

# A BARRIER-FREE ENVIRONMENT FOR THE ELDERLY AND THE HANDICAPPED

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HEARINGS  
BEFORE THE  
SPECIAL COMMITTEE ON AGING  
UNITED STATES SENATE  
NINETY-SECOND CONGRESS  
FIRST SESSION

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PART 3—WASHINGTON, D.C.

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OCTOBER 20, 1971



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Part 2. Washington, D.C., October 19, 1971.

Part 3. Washington, D.C., October 20, 1971.

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<sup>1</sup> Senator Winston Prouty, Vermont, served as ranking minority member of the committee from September 1969, until his death September 10, 1971. Senator Robert T. Stafford, Vermont, was appointed to fill the vacancy on September 17, 1971.

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# A BARRIER-FREE ENVIRONMENT FOR THE ELDERLY AND THE HANDICAPPED

WEDNESDAY, OCTOBER 20, 1971

U.S. SENATE,  
SPECIAL COMMITTEE ON AGING,  
*Washington, D.C.*

The committee met at 10 a.m. in room 1114, New Senate Office Building, Senator Frank Church (chairman presiding).

Present: Senators Church, Percy, and Gurney.

Staff present: Mr. William Oriol, staff director; John Guy Miller, minority staff director; Patricia Carter, professional staff member; and Phyllis Balan, clerk.

## OPENING STATEMENT BY SENATOR FRANK CHURCH, CHAIRMAN

Senator CHURCH. The hearing will please come to order.

This is the third day that the committee has scheduled hearings for examining the general question of architectural barriers as related to the elderly and the handicapped.

We have a panel with us this morning, and we will follow the same procedure that we have on the 2 previous days, asking each panelist to make a short statement, which may or may not produce questions from the committee, and then, when all panelists have completed their statements, we will address questions back and forth, and have some informal conversations among the panelists, and such members of the committee who want to participate.

Our first witness this morning is Mr. Harold L. Willson, chairman, Architectural Barriers Committee, Easter Seal Society for Crippled Children and Adults.

Mr. Willson, we are pleased that you are here, and I would suggest that you proceed with your statement, and then there may be questions that follow.

## STATEMENT OF HAROLD L. WILLSON, CHAIRMAN, ARCHITECTURAL BARRIERS COMMITTEE, EASTER SEAL SOCIETY FOR CRIPPLED CHILDREN AND ADULTS

Mr. WILLSON. My name is Harold Willson. I am chairman of the Architectural Barriers Committee, Eastern Seal Society for Crippled Children and Adults.

When the San Francisco Bay Area Rapid Transit System is completed in 1972, its service will extend into three counties with 75 miles

of track and 39 stations. The facilities for the elderly and handicapped will surpass those of any other mass transportation system in the world, providing for 100 percent ridership within its service area. These facilities were acquired primarily due to the efforts of the Architectural Barrier Committee of the Easter Seal Society for the Crippled Children and Adults of Alameda and Contra Costa counties.

Shortly after the inception of BART, it was noted that the BART system plan, as authorized by the public bond issue in 1962, excluded facilities for the elderly and handicapped with severe mobility limitations. Whereby I initiated a project to secure facilities which would be easily accessible to, and usable by, these individuals, including non-ambulatory persons.

The project objectives were fourfold as follows:

1. Obtain endorsements and support for the project from the elderly and handicapped individuals and organizations devoted to the welfare of the elderly and handicapped.
2. Inform, educate, and convince the BART board of directors and staff that the authorized plan would prevent access for approximately 4 percent of the population who are elderly and handicapped with severe mobility limitations.
3. Secure BART board of directors policy to insure that the system would be constructed whereby the facilities for the elderly and handicapped could be easily added at a later date, and to secure estimated cost of adding the facilities.
4. Since BART was not authorized nor funded by the electorate to provide for the elderly and handicapped, obtain authority and funds through the State legislature.

#### OBTAIN ENDORSEMENTS AND SUPPORT

Due to the many interest facets and enormous number of individuals and organizations involved, various methods and procedures were employed to obtain endorsement and support for the project.

Since the elderly and handicapped population would be directly affected by the success or failure of the project, it was imperative that the strongest endorsement and support should be obtained from the organizations representing and/or devoted to the welfare of the elderly and handicapped.

Therefore, many meetings with representatives of these organizations were convened to discuss problems and strategy and to trigger timely letter campaigns directed to BART and the State legislature. These meetings and letter campaigns were not only beneficial, they supplied the backbone support for the project.

On the other hand, it was evident that our project required the endorsement and support from the nonelderly and nonhandicapped citizens. Therefore, many of my evenings, especially in the early years of the project, were devoted to speaking engagements at service, church, and professional groups.

Rather than through the use of public demonstrations and news media publicity, the project accomplishments are primarily attributable to individual salesmanship with respect for the individual involved. As a result of this salesmanship and presentation of the facts

involved, I have gained the confidence and a professional attitude from everyone contacted.

### INFORM, EDUCATE, AND CONVINCING BART

I have been a volunteer consultant to the San Francisco Bay Area Rapid Transit District board of directors and staff since early in 1963, urging them to provide facilities in the initial construction which will be easily accessible to all the public, including the elderly and the handicapped in wheelchairs.

Since every existing public transportation system, through design, presents unsurmountable barriers to the elderly and handicapped with severe mobility limitations, a number of the BART officials and personnel understandably had difficulty in comprehending the necessity of special facilities to accommodate the elderly and handicapped. Nonetheless, project objectives to inform, educate, and convince BART were accomplished through:

1. Presentation of the statistics from the National Health Survey.
2. Projected increases for the elderly and handicapped population.
3. BART's responsibility to provide transportation to all of the public.
4. Fair and honest salesmanship and professional attitude.

### SECURE BART BOARD OF DIRECTOR POLICY

Since BART was not authorized nor funded by the electorate to provide facilities for the elderly and handicapped, it was necessary to secure a BART board of director policy that the system would be constructed whereby the facilities for the elderly and handicapped could be easily added at a later date, and to secure estimated cost of adding the facilities.

In 1965, the BART board of directors adopted a construction policy for the subway stations whereby it would be possible to easily add elevator facilities in the future, if the funds were provided.

Later, on February 29, 1968, the BART board of directors adopted the policy that they would inform all concerned that the facilities for the elderly and handicapped will require an additional \$5 to \$7 million, later revised to \$10 million, and that the State legislature be notified that the BART district is willing to install the facilities if the additional money is provided from sources other than the BART district.

### OBTAIN AUTHORITY AND FUNDS

Once BART was convinced, construction policy was obtained, and BART provided the estimated cost, our final objective was to secure authority and funds for the elderly and handicapped facilities from the State legislature. This authority was accomplished through the enactment of the assembly bill No. 7, chapter 261, which was approved by Governor Reagan on June 6, 1968. The basic provision of the law is as follows:

It is the purpose of this chapter to insure that buildings and facilities, constructed in the State by use of State, county, or municipal

funds, or funds of any political subdivision of the States, adhere to the American Standards Association specifications A 117.1-1961 for making buildings and facilities accessible to, and usable by, the physically handicapped.

This law was not directed specifically at BART, but rather for all public buildings. The passage of this law required a massive statewide effort by many elderly and handicapped groups and individuals with the Easter Seal Society in the thick of the effort.

A few months later, the State legislature resolved BART's funds-to-complete shortage problem and added \$10 million for the elderly and handicapped facilities.

