrastate Air Quality Control Region.
81.235 Southern West Virginia Intrastate Air Quality Control Region.
81.236 Central Georgia Intrastate Air Quality Control Region.
81.237 Northeast Georgia Intrastate Air Quality Control Region.
81.238 Southwest Georgia Intrastate Air Quality Control Region.
81.239 Upper Rio Grande Valley Intrastate Air Quality Control Region.
81.240 Northeastern Plains Intrastate Air Quality Control Region.
81,241 Southwestern Mountain-Augustine Plains Intrastate Air Quality Control Region.
81.242 Pecos-Permian Basin Intrastate Air Quality Control Region.
81.243 Central Minnesota Intrastate Air Quality Control Region.
81.244 Northwest Minnesota Intrastate Air Quality Control Region.
81.245 Southwest Minnesota Intrastate Air Quality Control Region.
81.246 Northern Alaska Intrastate Air Quality Control Region.
81.247 South Central Alaska Intrastate Air Quality Control Region.
81.248 Southeastern Alaska Intrastate Air Quality Control Region.
81.249 Northwest Oregon Intrastate Air Quality Control Region.
81.250 North Central Kansas Intrastate Air Quality Control Region.
81.251 Northeast Kansas Intrastate Air Quality Control Region.
81.252 Northwest Kansas Intrastate Air Quality Control Region.
81.253 South Central Kansas Intrastate Air Quality Control Region.
81.254 Southeast Kansas Intrastate Air Quality Control Region.
81.255 Southwest Kansas Intrastate Air Quality Control Region.
81.256 Northeast Iowa Intrastate Air Quality Control Region.
81.257 North Central Iowa Intrastate Air Quality Control Region.
81.258 Northwest Iowa Intrastate Air Quality Control Region.
81.259 Southwest Iowa Intrastate Air Quality Control Region.
81.260 South Central Iowa Intrastate Air Quality Control Region.
81.261 Southeast Iowa Intrastate Air Quality Control Region.
81.262 North Central Illinois Intrastate Air Quality Control Region.
81.263 East Central Illinois Intrastate Air Quality Control Region.
81.264 West Central Illinois Intrastate Air Quality Control Region.
81.265 Southeast Illinois Intrastate Air Quality Control Region.
81.266 Alabama and Tombigbee Rivers Intrastate Air Quality Control Region.
81.267 Southeast Alabama Intrastate Air Quality Control Region.

AUTHORITY: The provisions of this Part 81 issued under sections 107(a) and 301(a), 81 Stat. 490, 504; Reorg. Plan 3 of 1970; 42 U.S.C. 1857c-2(a), 1857g(a), 3 CFR 1970 Comp.

SOURCE: The provisions of this Part 81 appear at 36 F.R. 22421, Nov. 25, 1971, unless otherwise noted.

AIR QUALITY CONTROL REGIONS WHERE TRANSPORTATION CONTROLS ARE NEEDED TO ACHIEVE NATIONAL AIR QUALITY STANDARDS BY THE STATUTORY DEADLINE

1. Boston, Mass.
2. Springfield, Mass.
3. New York City.
4. Rochester, N.Y.
5. Northern New Jersey (Newark-New Jersey).
6. Southern New Jersey (Camden-Trenton).
7. Philadelphia.
8. Pittsburgh.
9. Baltimore.
10. Washington, D.C.
11. Cincinnati.
12. Indianapolis.
13. Chicago.
14. Minneapolis.
15. San Antonio.
16. Houston-Galveston.
17. Dallas-Fort Worth.
18. Denver.
19. Salt Lake City.
20. Phoenix-Tucson.
21. Fresno.
22. San Francisco.
23. San Diego.
24. Los Angeles.
25. Sacramento.
26. Seattle.
27. Spokane.
28. Fairbanks.
29. Portland, Oreg.

Chairman MOORHEAD. The next question you might answer now, or again, for the record.

In your oral statement you talk about ridership in mass transit. Are you familiar with the market share concept as a formula for Federal assistance to mass transit. It is a formula to encourage localities to get the individual out of his automobile and onto the mass transit system. It is better than pure ridership as an incentive to attract automobile drivers.

You may comment on that now or give us a more detailed explanation for the record.

Mr. TRAIN. I think I might try to do that for the record, if I may, Mr. Chairman. I am generally familiar with the concept but I think we have others in the agency who are much more knowledgeable and perhaps I can counsel with them.

[The following information was subsequently supplied for the record:]

Under the market share approach of allocating urban transportation funds, those cities possessing developed transit systems would benefit to a greater extent than those with poor ones. Such communities as Los Angeles, Denver, and Phoenix would be placed at a distinct disadvantage while, for example, New York would benefit considerably from the "market share" approach. We believe that communities needing development assistance should not be placed in a disadvantageous position. Whatever formula is devised should recognize that there are communities that need improvement assistance while others will need development assistance.

Chairman MOORHEAD. Your testimony, as I said earlier, is so involved with the automobile. In the city of Pittsburgh, we had smog, particularly post-World War II, which was particulate material, largely resulting from the burning of coal and coke. But we did clear up that problem. Now we have gaseous emissions which are our primary source of air pollution and which are primarily from the automobile, the bus, and so forth. Is this the standard across the United States, that the major source of air pollution is the automobile, petroleum burnings, and so forth?

Mr. TRAIN. No; I think it is not fair to put that much onus on the automobile. The automobile is certainly a very substantial contributor to air pollution problems in the country but in many areas stationary sources, powerplants, in particular, manufacturing sources, also represent a very substantial part of the air quality problem. It tends to vary. The picture is mixed even from automobile pollutants. In some areas the emphasis may be on carbon monoxide while in other areas hydrocarbons. One gets very different results in different parts of the country depending upon climatic, meteorological, and other factors.