#### ACCOMPLISHMENTS

Elevators will move the nonambulatory or semiambulatory person vertically from street to train platform. All elevators will be equipped with telephone for calling the station agent, and will have controls within easy reach of the wheelchair occupant.

Toilet facilities also have been designed to accommodate the elderly and handicapped. The door widths are wide enough for persons in wheelchairs to pass through, and restrooms will have one stall that can be used by the wheelchair occupant.

Stairs at stations will have handrails on both sides that will extend 18 inches beyond the top and bottom steps. Special parking facilities will be provided for the handicapped, with wider than usual stalls located close to the station and to the elevators reserved for the elderly and handicapped with severe mobility limitations.

The BART car was also designed with handicapped persons in mind. A wheelchair occupant can easily ride over the gap between the train platform and the car floor, can easily pass through the car door, and move from one end of the car to the other.

A combination of loudspeaker directions and easily read signs will aid the BART patron with impaired sight or hearing. Seeing-eye dogs will be permitted and, when necessary, the station attendant can assist the blind.

Other facilities for the handicapped include special service gates and fare collection machinery in stations, a communication system that includes closed-circuit television, special directional signs, and the low placement of telephones and elevator buttons.

This has been a very rewarding project for the elderly and handicapped of the San Francisco Bay area, and will assist in the future planning of mass transportation systems throughout the world. BART is the mass transportation laboratory, and will have the all important 100 percent ridership—a first.

As mentioned, a great deal of effort was expended on my part, and from many individuals and groups, including the BART board and staff personnel. However, maybe more importantly, this project demonstrated that individuals treating each other with respect and on a professional level can accomplish what appeared to be impossible.

Through the final months of construction. BART has requested that I continue to assist them in the area of inspection for they are proud of their system and their part in providing for the elderly and physically handicapped.

After the BART construction phase, the reduced fare question for the elderly and handicapped must be resolved.

Phase II of the transportation problems for the elderly and handicapped is to provide barrier-free access to the bus systems in the San Francisco Bay area. The major problem for wheelchair occupants and others with severe mobility limitations for accessibility to the bus systems is that one or two transportation systems cannot afford to absorb the bus redesign and tooling costs.

Furthermore, the bus systems cannot afford to scrap the existing buses to purchase redesigned equipment.

#### RECOMMEND FEDERAL LAW

Therefore, I recommend that a Federal law be enacted making it mandatory for all newly built buses to be equipped to accommodate wheelchair and other elderly and handicapped passengers, and that Federal funds be made available to the bus systems for the purchase of accessible-to-wheelchair minibuses, et cetera, to be used as a substitute system during an orderly and planned conversion to newly equipped buses and complete service to all the public.

Furthermore, I recommend that a Federal law be enacted making it mandatory for all public transportation systems, including air transportation, to be accessible to, and usable by the elderly and the handicapped, including the nonambulatory.

Except in rural areas, where public transportation is nonexistent, and areas executing a planned and controlled bus conversion program, I would recommend against separate transportation systems for the elderly and handicapped. In my opinion, this type of segregation would lead to higher cost and inadequate transportation for the elderly and handicapped.

Since the San Francisco Bay area has been labeled the transportation laboratory, I recommend that every effort be exerted at the Federal, State, and county levels to implement the total laboratory test such as the requirements for the elderly, handicapped (including non-ambulatory), and the poor.

I thank you, Mr. Chairman.

Senator CHURCH. Mr. Willson, thank you very much for your statement.

I think it is highly significant that the original plans of the BART system in San Francisco made no particular provision for the elderly and the handicapped, and you had to mount a public campaign to call this to the attention of the designers, and to obtain the necessary community support for making the adaptations that have since been made.

I think that this is inherent in the whole problem. The fact that general indifference toward the particular needs of the handicapped simply leads to designs that do not accommodate these people.

Mr. WILLSON. That is the reason, I think, one of the accomplishments we have done in this project, as well as the accomplishment for the San Francisco area, we planted the seed, so to speak, in the minds of designers going to other systems, and, hopefully, this seed will grow and spread into the designs of other systems.



Senator CHURCH. I was wondering if Easter Seals is attempting to undertake a national program to help develop an awareness on the needs of the handicapped and elderly as they relate to public transportation. Has any ever been made beyond the San Francisco area?

Mr. WILLSON. Not on transportation, but we had an architectural barriers committee that started in 1962 or 1963 with emphasis on public buildings, and from which many of the States have passed legislation on public buildings. If I may brag about California for a moment, we now have three laws wherein the public buildings are to be accessible according to the American standards, as well as the private buildings that accommodate the public, such as restaurants, and the stadiums, et cetera. Just this year, new private buildings that are shopping centers, private office buildings over 13,000 square feet, and professional offices, are to be accessible according to the American standards.

I think we made some great strides in California. I think the goal now is just put the word "transportation" into these laws as well as Federal.

In my opinion, it is an individual's right to have public transportation available and accessible, and if you deny him transportation, he has to go on welfare. If he goes on welfare, you are violating the rights of the population, through higher taxes, especially if the handicapped individual is willing and able to work, but has only to have a way to transport to and from work.

Senator CHURCH. Now, you are not ambulatory?

Mr. WILLSON. That is right. I am paraplegic.

Senator CHURCH. And you have to move about in a wheelchair?

Mr. WILLSON. Right.

Senator CHURCH. You came from San Francisco to Washington?

Mr. WILLSON. Yes, sir.

Senator CHURCH. What kinds of difficulty did you experience in using the public transportation system that brought you here? Could you give us an idea of some of your particular problems?

Mr. WILLSON. In the first place, you make your reservations with an airline having an agreement with the FAA which will allow the transport of the handicapped. The major lines, especially those that go across State lines, will put you on a little dolly, like a sack of potatoes, and roll you down the aisle to a legal seat—illegal seats are next to an exit. The major airlines that have the agreement with the FAA provide special services men who take special care of you within the guidelines of the agreement such as carrying you aboard on the dolly and taking care of your wheelchair after they help you into the airline seat. In the second place, you have to contact the hotel, and be very specific about your needs for the room you are receiving.

Unfortunately, there is a limit on handicapped rooms. Holiday Inns, where I am staying, has a handicapped room, which is quite adequate.

Senator CHURCH. Is that commonplace? You have a room that is designed to take care of handicapped people? Is that commonplace?

Mr. WILLSON. No. It is one of the major problems in traveling Holiday Inns and Travelodge, and some of the newer hotels have an agreement that they will provide handicapped rooms.

The only trouble is that my room is \$23 per day because it is a large room, and that is why they charge more, which I can afford, because I have a very nice job. However, those who cannot afford it, probably would not be traveling. I came out alone, on a DC-10, because I wanted to try it out, which was very nice, except, and this is one of the problems that I think should be corrected, you have to dehydrate yourself before you get on that plane, because there is no place you can get into. You have to dehydrate yourself for 10 hours to come to Washington from San Francisco.

The CHAIRMAN. Is this because the doors and the space limitations in the lavatory facilities?

Mr. WILLSON. That is right. Also, they take the wheelchair away from you, and you could not get up if you wanted to. I do not know if that is to protect the stewardesses or not, but I am not that type. [Laughter.]

You have to excuse my levity.

#### VERY LIMITED TRANSPORTATION FOR HANDICAPPED

When I arrive at the airport, the only means of transportation to a Washington hotel is to call a taxicab, which was \$17.50. Most anybody else could grab a limousine, bus, or what have you, and I think this is appalling.

I have a good job. I drive my own car, but I am going to use BART if I can talk AC Transit into hauling me about five blocks to my office in the Ordway Building. I think I would be laughed out of town if I did not use BART, to tell you the truth, after all the work I have done on the BART system. I am going to use BART, but there will be those who will have the transition problems between BART and the bus transportation we have now.

In other words, I have a 1969 Mercury Marquis, which has to be a big car so that I can transport my wheelchair, which I drive alone. However, I am not going to give the economic value in that car away by immediately selling my car and using BART. Like most handicapped people, I have to have two cars, and in my opinion, the handicapped will not use BART until the economic value of one of their cars is depleted, so that it would be to the handicapped economic advantage.

It is going to take 3 or 4, maybe 5 years before BART can really tell how much the handicapped is using the system to the fullest.

Senator PERCY. Mr. Chairman.

Senator CHURCH. Yes.

Senator PERCY. Mr. Willson, what facilities are available for car rental, or are you confined to drive a car that is especially equipped for you?

#### SOME CARS HAVE HAND CONTROLS

Mr. WILLSON. Hertz and Avis have hand control cars in some cities. I remember in 1966 I came to New York, and I took a jaunt down the coast to Florida, and I wanted a car in Oak Hill, W. Va. I called Avis, and you have to go right to the top because most of the other personnel do not know about it.

I obtained a portable hand control and carried it with me to Charleston, W. Va., which does not have the hand control cars. They installed it, and I drove the car. In Los Angeles they have the hand-controlled automobiles, and I suppose that they have them here in Washington. I have not checked, because, quite frankly, with the parking situation, as it is, it is much easier to take a cab.

The only trouble you have with cabs is that once in a while you have a cabdriver that has a "bad" back, and will not carry the wheelchair. Furthermore, the cabs always charge you extra for the wheelchair. I am very proud of my movement and my job.

Senator CHURCH. Senator Gurney.

Senator GURNEY. No questions.

Senator CHURCH. Thank you, Mr. Willson.

Our next panelist is Mr. Wilmot R. McCutchen, chief of design, San Francisco Bay Area Rapid Transit District, and he will describe how the adaptation of the systems to meet the needs of the elderly and handicapped, how effective the cost and economics of the system are.

Mr. McCutchen, we are pleased that you are here.

**STATEMENT OF WILMOT R. McCUTCHEM, CHIEF OF DESIGN, SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT, SAN FRANCISCO, CALIF.**

Mr. McCUTCHEM. Mr. Chairman and members of the committee, I appreciate the opportunity to appear before you to explain some of the problems and accomplishments of the San Francisco Bay Area Rapid Transit District in providing facilities for the physically handicapped on its rapid transit system (BART) now nearing completion. You have asked me to cover two specific points, namely (1) the working relationship of BART and the Architectural Barriers Committee of the Easter Seals Society and (2) how the removal of barriers affected the transit system in terms of costs and benefit to nonhandicapped riders. I hope to cover these topics in the context of my explanation of our overall program, because I believe it would be helpful for your committee to have this related information.

The basic criteria and authorization for construction of the 75-mile bay area rapid transit regional system contained no provisions specifically directed toward providing facilities for all types of physically handicapped. Certain amenities, however, such as widespread use of escalators, handrails, nonslip floors, benches on platforms, and comfortable seating on cars, called for in the original criteria, were considered beneficial to most disabled persons, including the aged, as well as the nonhandicapped public. We have estimated that these provided facilities could take care of perhaps 99 percent of those ordinarily able to move in public places without having to use elevators.

Mr. Harold Willson, a member of the Architectural Barriers Committee, Easter Seals Society of Alameda County, has been the principal spokesman of that portion of the physically handicapped community of the bay area whose impairments are such that it would be impossible, under the original construction plans, to utilize the BART station facilities unassisted. During the stage of intense con-

struction activity in 1966-68, he made many appearances before the BART board of directors to explain the need for making it possible for this nonambulatory segment of the population to use BART. The district in early 1968 stated a willingness to provide the needed facilities, but because of an acute funding problem at the time, stated that additional funds would be required.

#### STATE LAW

On June 6, 1968, the Governor of California signed into law the provisions of government code sections 4450 et seq., relating to public buildings, entitled "Access to Public Buildings by Physically Handicapped Persons." This State law requires that public buildings constructed after November 13, 1968, generally conform to the American Standards Association standard specifications for "Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped" (A 117.1-1961)\*. By subsequent action, the BART Board of Directors resolved to comply as fully as possible with the intent of the standards even though some of the structures in the BART system were at an advanced stage of construction.

The primary areas which required either remodeling (in the case of buildings of advanced construction stage) or revisions to design criteria (for stations yet in the design stage) were:

1. Toilet facilities—widening doorways, providing additional space, lowering mirrors, raising toilet heights, providing grab bars, et cetera.
2. Public telephone facilities—at least one public telephone would be within reach from a wheelchair.
3. Drinking fountains—within reach of wheelchair patrons.
4. Access to the stations through special parking facilities and ramps.
5. Elevators as a means of vertical circulation within the station from platform to street level.
6. Closed-circuit television for surveillance where needed.

The total cost of providing all facilities for the physically handicapped was estimated in May 1969 at \$9,457,500. These estimates account for the required facilities at the 38 stations in the BART system. The cost estimates for individual stations run as high as \$324,000 for a station essentially complete where extensive remodeling would be required, to a cost of approximately \$70,000 for a station where the facilities could be provided in the original design.

Exhibit I shows an aerial station where facilities were provided at reasonable cost even though remodeling was required.

Exhibit II shows our design for an elevator kiosk for a subway station beneath Market Street in San Francisco.

Exhibit III shows a completely separate facility for the handicapped, constructed after the station was complete.

The current projection of the total cost is approximately \$8 million.

I have covered BART's relationship to the Easter Seals Society in formulation of this program, and I have briefly described the construction complexities and cost problems we faced. To date, we have

\*See pt. 1, p. 59.

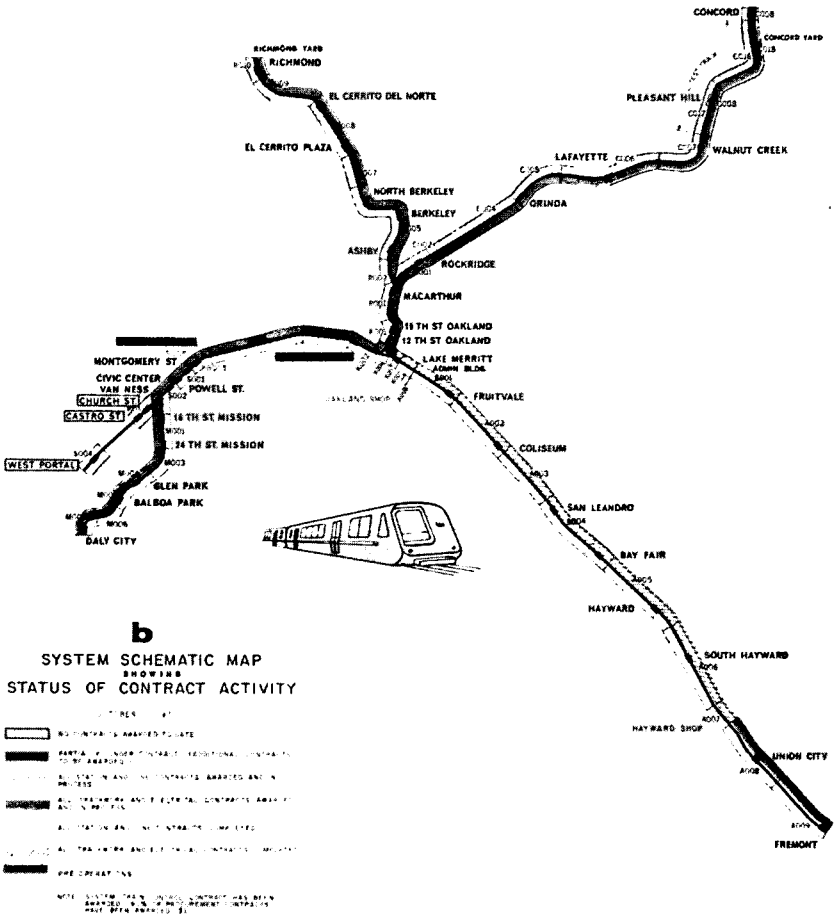
been able to construct, or determine a definite design, for all but three of our 38 stations. We are actively pursuing the solutions for these.