Let me make one point which I think in passing I touched on and that was as you did yourself, the fact that mass transit represents an energy-saving mechanism. I think it is important to emphasize this. I do not think that shifting to mass transit is going to solve the energy problems of the country. At the same time, it is an important factor, I believe, in any concerted national strategy for reducing energy demand. It would go hand in hand, for example, with a movement to smaller automobiles on the part of the American automobile industry, automobiles that would achieve about twice the fuel economy at the present time, upwards of around 20 to 24 miles per gallon, which certainly easily is within the reach of technology. Many cars achieve this

at the present time. It would save us around 3 to 3½ million barrels a day if all of our cars achieved that kind of economy. That is the kind of goal, it seems to me, that we have to move to. But mass transit at the same time, is a far more energy efficient way of moving people. This must be part of, as I said, any comprehensive national strategy for reducing energy demand and I think this is an exceedingly urgent need in this country at the present time and for the foreseeable future. There is no way that we can solve our energy problems simply by increasing supplies. I believe this is sort of a very illusory or self-illusory approach to think that you can. I think that in terms of balance of payment protection, in terms of reducing inflation, in terms of giving us time to develop new energy sources carefully and rationally, rather than in sort of a panic, with a panic approach, it is essential that we reduce energy demand.

Chairman MOORHEAD. You give me that as sort of a closing question to wrap it up, so let me interrupt for a moment.

In your oral statement you ask the ultimate question about mass transit; will the public use it? Then later you talk about what I call disincentives, parking surcharges and gasoline rationing.

Do you think we need disincentives such as those two I have mentioned, in order to develop a favorable answer to the question will the public use it?

Mr. TRAIN. Frankly, I am not personally keen on those kinds of disincentives. I think that we should try to provide a real option, and if we do, hopefully more and more the public will use it. At the present time, the mass transit alternative is largely illusory in many places, as you know, even where mass transit exists. It may be dirty, it may not be safe, it may not go to the right places, and I think if we can solve those problems then people will use mass transit.

I think the experience with free bus facilities, say, in downtown Seattle, has indicated a very sharp upsurge in ridership when there is an easy, convenient, efficient system at hand.

Now, the kinds of disincentives I was talking about were parking surcharges, things of this sort. They are believed to be in terms of the studies that have been done, very effective in shifting people away from the automobile but it is the kind of approach again which I think is very negative in its concept and preferable to keep away from. As I said, if any communities wish to try surcharges, we certainly will approve them as part of their transportation plans, if they initiate them, but we are not going to push them on any communities.

On the whole, I think that incentives rather than disincentives are more productive in terms of public response and I think here we are really dealing with lifestyles and with people's individual preferences and I think the best thing to do is to try to educate and attract rather than trying to bludgeon people out of their cars and into mass transit.

Chairman MOORHEAD. Well, politically, the carrot is always more attractive than the stick to get the beast to move.

Mr. TRAIN. Often more effective.

Chairman MOORHEAD. Today you are an environmentalist, 10 years ago you were a conservationist. Should we not be thinking a little bit more of conservation in the sense of saving our energy, our materials? Should we not be thinking that everincreasing consumption has come to an end and is that not related to the things we are discussing here today?

Mr. TRAIN. Absolutely. I think that I have said on several occasions that we as a nation should declare war on waste. That is sort of one of those nice round phrases that sounds good in public but in many ways I think it is absolutely the need that we have.

We have recently been caught short by an energy crisis and so far as I am aware, this energy problem is going to be with us for the foreseeable future, 5, 10, 15 years or more. I think we are seeing an increasing problem in terms of food supply in the world at large and I think this is going to continue to get a lot worse. We are seeing increasing shortages of various raw materials, and I would assume this is going to get worse. I think we are reaching, we have reached, I will change my tense, the point where we have gotten out of balance with our environment in a very broad sense and we do need to have a new conservation ethic that is built upon living within our means rather than living on the capital of the future. And that is really what we have been doing in terms of fossil fuels and fertility of our soils and fisheries of the oceans.

I hate to think what we are leaving for future generations. We act as if the world is here for our use. The hell with the future. And I think we do have to very substantially change this whole attitude and I think it is going to take strong governmental leadership and leadership from every sector of our society to try to achieve this. I think it is a matter of real urgency and it is not a matter that can be felt simply to a hopeful change in market factors or private preferences. I think it is going to take leadership and it is going to take a certain amount of regulatory push.

Chairman MOORHEAD. I think you are providing national and international leadership of that kind, for which I commend you.

I have some more questions that I will submit, if you do not mind, for the record. I want to ask about the structure of the Clean Air Act and the effectiveness of developing objectives and then having the localities achieve these objectives by their own devices. Can this be adapted to transportation policy?

But in many fields which go far beyond urban transportation, I think the words that you have just said about war against waste should be printed on the minds of every American. You do a magnificent job of doing that.

Mr. TRAIN. Thank you, Mr. Chairman.

Chairman MOORHEAD. Thank you for your testimony.

[The following information was subsequently supplied for the record:]

Under the Clean Air Act States are required to develop implementation plans to achieve and maintain National Ambient Air Quality Standards. These plans first identify the problem to be solved including the contribution of individual major sources and second, provide a control strategy geared at meeting the standard by the statutory deadline. EPA provides guidance to States in a variety of ways including assistance on the extent sources can be controlled, but the ultimate decision on the control of individual sources is left up to the State. This approach recognizes that each community's air pollution problems are somewhat unique, hence, their control strategy should be tailored to individual local circumstances.

With respect to establishing statutory deadlines, some recognition of the existing and anticipated levels of pollution is necessary. It should be noted, however, that the science of air pollution control is an evolving one. As a greater volume and more reliable monitoring data become available, we find that the levels of pollution in individual cities may either be less or more than originally thought, hence, deadlines in some cases will have to be changed.

In regards to quantifiable objectives, the existence of such objectives acts as a target thereby allowing various control approaches to be considered. At all times, however, the target is the main focus and the options considered are tailored to achieving it.

Chairman MOORHEAD. The subcommittee would now like to hear from Mr. Louis J. Gambaccini, vice president and general manager of the Port Authority Trans-Hudson. He will give us the views of the Institute of Rapid Transportation on urban transportation.

Nice to have you here with us and we appreciate your arriving in time to give us the benefit of your thinking.

Mr. GAMBACCINI. Thank you.