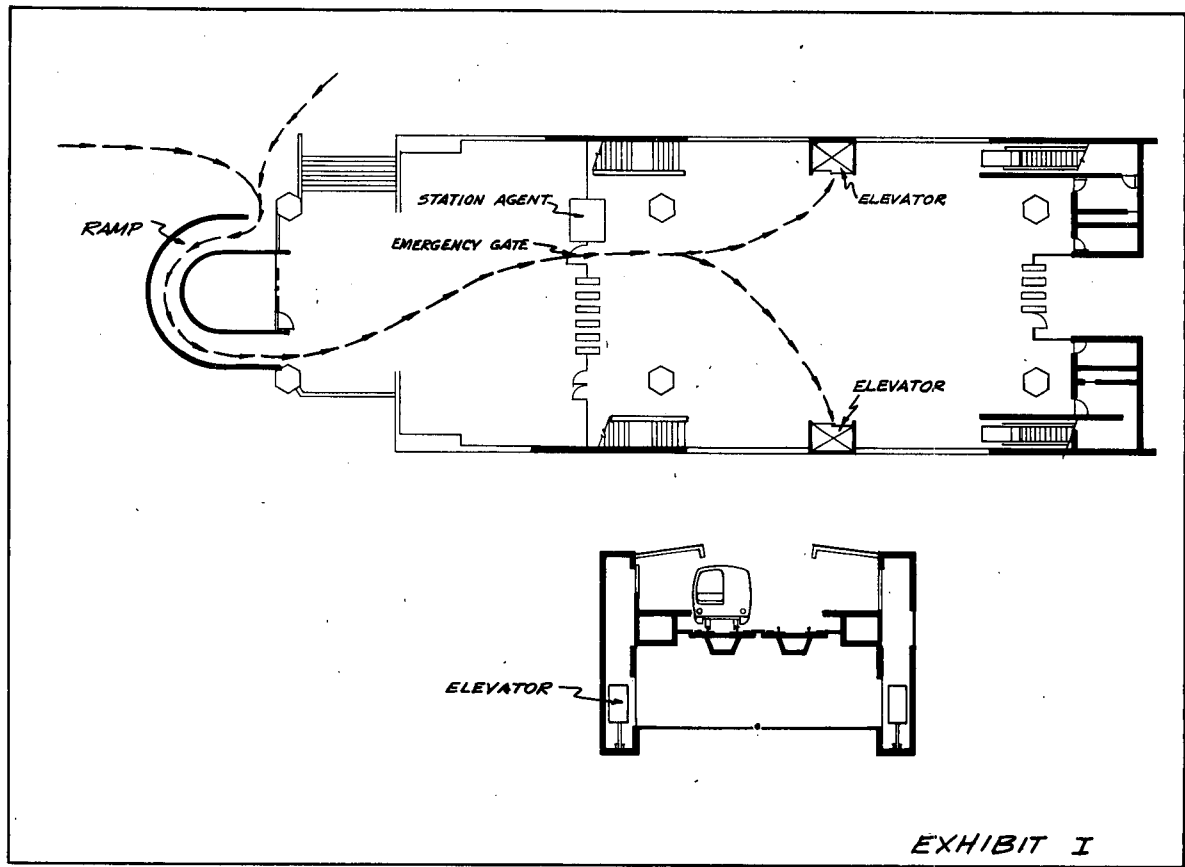
Mr. Willson has been of valuable assistance to the BART staff in consultations on our designs and on field checks of our construction.

Since the BART system is not yet operational, it is not possible to assess the benefits to either the "handicapped" or the "nonhandicapped" rider except for the broad social benefit of making a transportation facility available for all segments of the public.

(The exhibits referred to follow :)

SYSTEM SCHEMATIC MAP SHOWING STATUS OF CONTRACT ACTIVITY





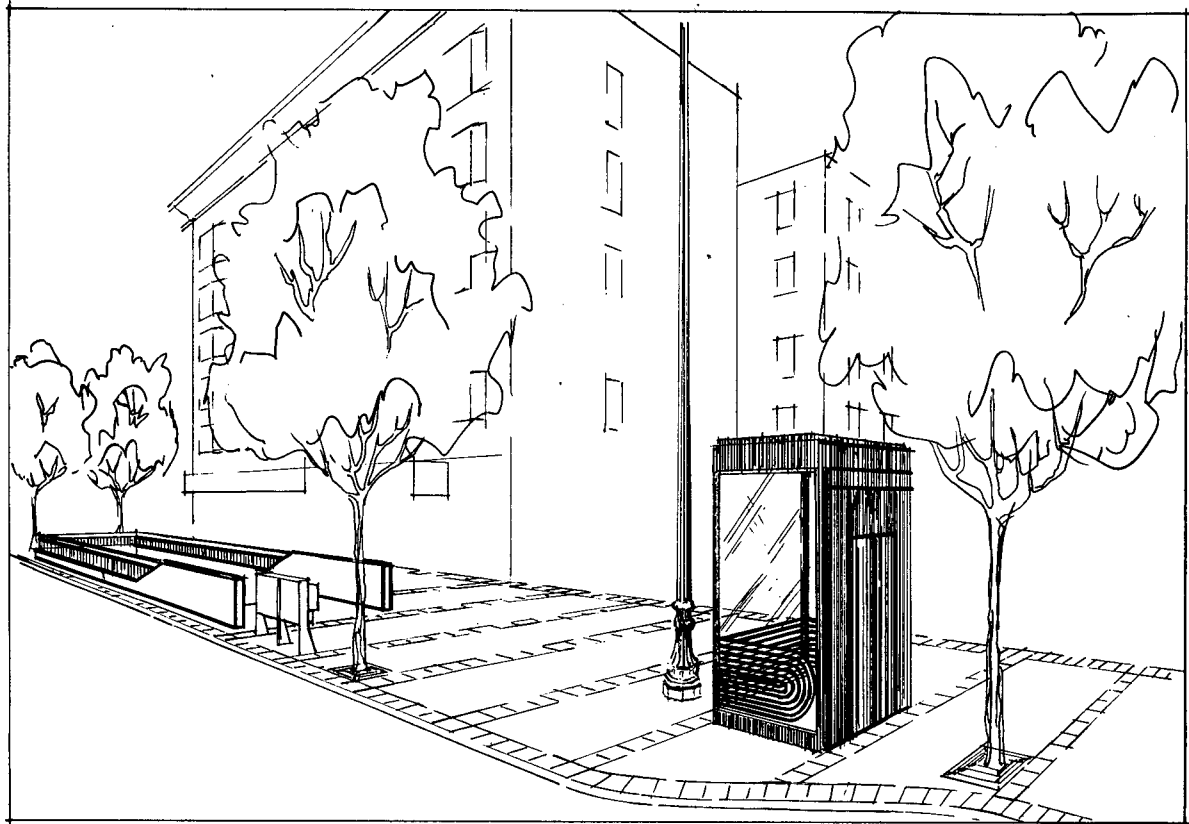
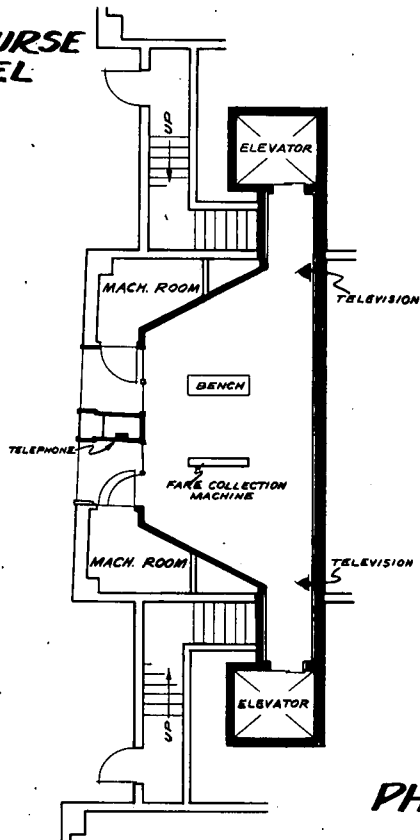


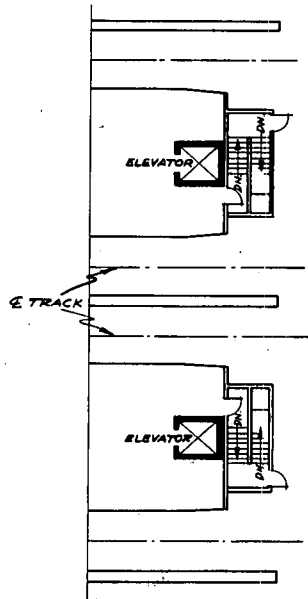
EXHIBIT II

CONCOURSE LEVEL

40TH STREET



PLATFORM LEVEL



FACILITIES FOR THE PHYSICALLY HANDICAPPED

MACARTHUR STATION

EXHIBIT III



Senator CHURCH. Thank you very much, Mr. McCutchen. I think it is clear that the way to approach this problem is to think about it before you get started, and work it into your original designs. It is rather dramatic, the difference in cost that is involved.

Mr. McCUTCHEN. Yes, sir.

Senator CHURCH. Presumably we are doing that in Washington. We will hear more about the Metro system here, but I know that in connection with the Metro stations here in Washington, there has been the using of something that is called an inclinator, instead of an elevator, to carry handicapped people up and down vertical inclines. Why did you choose the elevator as the device?

Mr. McCUTCHEN. Well, sir, we did investigate the inclinator, or the inclined elevator, quite extensively during the course of our development of the program. There is one property, to our knowledge, that does use this type of vertical circulation, and that is the Stockholm subway. We wrote to them. We were also aware of the investigation that the Metro people had done, and aware of the development of their design. Our elevator consultant advised us that the ordinary types of home-use inclined elevators were not sturdy enough, not reliable enough for this particular usage, so that a new development in the United States would be necessary.

#### ELEVATOR MANUFACTURERS NOT INTERESTED

We contacted one or two of the elevator manufacturers. They did not seem too interested in doing this type of development without the assurance of a large market; and due to the press of time, we decided that we should best go without these improvement techniques. Since the elevator was a developed type of machinery, and would be desirable and suitable for our purposes, that is why we used it.

Senator CHURCH. What, if any, assistance did you get from the Federal agencies through the use of Federal funds in helping you achieve a barrier-free design for the BART system?

Mr. McCUTCHEN. Senator Church, we have had grants-in-aid under the Urban Mass Transportation Act of 1964. This has mainly been to help us construct certain segments of the lines. We have had only one station so far, for which these Federal funds were applied as assistance.

We do have other funds that are due in as soon as a contract is consummated with the Federal Government.

Senator CHURCH. But you have no particular Federal help in designing these facilities for us?

Mr. McCUTCHEN. No, sir. We have not.

Senator CHURCH. Could you tell me, just out of curiosity, how large the total Federal contribution will be, and the total construction cost of the system, as compared to the total cost of the system?

Mr. McCUTCHEN. The total we expect to receive—that is, for the construction and for the purchase of our vehicles—will amount to approximately \$160 million. That compares to a construction cost in the nature of \$1.3 billion.

Senator CHURCH. So you would receive Federal help in—a little over 10 percent?

Mr. McCUTCHEN. Yes, sir.

Senator CHURCH. That is interesting to me, because of the enormous Federal subsidy that goes into the construction of highways, and the Interstate System is 90 percent. That illustrates where the clout is, I guess.

Mr. McCUTCHEM. Well, the new urban transit legislation of the Federal Government would permit grants of up to two-thirds of the project cost. However, for the Bay Area Rapid Transit System, I guess we got in a little bit too early.

Senator CHURCH. When does the system go into operation?

Mr. McCUTCHEM. It will go into operation in March of 1972.

Senator CHURCH. March of 1972. Thank you.

Senator Gurney.

#### CLOSED-CIRCUIT TELEVISION

Senator GURNEY. I wonder if you could explain a little more how you used your closed-circuit television. For what purpose?

Mr. McCUTCHEM. Well, the closed-circuit television is connected to the station agent's booth. In each station we have a station agent who is in a booth, generally, unless he is moving around in the station, which is not too often. This station agent has a monitor there in his booth so he can observe these television hookups. The cameras are spotted in advantageous positions. Where we have a remote elevator, such as the one I described here in the exhibit, the agent would be able to observe the areas that are monitored by closed-circuit television, and this would just substitute for his not being able to see the area directly from his booth. We tried to design the booths so that in ordinary circumstances this agent is able to see throughout all areas of the station mezzanine—see the activities going on at the ticket purchasing areas, at the doors to the lavatories, at the steps, and the elevators, but where that is not possible, we have put the closed-circuit television installations in.

Senator GURNEY. Is the premise to help the handicapped if they get into difficulty, is that it?

Mr. McCUTCHEM. Yes, sir. It is. It is also for the purpose of identifying those who would try to use these facilities that are not legitimately handicapped people, and would hopefully prevent abuse of the system.

Senator GURNEY. Have you estimated how many physically handicapped are in the Bay Area who are going to be helped out because of your changing the design there?

Mr. McCUTCHEM. We have run some estimates of our own, but we have not come out with any definitive answers to that problem. There are estimates that people in the situation that Mr. Willson is in, perhaps 1 percent of those who would otherwise not be able to use the BART facilities are in his category.

Now, there are other stages of being handicapped, and they go from about almost 7 percent to the projection of the American Standards Association, which says 15 percent of the public has some kind of physical impairment of one nature or another. Some of these physical impairments do not prevent them from utilizing the facilities that BART provides normally.

Senator GURNEY. The numbers are considerable, regardless of what the numbers are, is that correct?