Chairman MOORHEAD. I might say I think the first time I ever made a speech on this subject, quite a number of years ago, was before the Institute for Rapid Transit's annual meeting in Philadelphia.

## STATEMENT OF LOUIS J. GAMBACCINI, CHAIRMAN, GOVERNMENT AFFAIRS COMMITTEE, INSTITUTE FOR RAPID TRANSIT, AND DIRECTOR, AMERICAN TRANSIT ASSOCIATION

Mr. GAMBACCINI. We have enjoyed our relationship and your leadership in the field of urban affairs and mass transportation, Mr. Chairman.

Mr. Chairman, my name is Louis J. Gambaccini, and I am vice president and general manager of the Port Authority Trans-Hudson (PATH) rapid transit system, a subsidiary of the Port Authority of New York and New Jersey. I am appearing today in my capacity as chairman of the government affairs committee of the Institute for Rapid Transit and as a director of the American Transit Association. These two agencies are in the process of merging to become the American Public Transit Association, which will represent all urban public transport operations in the country.

As a public transport operator, I am very pleased by the increased concern with public transportation as a vital public service and with its role in achieving significant progress in many areas of national concern. Your subcommittee's inquiry is indicative of this increasing concern not just with what is being done to improve public transportation, but why it is being done. At a fairly general level, there is substantial acceptance of public transportation service as a means for achieving goals in related social, environmental, and energy fields. But this recent acceptance of the need for improved public transportation must be placed against the background of a long-term decline in the industry's condition. Over the past 30 or 40 years, public transportation has been the most neglected sector of our national transportation resources. With a heavy concentration on highway construction and the decentralization of our population, privately owned transportation operations suffered great financial setbacks. During this time period, there was little or no incentive or capacity within the industry for research, for planning or even for the necessary elements of marketing, maintenance, and management to offer an acceptable service. Now, with a heightened sense of public transportation's contribution to the goals of energy conservation, environmental enhancement, and a better urban life, public policy has "rediscovered" this neglected mode. In order that it really be capable of a significant contribution, major strides are needed to make up for the lost time—

not only in terms of funding, but in the development of policies and a rational basis for planning and decisionmaking. We are beginning to develop some measures of transit's importance, some of which I have included in my statement for background. More such work is necessary to advance transit planning and policy to the level of sophistication already achieved by the highway program.

The energy consequences of our long dependency on the private automobile as a main source of urban mobility came to haunt us in the recent period of petroleum shortage. Even though this was a short-lived "crisis," I hope that we take it as a timely reminder of our energy dependency and that this warning leads to effective new policies to deal with what is clearly a long-term and vital dilemma of this country, if not indeed the world. Both the facts and the policy responses during the crisis indicate the significance of urban transit improvements as a means of energy conservation.

Aggregate studies of energy consumption in the New York metropolitan region, carried out by the regional plan association, show that public transportation modes—rail and bus—carry about 19 percent of the region's annual surface passenger trips and account for about 16 percent of the surface passenger miles traveled. Yet, these modes comprise only 8 percent of the region's surface transportation energy consumption.

Studies of transit efficiency in specific applications show even more dramatic results. Data provided by the Cleveland transit system estimates the efficiency of their buses as 14 to 17 times that of the auto in rush hours and the efficiency of their rapid transit cars as 18 to 36 times the auto, all expressed in terms of passenger-miles per gallon of fuel consumed.

Perhaps the most telling example of the energy implications of urban transit, however, was provided in the policy area by the Federal Energy Office. In preparing contingency plans for gasoline rationing during the recent crunch, the FEO officials allocated 10 to 20 percent less gasoline to motorists in cities with good transit than those residing in the cities which have little or no service. It is particularly significant that the lowest allocations were slated for cities such as New York, Boston, Philadelphia, and Chicago which have extensive rail transit systems.

The role of transit services as a tool for environmental enhancement is also a matter of demonstrated fact as well as accepted policy. Pollution output, of course, is essentially the waste product of energy input. The more efficient powerplants and motors of public transportation carriers and their far more efficient carrying capability give them a tremendous advantage over the private automobile. As a generalization, the diesel bus enjoys a 25-to-1 advantage over the auto and the electric transit vehicle a ratio of 40 to 1 over the auto when the various pollutants are scaled according to volume and toxicity.

Policy determinations at both the national and local level have taken into account the environmental advantages of public transportation. Regional air quality plans prepared in furtherance of the standards of the Clean Air Act place heavy reliance on the availability of public transportation services as a means of achieving sufficient reduction into auto travel to meet the pollution abatement goals.

Air quality officials are moving to make these policies operational. For example, since low transit fares are considered a positive factor in attracting ridership away from the auto, the Federal Environment Protection Agency has intervened in cases where transit operators have proposed fare increases out of economic necessity. Likewise, Environmental Protection officials have been on the side of toll increases for autos as a means of diverting traffic away from that mode.

The environmental and energy consequences of public transportation service are not always a matter of such short-term factors as fares or particular levels of service on a given line. In fact, the long-term development of entire regions is seen by many as being strongly influenced by the type of transportation services provided.

A few areas in the United States and more in other countries suggest through example that the provision of good transit services, preferably on a fixed guideway, can be a major element in stimulating a far more efficient style of development. The fixed guideway system, whatever its technology, can create a clustering of development based on a mix of private and public investment with confidence in the continued availability of transportation. Corridor development in Toronto along rail rights-of-way—and even in advance of their construction, and the stimulus to downtown growth in San Francisco and Atlanta as the transit system entered the planning stages—indicates this concentrating power. Obviously, caution must be exercised in the degree of development, but there are clear energy and environmental benefits to a pattern of increased concentration. For example, with its efficient public transportation system and its more concentrated development, New York City consumes just a little over half the national average energy per capita—139 million Btu's per year versus the national average of 254.

Other matters of national policy also relate directly to transit investment and development. Human resources can also be conserved by substituting safer public transportation travel for the much greater risks of the automobile. And the social or economic isolation of many urban dwellers—the poor, the unemployed, the elderly, and the handicapped, to mention only a few—can be alleviated by better transportation.