Mr. McCUTCHEN. Yes, sir, they are.

Senator GURNEY. Thank you, Mr. Chairman.

Senator CHURCH. Senator Percy.

Senator PERCY. Just one question. I would like to commend the Government and legislature for what it has done here. In my own city, which has a very large mass transit system, construction has started for a system going to O'Hare Airport.

Do you happen to know whether special consideration has been given to the handicapped in Chicago with regard to this latest extension—financed partially with Federal funds?

Mr. McCUTCHEN. I do not, sir. If they are utilizing these Federal funds that have been made available, I would assume that they would be adding these facilities for the handicapped, because it is in the law.

Senator PERCY. Mr. Willson, do you happen to know anything about that?

Mr. WILLSON. No, I do not, Senator. I know New York has asked for some information from me, and I have supplied it.

Senator PERCY. But the law is quite specific now in that any future projects should take the handicapped into account—

Mr. WILLSON. I understand it is in the interpretation of the 1970 law. I have not read it completely, but I think it is more of a—it is available if you want, and we still have the problems of the over-protective attitude.

Senator PERCY. Mr. Nugent, I wonder if you have a thought on this?

#### NO TANGIBLE EVIDENCE OF PROGRAM

Mr. NUGENT. Senator Percy, there has been a great deal of discussion and enthusiasm in developing a program. I see no tangible evidence yet that it has been included in a workable way. It may be too early. I would answer your other question by saying that I believe the criteria for receiving Federal funds in many instances now makes it mandatory that the disabled be included in the plan. The wording is such in some instances that it has a few loopholes. There are always some people looking for these.

Senator PERCY. Thank you very much.

Mr. Chairman, I would like to note the presence of Father Anthony Rocha, who is a special assistant on aging to Secretary Volpe. We are happy to have him in our audience this morning.

Senator CHURCH. Our next witness is Warren D. Quenstedt, deputy general manager of the Washington Metropolitan Area Transit Authority.

#### STATEMENT OF WARREN D. QUENSTEDT, DEPUTY GENERAL MANAGER, WASHINGTON METROPOLITAN TRANSIT AUTHORITY, WASHINGTON, D.C.

Mr. QUENSTEDT. Mr. Chairman and members of the committee, thank you for the opportunity to appear here today to testify concerning provisions for the use of the Metro system by the aging.

I would depart from my testimony to compliment the committee for the method by which you are holding this hearing. I have not come in contact with this technique before and I am sure that this opportunity to have discussion among the witnesses will provide a record which will be of great help to the committee in considering transportation problems of the aging.

I made a judgment in preparing my own statement, that the gentleman who preceded me would cover in some detail some elements of this subject. I welcome the opportunity to enlarge on them in any way the questions might require, or discussion might inspire.

Let me begin by assuring this committee that we are now and always have been aware of our responsibility to the aging and have been actively engaged in a program to eliminate all architectural barriers and to design and construct a Metro system capable of accommodating all persons wishing to use the facilities.

From the early planning days of the National Capital Transportation Agency (WMATA's predecessor) to the present time, there has been a continuing relationship between those interested in the welfare of the handicapped and those concerned with planning the Washington Metro System. Almost at the outset, the determination was made by the Authority to adhere to the American Standard Specifications for making buildings and facilities accessible to, and usable by, the physically handicapped. These American Standard Specifications classify the handicapped into six categories, including the aging, and define aging as those manifestations of the aging processes that significantly reduce mobility, flexibility, coordination and perceptiveness.

Related to this problem, by Public Law 90-480, subsequently amended by Public Law 91-205, Congress expressed its interest in the problem of the accessibility of public transportation for the handicapped. This interest of the Congress was reaffirmed by the enactment of Public Law 91-453, the Urban Mass Transportation Assistance Act of 1970.

The decision to adhere to the American Standard Specifications and to follow the interest of Congress has resulted in the inclusion of features in the Metro System which meet or exceed the requirements for the accommodation of all but the nonambulatory handicapped.

Recognizing that exit from stations of great depth would be difficult, it was decided to provide escalators from platforms to the surface in all stations. With this decision, all persons, except for a very small number in wheelchairs, would have ready access to the transportation facilities.

#### OTHER FEATURES HELPFUL TO THE HANDICAPPED

Other provisions will be made to assist the handicapped; for instance, extensive acoustic refinement along with high quality audio announcements will provide greater security to those with impaired sight in using the System; a difference between the texture of the granite edging of the train platform and adjacent paving will provide a warning that will particularly help those with poor vision, as will the underfloor lights which will illuminate along the platform edge at the approach of the train.

Nonslip floors, without abrupt changes of level, proper entrances and doorways, walkways with gentle slopes, are all requirements of the American Standard Specifications which the system meets or exceeds.

Through these, the Washington Metro will be easily accessible to all but approximately one-tenth of 1 percent of the physically handicapped persons who are not confined to the home. This estimate is based on statistics published by the U.S. National Health Survey, "Chronic Conditions Causing Limitations of Activities" and subjected to the same analytical techniques as were used in determining the anticipated patronage of the transit system by the public generally.

Very early in our work we encouraged representatives of the handicapped to study the problem of accommodating those persons who thus appear to be excluded from the System. Their study produced a conceptual design for an inclined elevator which could be placed in the space ordinarily occupied by an escalator. This inclined elevator would provide the handicapped with an opportunity to use the subway in complete association with all transit patrons without a sense of being excluded, would not necessitate circuitous underground passageways, and would avoid interference with traffic at the surface.

On August 27, 1970, the board of directors of WMATA approved this conceptual approach and directed the staff to initiate discussions with the Department of Transportation in an effort to obtain Federal support of a research and development program to produce an engineering design and production techniques by which the inclined elevator could be made a reality. On October 8, 1970, a preliminary application was filed. On December 18, 1970, the Metropolitan Washington Council of Governments, by resolution, supported us in this effort. Our formal application was filed with the Department of Transportation on June 28, 1971, and we await decision by that Department.

Our objective is to complete developmental work and install a prototype of the facility in our first subway station so that it can be completely tested before committing ourselves to the very large number of these facilities which would be required to service the 86 stations of the System.

I would add that in our study of the system there would be 69 inclined elevators required to provide service throughout.

Since operation of phase I of the System is scheduled for early 1974, it is our desire to begin tests of the prototype during the latter part of 1973.

In conjunction with the inclined elevator project, we have investigated the requirements for conventional vertical elevators which will be used between mezzanine and station platform throughout the Metro System. This initial investigation indicates that 127 such elevators will be required. Our general engineering and architectural consultants are preparing detailed studies for the location of these conventional vertical elevators and any changes necessary to the general plans to accommodate them.

To insure access in the event that the effort to develop an inclined elevator is unsuccessful, or in these instances where the inclined elevator is not feasible, we have instructed our general architectural and engineering consultants to survey the entire Metro System with a view to using conventional elevators.

At the request of the Department of Transportation, the Authority has prepared comparisons of the cost of providing vertical elevators at all stations and of providing a mix of vertical and inclined elevators at all stations. These estimates are order-of-magnitude and indicate that providing access for the handicapped via a combination of inclined and vertical elevators would cost approximately \$44 million, while an all vertical elevator system would cost approximately \$60 million.

#### ADDITIONAL FUNDS WILL BE NEEDED

The Congress has been informed that it will be necessary for the Authority to seek additional funds for these facilities inasmuch as the financial plan on which present activities are being carried forward makes no provision for the cost of special facilities for the handicapped. As we went forward with planning, provision for this cost was impossible because the facilities had not been designed and this cost could not be determined.