Given the national significance of energy, environment, social and economic development and the high priority of these issues as matters of national policy, one would naturally presume that our transportation policy would include a strong emphasis on the use of public transportation, by whatever mode is most appropriate, as a means of achieving national goals. With the proven ability of public transportation to contribute to the resolution of these problems, this would seem a natural and logical development. Russell Train said recently:

> Our energy and environmental problems are one and the same, and measures to conserve energy are also measures to insure a cleaner and safer environment.

I would agree strongly with this statement, adding public transportation to the equation. The general goals of energy, environment and public transportation improvement are largely congruent, and one would expect to see transportation policies formulated on this basis of achieving such compelling national goals as energy conservation and environmental improvement.

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Your subcommittee has suggested the need for a greater orientation to planning in the transit program, and we in the industry agree completely. I would like to review with you today two industry proposals for giving a broader focus to the subject of transit investment.

First, we call for the development of a national urban transit plan and policy. This call is included in the legislative program adopted by the Institute for Rapid Transit and joined in by the American Transit Association, the National League of Cities and the U.S. Conference of Mayors. This plan and policy would, in our view, provide the basis for the national, as well as regional, transit commitment we need. While the plan would ultimately identify an inventory of needed projects, lines on a map, as it were, it should be more than this. As a policy statement and as a plan, there should be consideration of and broad, flexible guidelines for area coverage of urban transportation, for levels of service, for institutional relationships and even for the basic goals of urban transportation. Such national standards for design and service levels have long provided the basis for the highway program's national success. Yet, as in the highway program, there must be a strong input from State, regional and local levels in the development of the national program and a tolerance for diversity and deviation from standards where warranted.

The ability of such a statement of national purpose to mobilize resources for a long-term project should not be minimized. It is on the basis of just such a statement that we were able to carry forward the manned space program within its targeted time frame and with such enviable results. In our own area of ground transportation, the continued progress of the Interstate Highway System provides strong evidence that a well-defined national commitment can generate the kind of momentum necesssary to carry a program through. I would mention, nothwithstanding overruns and costs and time frame, the commitments to the ultimate goal was there and facilitated the execution throughout nothwithstanding hurdles. But, despite some tentative efforts, perhaps more rhetorical than real, there has been no commitment comparable to the space or highway programs for public transportation.

Instead, we see the Department of Transportation seemingly retreating from any position of policy influence in urban transportation, while other Federal agencies with peripheral concerns are increasingly making their voices heard on transportation matters.

I would note especially the Federal Energy Office and the Environmental Protection Agency are perhaps doing the most significant policy formulation in the field of public transportation.

Chairman MOORHEAD. Do you know any reason why this is taking place? Does it not seem rather strange?

Mr. GAMBACCINI. I think it underscores the compelling need for improved coordination in the Federal Government as among the several agencies, each have a vital concern. The Department of Transportation presumably should have the lead role in that coordination. I think there is some progress but not nearly enough as against the needs that are so evident.

I believe there is some reservation on the part of the Secretary with respect to the potential for defining a national plan and policy. I believe he testified to that effect to this subcommittee. And we have been

in active dialog with the Secretary and members of his staff in an effort to try to build more momentum in the direction of policy formulation and long-term transportation planning with the particular emphasis on interdepartmental coordination and particularly of goals and policies.

Chairman MOORHEAD. Let me ask one more thing. When there was debate about whether urban transportation should be considered as part of city planning and hence, should be in the Department of Housing and Urban Development or whether it is really transportation, in which case it should be in the Department of Transportation, we finally opted for Department of Transportation. It is discouraging, if your testimony is correct, that DOT seems to be backing away, more interested in highways and intercity rather than intracity transportation.

Mr. GAMBACCINI. I think the point is valid, that there has been more of a concern in the Department with intercity air and rail than there has been with urban transport, which has pretty much been delegated to State and local governments for decisionmaking as part of the new federalism. I believe there must be a stronger role essential for the Federal Government, at least, as I will indicate in the remaining part of my testimony, insofar as a legitimate continuing Federal role in developing general guidelines and broad policy objectives.

Chairman MOORHEAD. I will restrain myself and will not interrupt again.

Mr. GAMBACCINI. Without a national policy and national plans based on these policies, there is a natural tendency to focus solely on costs on the short-term budget cycle, and on a narrowly defined concept of cost-effectiveness. When you look at a program within such constraints, a cost-effective transportation system is bound to mean a system which can be quickly implemented and which, above all, is cheap. The long-term implications of transit investment in terms of its ability to shape regional development, or even its contributions to other national goals such as energy and environment, do not fit within the framework of the annual budget review. Thus, unless there are explicit national policies which direct concern for the long-term considerations and the full range of social costs and values, the Federal tendency will be toward measures of short-term success in terms of the number of areas assisted, the number of buses purchased, and the like.

With the policy decision in the new Budget Act that long-term contract authority will not be used, it is even more critical that a national plan be established to guide our long-term efforts in transit system development. Guidelines as to the orderly progression of Federal funding are badly needed so that our cities can marshal their resources for long-term commitment through delicate mechanisms such as referendums and the creation of tax resources.

Some contend that transit planning is strictly a local issue and that there is no role for a national plan. In light of the many vital national implications of transit development, I cannot see how a national role or best efforts at the development of a national policy and plan can responsibly be avoided. Energy consumption and conservation is a national concern, and transit saves energy. Environmental enhancement is a national objective, and shifting trips from the auto to transit improves the environment. Highway deaths are a national tragedy, and transit is a safer means of travel. The future shape of urban development is a matter which must concern us all, as it critically affects the

economy, the allocation of scarce resources (dollars, land, et cetera) and the quality of life. With a projected increase from 25 to some 44 to 50 areas, over 1 million by the year 2000, and with 5 out of 6 Americans expected to live in the megalopolitan regions, transit planning to influence this inevitable growth must be a national issue.

Of course, there are still significant gaps in our knowledge of the relationships between transit investment and these major concerns. Without better information, there will be a continuing temptation to restrict planning and analysis to the narrow cost parameters of the transportation system instead of properly including key factors of environmental and social costs. Transit operators are aware of these research needs, which to date we have been unable to pursue because of our focus on survival. In order to focus our thinking in this area and be an effective contributor to the research process, the Institute for Rapid Transit Board of Directors has organized a working group to consider how such a national urban transit plan and policy should evolve. The members of this working group, in their discussions, have identified not only the need for a policy statement, which they are drafting, but for better research into the broad factors which underlie the planning process. In order to demonstrate the need for transit development, we must be able to do a better job of identifying and tracing the linkages between transit and regional growth, environmental enhancement, energy conservation and the like.

The working group has begun to identify the specific areas where such research is now being carried out and is developing ideas on how we, both as individuals interested in transit progress and through our new APTA organization, can be more effective in monitoring, shaping, contributing to, and where necessary, refuting the output of economic and planning research. We propose to work closely with the Department of Transportation, the Federal Energy Administration, the Environmental Protection Administration, your Office of Technology Assessment, the Transportation Research Board and the universities to bring about better understanding of the dynamics of transit and regional development. Such research provides the input to national transportation policy, which in turn will guide the future of the transit program. There are matters in which we, as transit operators concerned with that program's future, become involved.

Finally, I should not let the opportunity pass to stress our need for action on basic transit legislation this year. As strongly as I believe in the need for an improved planning process, it is ever more important that momentum not be lost in implementing and continuing the process of transit improvement that has been underway since the Urban Mass Transportation Act of 1964 was first passed. At this time, it is critical that an operating assistance option be added to the program so that existing transit resources can be preserved and ridership maintained at a reasonable fare level. A substantial increase in capital funding is also needed in order to continue progress on development plans generated through the local planning process. These capital funds should be available on an equitable basis to all areas with soundly developed plans for transit improvement, with no artificial barriers to the type of systems planned. The analysis to back up these grants must be done on a site-specific basis rather than according to arbitrary criteria, but we believe it can develop into a flexible overall national plan and policy, dynamic in its everchanging

nature but reasonably rooted in the determination of long-term goals, physical and service guidelines to achieve those ends.

Timely legislative action, together with the implementation of a national planning process, could put America on the way toward a major reorientation of our travel patterns and our urban lifestyles in this decade. These are matters of national concern and I hope that the findings of your subcommittee will draw attention to this national need.

Mr. Chairman, that concludes my remarks. Thank you.

Chairman MOORHEAD. Thank you very much for your testimony. I think the fundamental debate that is going on is as you said, whether urban transit is a local problem where the Federal Government washes its hands of the thing and says you take care of it, or whether there is a need for a national policy.

The testimony before this subcommittee from the Department of Transportation was not the same as yours. You urge a national policy and, as far as I am concerned, that is the only situation that makes sense. There are things that are done in one region that have to be different from another, but within a general framework of a national policy. It just makes sense to me. Is that not the thrust of your testimony?

Mr. GAMBACCINI. I would say so. I would think one of the problems in this kind of debate is the reluctance on the part of some to take on what is admittedly an extremely complicated business. I would be the first to admit that developing a national plan for transit is infinitely more complicated than developing a national plan for space or highways. It is less susceptible of description as to the tangible elements. There are more social factors that intrude themselves, such as service levels, the implications on land use, commercial development, and the like.

Furthermore, the conflict of values between public and private enterprise in this whole field further complicates matters. This, however, should compel more urgency in trying to attack the problem and make evolutionary progress on it and perhaps to highlight some of these conflicts in values and policies in order that they can be focused upon and resolved.

So that what I am saying is as we see the policy and the plan it is not as simple of depiction on a map as is the interstate highway system, it has got to be more a blend of physical dscription as well as social and other less tangible guidelines. However, it can be done and the proof of it is in the many European cities where they have grappled with this kind of thing effectively.

Chairman MOORHEAD. If I had one criticism of your statement and I say this in a very friendly way, it is that when you listed the people that you are going to work with, you do not make mention of the Congress.

Mr. GAMBACCINI. The Office of Technology Assessment, I believe, is a vehicle of the Congress.

Chairman MOORHEAD. There is more than technology involved. I think that, if mass transit is suffering compared to the highway program, it is not due just to the complexity of mass transit and the simplicity of the highway program. It is also the politics of the matter. On one hand, you have got the petroleum, concrete, asphalt, and auto-

mobile industries and the individuals who are automobile owners, whereas mass transit has the poor, the old, the very young, the handicapped, and that is not as powerful a constituency. I think you have got to think about the politics of mass transit in addition to the other matters involved.

Mr. GAMBACCINI. May I talk to that point?

Chairman MOORHEAD. You certainly may. Because this bothers me a lot.

Mr. GAMBACCINI. That was not an intended omission. The reference you cite refers to research per se, and I believe the bulk or the most of our action will be with the agencies mentioned.

With respect to the other major thrust of this effort, the development of the policy and the plan, I suspect that there will be more interaction with the committees of Congress than there will be with any of the administrative agencies, because as you say, it interacts with virtually all of the vital political processes including land use, local home rule, political jurisdictions, the whole range of interest groups. So certainly that was implicit in the earlier statement on policy and plan.

Chairman MOORHEAD. Well, I bring this out largely because this is one of the reasons for these hearings.

Mr. GAMBACCINI. Yes, sir.

Chairman MOORHEAD. We do find in the Congress that on the legislative committees there are jurisdictional disputes. This brings up the question, should the Public Works Committee or the Banking and Currency Committee deal with urban transportation? The Joint Economic Committee, does not have any legislative jurisdiction, so we can hold hearings without treading on the toes of either one of those, but making observations that would be helpful to both.

This is one of the reasons we asked you to come forth and give us the benefit of your thinking.

Getting back to some technical points in your testimony, you can talk about fixed guideway systems.

Is the important element that it is a fixed guideway or that it is separated from grade, from regular automobile and other vehicular travel?

Mr. GAMBACCINI. Fixed guideway contemplates, may or may not contemplate grade separation. It is separate from interaction with other modes and the key here is to provide a higher speed, higher line haul capacity, greater reliability, and the like.