The paramount consideration was the necessity to enter into contracts with the local jurisdictions responsible for the local share of system cost, which could only be done on the basis of known costs. Representatives of the handicapped group have been fully advised of the need for this course and have expressed their willingness to support this organization in its effort to have such funds appropriated.

Through all our efforts, we feel that we are fulfilling the requirements of providing for the handicapped. We especially feel that because of our actions the aged will have full access to Metro.

Thank you, Mr. Chairman.

Senator CHURCH. Thank you, Mr. Quenstedt.

I have received a letter from Senator Daniel Inouye. I want to include the letter in the record of proceedings. He wrote to me:

(The letter referred to follows:)

Because of my long and close relationship with associations for the handicapped and because of my responsibilities as Chairman of the Senate Appropriations Subcommittee for the District of Columbia, I would appreciate any consideration you give to asking some or all of the attached questions of the representatives of the Washington Metropolitan Area Transit Authority.

On behalf of the elderly, as well as the handicapped and the young mother with a baby carriage and shopping bags, the traveler with luggage, et cetera, I think it advisable to have on record the intent and the formulated plans of Metro in regard to the construction of a completely barrier free rapid transit system.

Knowing of the limitations of time and germaneness for which your hearings are bound, please be assured that I am appreciative for whatever questions you deem appropriate to ask.

Senator Inouye has submitted some questions which I will put to you, but before doing so, I would like to get back to your statement that present plans will make the Washington Metro System easily accessible to all but approximately one-tenth of 1 percent of handicapped not confined to the home.

I suspect that that is meant to include the wheelchair cases.

Mr. QUENSTEDT. That, sir, is correct.

Senator CHURCH. But we have had testimony that there are handicapped people besides the one-tenth of 1 percent who are not confined to wheelchairs who need to use elevators. People with heart conditions that do not have to ride around in a wheelchair, but never-

theless are required to go on steps, and other older people, as Senator Inouye points out, people loaded with luggage or parcels of that kind, that might have need to use special lifts, so really, the one-tenth of 1 percent is much too small a figure, is it not, to consider all of these cases

#### DEFINITION OF "HANDICAPPED" VERY DIFFICULT

Mr. QUENSTEDT. The definition of the term "handicapped," of course, is one of the most difficult things we are faced with. Obviously, a person without legs is handicapped. We recognized the problem of the man with the heart condition at the outset, and have determined that we will have escalators from the platform to the street.

This will be the only type system in the world, I believe, that takes care of the person with the heart condition, and in most instances it will take care of the person with packages or luggage, or whatnot. I have watched many times ladies with baby carriages, especially the stroller type that we use in the United States, go up and down escalators with the baby, and apparently suffer no serious difficulty.

Assuming our success in providing the inclined elevator for the one-tenth of 1 percent, that facility would be available to the individual who is unable to use the escalator. There are some persons with very serious motor conditions, for example, and I would not require that a person come wearing a badge, such as a wheelchair, and say, that only by use of a wheelchair you may use the elevator. The inclined elevator would meet these requirements that you described, and it is because they are rather broad in nature that we have been pursuing these things as we have.

Senator CHURCH. Let me ask you the questions of Senator Inouye, so we may have your answers on the record.

He says, "Rapid transit is an expensive but critical battle that must be won if we are to succeed in the struggle that the inner cities of America are now involved in.

"What do you estimate the additional cost to be to insure that the rapid transit system of the Nation's Capital be completely barrier free?"

Mr. QUENSTEDT. We have not identified specifically the added costs related to our decision to meet the American standards. We simply assumed them to be a proper expense in connection with building the system.

I suggest, sir, that although there are some costs in connection with that we do not lament our responsibility. I have identified in my statement that it will be from \$44 million to \$60 million to add this one additional facility of which there have been discussions.

Senator CHURCH. Does your concept of "complete" include all but the nonambulatory?

Mr. QUENSTEDT. I believe our design will include all but the nonambulatory, and even some people of severe motor difficulty will be able to use the escalator. Now, it would be within the capacity of the attendant in the station to stop an escalator, to stop it and let the person on, and stop it and let the person off.

Senator CHURCH. Why do you not include the nonambulatory?

Mr. QUENSTEDT. Why do we not?

Senator CHURCH. Yes.

## WHEELCHAIRS ON ESCALATORS

Mr. QUENSTEDT. Only because of the problem of how do you accommodate a wheelchair on an escalator.

Now, that can be done. I have myself, in a wheelchair, and completely without experience in the use of a wheelchair, gone up and down escalators to determine whether or not it can be done.

I do point out that I am of larger than normal stature, and fortunately in good health, and I am sure Mr. Willson could do it, because he is a very powerful man.

Senator CHURCH. I understand there are some hazards involved in that.

Mr. WILLSON. May I comment on that, sir?

Senator CHURCH. Yes.

Mr. WILLSON. I hate to put it this way, but for any transportation system, I would strike out every escalator.

In an emergency, I suppose, I could get on an escalator, and what you are doing is hanging on for dear life on the rails, and hope to God that the chair is still under you when you reach the end. It is not safe. It will not take blind people with seeing-eye dogs, for example, nor an individual with a nervous disorder. If you require that type of traverse between levels, the least you should install is a moving ramp, wherein if someone falls or has any difficulty, they are not going to be chewed up, or injured on sharp edges.

I personally feel that escalator companies should go out of business.

Senator CHURCH. I noticed in this pamphlet, "Travel Barriers," which has been published by the U.S. Department of Transportation, a discussion of escalators is included, and there is, in that discussion, the following statement:

"At least 25 percent of the physically handicapped have difficulty using a typical escalator." It is a rather sizable percentage of the total.

Mr. QUENSTEDT. Mr. Chairman.

Senator CHURCH. Yes.

Mr. QUENSTEDT. There seems to be some threat of confusion in this three-corner exchange, because of my failure to answer clearly what you asked. There has never been a purpose on our part to exclude anyone.

On the contrary, I would point out that what we decided to do accommodated all but a small fraction, and what we are now pursuing is intended to pick up that small fraction.

Senator CHURCH. Yes.

Mr. QUENSTEDT. At lower cost.

Senator CHURCH. Yes.

## ONE HUNDRED PERCENT ACCESS—IF SUCCESSFUL

Mr. QUENSTEDT. And in the process the facility would be available to all in need—the person I described a minute ago, need not wear a badge, a wheelchair. We will achieve 100-percent access if we are successful with the plan.

Senator CHURCH. Do you have estimates of the nonambulatory in the greater Metropolitan Washington area?

Mr. QUENSTEDT. We have estimates, and one member of the staff may have the figure with him. We are presently conducting a poll of the



entire 300 square miles of our transit zone to ascertain the number of persons who fall under the category and the number of trips they would generally take.

We have applied, as I mentioned earlier, the same analytical approach to the Public Health Service percentages as we have to determine the probable use of the stations. We have not yet had a report from the polling organization on what they have found with regard to the actual situation in the city.

Our analysis of previous figures, Mr. Chairman, indicated that there would be 427 persons in wheelchairs who are nonambulatory and would be seeking use of the System.

Senator CHURCH. The next question from Senator Inouye:

Is there any substance to the allegation that Metro is planning to ultimately place escalators in the spaces that are now supposedly reserved for the "inclined elevators" in the six or seven stations that are presently under construction?