Now, I deliberately said fixed guideway in order to comprehend the whole range of technology that is implied. It is not a plea for rail per se. There could be exclusive bus lanes, it could be any of the new PRT developments, but we think the fixed guideway is the essential component.

Chairman MOORHEAD. You have to educate me. Do you consider an exclusive bus lane a fixed guideway?

Mr. GAMBACCINI. I take it back. Exclusive bus lanes would not be fixed guideway, it is a step along the evolution to a fixed guideway, if

you will, the distinction being fixed guideway being a control system and the ability to isolate from other traffic.

Now the existing exclusive bus lanes are a variety of experiences, some of which are temporary loan of a given lane, some of which do permit the interaction of carpools by automobile and the like.

I think on this point though, that it is an important point, there has been a tendency in recent debate to polarize the issue, bus and rail or exclusive bus lane versus rail.

If there is one thing most of us in the industry feel strongly that this polarization is a great disservice and really the development of strawman issues. In fact we are talking about the most responsive way of dealing with transportation needs and it should and must contemplate the full range of possibilities and variety both as to time frame, as to the evolution from one type of technology or another within the same area, it should be based upon market development, costs, and a whole host of other factors.

Chairman MOORHEAD. I noticed that you started your testimony by stating that your two associations are in the process of merging. Rightly or wrongly, the Institute for Rapid Transit came to be thought of as a rail-oriented group. What we need now is not a rigid adherence to rubber or steel, it is moving people, great numbers of people as quickly as possible. I note in our area we are contemplating putting concrete over part of the rail system to have busways which would not be fixed guidance. You have to have a driver because at the end of the exclusive lane he goes right onto the city streets, but when he is far enough out of the center of the city he can move rapidly. So I think it is grade separation that is the important thing we should be stressing rather than metal or rubber. I trust you agree with me on that.

Mr. GAMBACCINI. Yes; but again, depending on the peculiar situation. For example, in the very, very peculiar circumstances surrounding our Lincoln Tunnel exclusive bus lane, that is a most effective low-cost solution given the facilities that happened already to be there. So that may very well be a better choice for that particular application but such a solution might not be applicable for a brandnew need elsewhere that is to serve a developing area where you have to start with new construction of highway and bus facilities.

Chairman MOORHEAD. I have got to find a new word for it, I guess it is traffic separation that we are looking for.

Mr. GAMBACCINI. Yes.

Chairman MOORHEAD. I think one of the things that will get people out of the automobile and onto the mass transit is having a city jammed with traffic and seeing the mass transit whipping by and getting people to wherever they want to go much more quickly.

Mr. GAMBACCINI. It is a very important dimension.

Chairman MOORHEAD. Even more important than the fare consideration.

Mr. GAMBACCINI. Yes.

Chairman MOORHEAD. The other problem I guess I am thinking about is the financing of this national program or national commitment to mass transportation.

Do you think that it is necessary to have the highway trust fund available at local or State discretion for mass transit purposes?

Mr. GAMBACCINI. The industry worked with the Department of Transportation, and with a number of congressional interests on the Federal Aid Highway Act of 1973. That was a first step along the line of fund flexibility within the trust fund but we believe at this point our interests are better served by not taking that kind of an issue on headlong. With time it may resolve itself as we develop more sophistication both in financing, and the allocation of resources on a priority basis, but our concern at this juncture is really to emphasize, as we have in this statement, the long-term public transport need. We believe when we dramatically underscore that need financing will follow just as it did in the space program and highway program because there will be no acceptable alternatives. So we have shifted our orientation to working very intensively to trying to force a sharper focus on what the turn of the century need will be based upon the considerably enlarged population, the doubling of urbanized areas over 1 million population, and all that that implies.

Chairman MOORHEAD. I was very much intrigued with your statement about the Btu consumption in New York City versus the rest of the Nation.

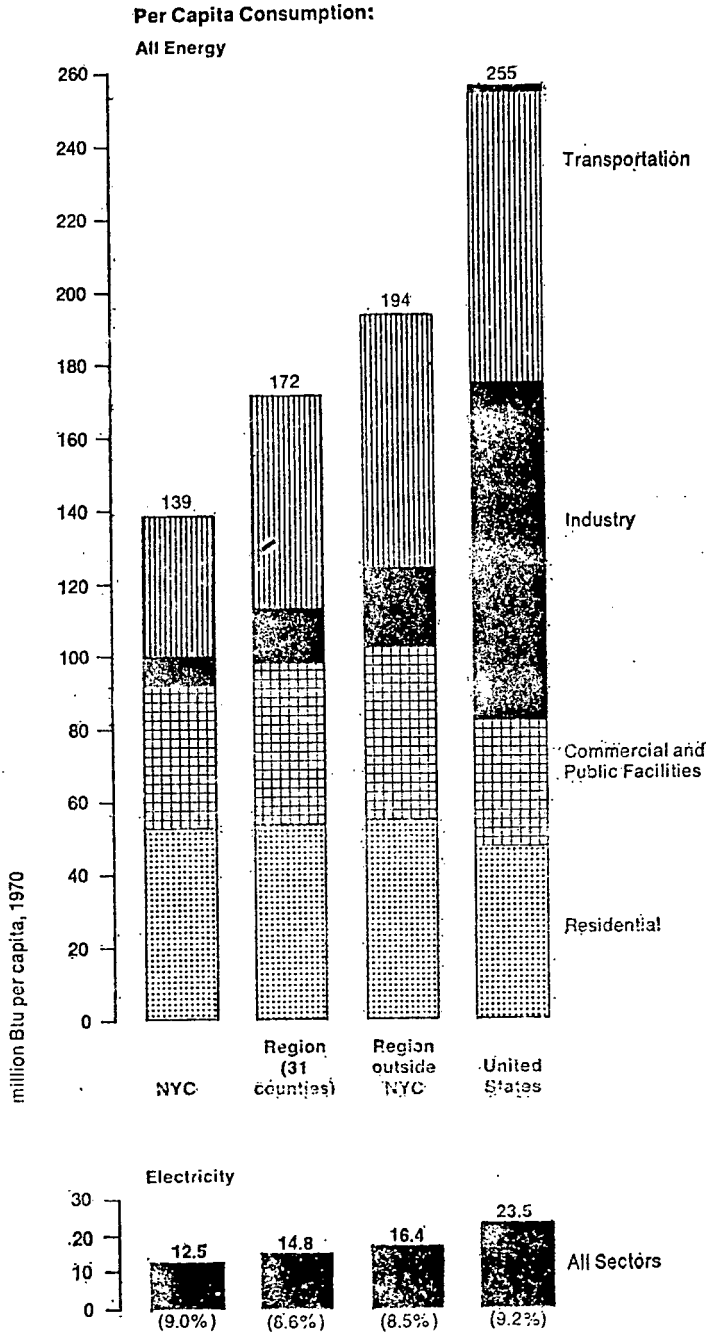
I noticed that New York, from the chart in my possession, is the same or a little bit larger in consumption for residential use, commercial use, and public facility use. The industry use is considerably less in New York. But transit is the other factor that makes the difference between the 139 per capita Btu for New York City versus 255 for the United States.

Mr. GAMBACCINI. I think it is probably the most significant contributing factor; the high densities and the high proportionate use of public transit in New York as against other urban areas makes the difference.

Chairman MOORHEAD. Without objection, the chart in this connection will be made part of the record.

[The chart follows:]

# LEVELS OF CONSUMPTION



Chairman MOORHEAD. Getting back to financing. There have been suggestions that when a transit system is being developed, that the increased land value around every transit stop, through concessions or what not, be available to the public transit body to help to finance transit services. There are others, the mayor of Atlanta, for instance, who are opposed to this because it would take land off the tax rolls.

Do you or your association have any views on this point?

Mr. GAMBACCINI. We have no policy position as an association. We generally applaud efforts to experiment with such efforts on a State and local basis. Like so many other theoretical approaches on financing and planning, more knowledge is needed. There were certainly research and experimentation efforts in these directions but until and unless they can be demonstrated to be either universally applicable or that their full range of advantages and disadvantages are clear, we do not think that it is beneficial to flock too readily to any one of these palliatives until we are more sophisticated about them. We have been concerned about the emphasis on punitive measures or disincentives as well as a whole host of other low-capital intensive devices. We applaud the effort to develop a higher degree of knowledge and confidence in each of these measures but we think it is a distinct disservice by those who would trot these out in lieu of needed investment in transit needed to preserve what we have or to improve it. None of these ideas yet have such proven validity that they can be viewed as effective alternates to or a basis for deferring the commitment to needed near-term preservation and/or improvement.

Chairman MOORHEAD. In an area where high capital investment is needed, we have got to think of ways to finance these investments. What we are looking for is the balance between the high cost capital investment and the relatively lower cost of ridership subsidies. We have got to think about how we are going to finance both, so I hope your association will direct its studies along this line.

Mr. GAMBACCINI. Well, to that extent, we are very firmly of the view both capital and operating assistance must be shared in some appropriate proportion between Federal, State, and local levels of government, and we have been in constant negotiations with the Congress and with the administration on what formula should obtain.

One of the concerns, if I can disgress slightly—one of the concerns I have again is the tendency to work from what I consider outdated concepts about transit—that it is private enterprise or that the emphasis or focus has to be on a profit and loss statement. Transit has evolved to the point where it can no longer be in any way regarded as enterprise in the sense of a profit and loss statement. It is much more analogous—perhaps it is rather hackneyed to say it—it is much more analogous to police and fire protection, vital public services that have to be sustained substantially from the public treasuries, and it seems to me that it is worth exploring other devices like real estate enhancement approximate to transit development, but one cannot use that as a way of deferring what must be continued progress to serve the need.

Chairman MOORHEAD. I think you are getting to what I find a most difficult conceptional problem. Some areas need an awful lot of capital to get a transit system going or to modernize an existing one but other areas really have a pretty darn good system. What they need is some operating assistance. And how do we devise a formula that covers both of these needs?

Mr. GAMBACCINI. I think the springboard—I believe it was Russell Train again who described New York City as a major national asset—I think the springboard has got to be a concept that views public transportation in the context of its energy conservation and environmental enhancement roles and if it is a national asset then I think it leads to a commitment and decisions—a biting of the bullet, so to speak, a national commitment to public transportation as a vital asset.

Chairman MOORHEAD. I think we can get the commitment if we have a formula that we can sell.

Why is it, in your opinion, that the European nations, including the Soviet Union and our good friends to the north in Canada, seem to do a better job on mass transit than we do?

Mr. GAMBACCINI. I think Russia and the United States stand as two extremes with the European nations somewhere in between. I think the European countries have more of a tradition of central planning, not as extremely as the Soviets, but certainly more so than the United States. Therefore, decisions about transportation are made in a context as we have been appealing in this paper, about its direct relationship to other factors of development—residential development, commercial development, and land use. There is a less tenacious spirit of individual choice and local home rule determination on most matters.

Recently I was in Oslo, Norway, and was quite surprised to find that Oslo, with a population of less than a half million, has a rather extensive rail transit system with a very modest density of population, and extremely large land area. As you know, it is a canard in this country that cities of under a million cannot justify fixed rail public transportation. The difference, in my opinion, is that the Norwegians, as with most Europeans, are much more conscious of the consumption of resources than we Americans are. You were expanding with Mr. Train on waste of materials. Europeans are much more concerned about the consumption of scarce resources, dollars, land. and materials. In their analysis, rail rapid transit though heavily subsidized in capital and operating costs, on balance, is a far more economic and thrifty way to proceed in a period of a long-term development. They are able because of their control over land use to force the results of high rise development immediately adjacent to transit stations. So in effect, they build their own captive market and they preclude deliberately the expansion of competitive services, highways, for example.

I was with an Oslo council member on a very congested two-lane highway that paralleled the transit system, and it was rather striking, his firmness that they would do nothing to expand that highway system. Those who were foolish enough, he said, to drive on that highway system should have to suffer the delays, since the nation and the city have made such a large commitment to a low fare, frequent service, and well-maintained transit line.

Chairman MOORHEAD. I think we have got to do the same thing, but I do not know when we will actually bite that bullet, as you say.

We had testimony from Congressman William Frenzel of Minnesota about the upturn in ridership, which had been going down for a long time. Then newspapers in the Washington area reported that the upturn in Washington Metro had reversed.

What is the national experience? Have we turned the corner, do you think, or was that just a temporary oil shortage situation?

Mr. GAMBACCINI. Well, I think the answer is that it is both. I think in fact transit decline, ridership decline has stabilized or turned the corner and has increased slightly. The energy crisis gave us a short, significant spurt in traffic growth. It demonstrates, I think, once again rather dramatically the high sensitivity of transit traffic pattern based upon availability of gasoline in that particular case or the tendency in many areas to pretty much hold the line against further highway development. My personal belief is the fact that there has been a very considerable slowing of urban highway development and in many areas a conscious policy not to expand vehicular facilities, as in the case of New York. My own agency some 10 years ago had concluded it would no longer expand trans-Hudson vehicular capacity. Once you reach saturation the tendency is for transit to pick up some of the slack as congestion increases, but it is a very delicate balance and I think it can be demonstrated that the two interact very closely; the availability of options and the unfettered individual choice to do other things will tend to depress transit ridership. When the equation slightly shifts, transit ridership is affected.

Chairman MOORHEAD. As we look at various systems across the country we are concerned, not only in transit, but in other areas, with productivity. Is the measure we should be looking at the number of passengers per employee, and, if so, what is the picture in the transit industry for productivity measured on this or any other basis?

Mr. GAMBACCINI. When we got into this question with the Department of Transportation some 3 years ago as part of the operating assistance thrust, it became very evident, very quickly, that any single ratio of, or any single measure, had its built-in limitations or distortions. So I think the real answer is that we need to move on several fronts simultaneously. We should improve the uniformity of performance accounting and results on the part of all transit systems, and measure a number of ratios simultaneously.

Now, I believe whatever formula comes out in legislation ought to be reasonably solidly based on delivering the money where the need is and also a politically viable formula that will tend to get the maximum support to get the bill enacted. But in terms of the long-term administration of the program, theere ar a whole host of ratios that ought to be looked at on a continuing basis besides employees, as a function of passengrs carried.

Passengers carried as a function of car miles operated and so on. There are no less than two or three dozen such realistic and reasonable formulas any single one of which can be terribly unfair to any given location because of the peculiarity of the locale. When we get one substantial aberration in one system, it compels looking at that closely to see why that is out of line with others and whether operations there are inefficient. If there is one thing I think the industry agrees on, it is that no single such ratio can be relied on solidly. There is the absolute need to keep some flexibility and the general parameters in focus at any given time while looking at ratios.

Chairman MOORHEAD. I think we are looking for formulas because quite frankly, we do not want to have city A favored over city B because city A has more political clout than city B. If we can do it by some form of formula we are better off.

Mr. GAMBACCINI. Your focus is the allocation of dollars and resources?

Chairman MOORHEAD. Yes, and also efficiency.

Mr. GAMBACCINI. I thought you were looking at performance and efficiency. On the allocation of dollars the industry had come out largely in favor of a passengers carried formula, on the basis that that had its own built-in incentive. The more passengers you carry the more you get, under this operating assistance formula.

We were persuaded that in fact politically that basis alone was perhaps not sufficient and some ingredient of population in order to permit those cities that do not have either any or extensive transit systems might also qualify. So we were sympathetic to some formula like the Minish-Williams bill formula that was a blend of population, ridership and vehicle miles in some appropriate mix.

When I say some appropriate mix, hopefully, one that also reflected the extent of need in the large urban areas as well.

Chairman MOORHEAD. What do you think of the market share formula, that is the percentage of urban trips made by mass transit as opposed to the private automobile. In other words, we should be encouraging those systems, whatever device they may use, to get the individual out of the automobile and onto the mass transit system.

Mr. GAMBACCINI. I think this concept is a great one because it certainly builds the incentive to try to turn the proportions around, that is, the proportionate use of public transit as against private auto. However, I would qualify my answer to say that I think there is further work needed to specify how such a formula might in fact work and what impact it would have on specific urban areas. But let me say that any such incentive formula must be based upon an awareness that at stake is survival of the transit systems and the preservation of what we have. So any such formula ought to be an add-on to assuring that there is responsiveness to the needs just to preserve what we have and to improve it. In addition, there can be an incentive approach to further sweeten the pot and provide a basis for those cities that are doing aggressive work in building traffic, to do more in that direction and, therefore, to have more eligible funds.

I do not know if I am making that point clear. It must be additive to a basic response to the critical need of sustaining what we have.

Chairman MOORHEAD. The other concern I have is how do we deal fairly with the capital subsidy and the operating subsidy? If we make the capital subsidy too attractive maybe the localities will buy new buses when they could, by better maintenance, keep a bus going for another 5 years. On the other hand, if we make the subsidies too attractive, they may not make the wise decision to make capital expenditures which would really transform that particular locality.

Mr. GAMBACCINI. I think this is developed rather dramatically in the Joint Economic Committee report, the Tye report, and I think it is a very valid point to have raised. I think the Tye report perhaps might have overstated its actual impact. I think it is well to highlight it as a possible future distortion and concern. My reaction would be that it has not been a serious distortion in the past with the limited extent of available urban capital funds and in the absence of operating assistance funds but ought to be one of the concerns that ought to be

watched as the enhanced program proceeds. If that tendency develops then the appropriate response or recalibration of the formula or capital versus operating program be returned, if you will, to curb that tendency. But I think it is more of a theoretical concern which might in fact become a major reality, but I do not think it has been demonstrated yet that it has.

Chairman MOORHEAD. Mr. Gambaccini, you have been of great help to us in this formal hearing. I hope that you will continue to give us the benefit of your advice on an informal basis.

Mr. GAMBACCINI. Thank you.

Chairman MOORHEAD. Thank you.

The Subcommittee on Urban Affairs is now adjourned.

[Whereupon, at 11:45 a.m., the subcommittee adjourned, subject to the call of the Chair.]

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