Mr. QUENSTEDT. It would be speculation. There has been no decision. We are completely committed to this undertaking. We believe the inclined elevator is a part of it, but on August 27, 1970, the Board directed the staff to pursue alternate methods to be employed if we were unsuccessful in the inclined elevator, and the staff is presently taking a look at the idea of vertical elevators in these stations so that we will meet the requirements of the handicapped if we are not there with the inclined elevator.

Senator CHURCH. Assuming that the entering and the egress of the stations is completely barrier free, will there be provisions within the individual cars to assist the handicapped person?

Mr. QUENSTEDT. There are no special physical design features included in the design of the cars. As to the people in wheelchairs, we have talked to them about that, and they assure us that if the person is nimble enough to move about, the brake on the wheelchair is capable of withstanding the dynamics of acceleration and deceleration, which, by the way, are forces of no small consequence—

Senator CHURCH. Senator Inouye's last question:

This Committee has received testimony that the rapid transit systems of San Francisco and Stockholm, Sweden, have the traditional type elevators installed in each of their stations. Thus, other cities have given evidence that it is practical and economically feasible to have elevators. It is the hope of this Committee that Congress can point to the rapid transit system of the Nation's capital and to Metro, and find that it complies with the mandate of Congress in the form of Public Law 90-480 and Public Law 91-205, and that the system is completely barrier free.

Do you regard such a requirement as mandated by Congress?

Mr. QUENSTEDT. It was expressly mandated in Public Law 91-205, which amended Public Law 90-480, but with regard to the content of what you said, completely so, it may be appropriate to select key stations to make these facilities available, because in some instances, as engineering design produces a problem, so to speak, it may be that it is out of all reason to attempt to put the facility in. Some of our stations will be about 150 feet deep. Seventy percent of the people who will ride the Metro System will complete some part of their journey by other means of transportation, and those who are handicapped and would come to our System could go to the selected or designated stations on the System

should it prove impossible to put the special facility in in any particular place.

Senator CHURCH. In your studies in designing this System, did you look at all existing systems, including the Systems of the——

#### NUMEROUS RAPID TRANSIT SYSTEMS VISITED

Mr. QUENSTEDT. I have personally visited almost every rapid transit system in the world, and if you will permit me to do so, I will say I went with a serious purpose, and made copious notes. My last trip was in April of 1970. They have made no real physical progress toward their objective, but I was told how this could be accomplished here and there.

In Stockholm they do not provide elevators in all installations. As a matter of fact, I have seen it in only one station there, and I cannot tell you of the number of places.

In Oslo, some of the stations provide very long ramps at a relatively modest grade. They provide access for anyone on wheels, because there is a fantastic amount of the population using perambulators, more than you see in the United States. And with regard to San Francisco, you may raise the question of why such a fantastic amount of cost for our System as compared to theirs.

Our System is much longer, and our System will be underground considerably more than theirs. We have 86 stations and they have about 33. Of our 86 stations, about 44 are underground, so as it is expensive to do it, it is also on a larger scale.

Senator CHURCH. You actually anticipated the questions I was going to ask you on why the differences on cost. You answered it before I had a chance to ask it.

Mr. QUENSTEDT. I am sorry, sir.

Senator CHURCH. No. I want to compliment you for being one of the most diligent witnesses to appear before the committee. You answered the questions before they were asked.

I have no further questions.

Senator Gurney.

Senator GURNEY. Well, no mention is made of it, because it is assumed that we believe it will be done. What about things such as toilet facilities, drinking fountains that are necessary for the handicapped?

Mr. QUENSTEDT. Drinking fountains will be, of course, a standard facility, and under the American Standards, there will be adequate accommodation for the handicapped.

In keeping with the universal practice of the transit business, and there are certain exceptions that I can discuss, our organization will not provide public toilet facilities in the transit system. They have been found to be the cause of very serious difficulties. Every person that I know in the business urges that they not be provided, and in consequence, we have not.

We do have toilet facilities available for our employees, and in an emergency situation that facility would be made available to a person. I do not know where the philosophy, if that is what you call it, arose that there should be public toilet facilities in a transit system, but the problems that have developed have simply run us out of the business, if that is what you could call it.

Senator GURNEY. Well, I am just talking about the things that are necessary for the handicapped to use this facility. Have all those been examined and gone into and provided for?

Mr. QUENSTEDT. Yes, sir. The American Standards for making these facilities accessible cover this subject very, very thoroughly.

Senator GURNEY. What about the rolling stock? Senator Church asked the question. I wanted to probe into it, too.

Are there things that can be put on the cars to aid the handicapped?

Mr. QUENSTEDT. In the discussion with persons interested in those in wheelchairs, I mentioned that—

Senator GURNEY. Suppose somebody has got bum legs, and while standing up, falls down?

Mr. QUENSTEDT. We will have the usual stanchions to steady themselves. There will be handles on the seats for example. Hopefully, the day has not passed in our country where people will give a seat to persons suffering the physical difficulty you speak of. I do not know what type of facility you would build for the person who has a leg in a cast. There is nothing that we have not given a lot of thought to.

We have heard of one general approach that provides a special seat, elevated over the normal, so that people can half stand and half sit. I do not know its application. I do not know the source of the idea, so to speak.

Senator GURNEY. What about in San Francisco? Are there any provisions for special seats?

Mr. McCUTCHEEN. No, sir, there has been no provision for any special type of seat. We do have room on the car, without any modifications for wheelchair patrons, and there are 72 seats available on each car of the regular type which we feel are suitable for everyone to sit down.

Senator GURNEY. What is the special provision for a wheelchair?

Mr. McCUTCHEEN. Well, simply adequate space for people in the numbers that we think are going to use the system, to have a place for his chair.

Senator GURNEY. In other words, the seat can be taken down, and the chair can be backed down in it?

Mr. McCUTCHEEN. Yes. We could do that. We are not making that plan at the present time.

Mr. QUENSTEDT. With regard to the Metro car, there will be seating accommodations for 87 persons. There will be no special void to accommodate the chair, unless there finally develops a real need for it. We believe it would be possible for the person in the chair to occupy space in the vestibule provided for people to come on and off the car.

Senator CHURCH. Do you know how many wheelchair people there are around this area?

Mr. QUENSTEDT. We have a telephone and face-to-face survey going on to indicate the number of handicapped making trips but who are unable to use the escalators provided in Metro. I do not have the results of this survey as yet, but rough estimates indicate that there are about 8,500 of these people in this metropolitan area today. Whether all of these people would travel every day and, if they did, whether Metro would be available for all their trips and if it is, whether they would choose to use it are subjects for further analysis. These handi-

capped people are not all confined to wheelchairs, nor do all wheelchair people make trips. To answer your question specifically, no one knows how many wheelchair people there are in this area.

Mr. NUGENT. Mr. Chairman, is it appropriate and in order that the other members of the panel make comments and ask questions?

Senator CHURCH. Yes, of course it is. But since we are falling behind, we might go through the other initial presentations, and then if there are questions that the panelists wish to ask, you may.

Our next witness is Mr. William M. Spreitzer, head of the transportation research department of General Motors Research Laboratories.

**STATEMENT OF WILLIAM M. SPREITZER, HEAD, TRANSPORTATION RESEARCH DEPARTMENT, GENERAL MOTORS RESEARCH LABORATORIES, WARREN, MICH.**

Mr. SPREITZER. I am William Spreitzer, and I am appearing on behalf of General Motors Corp. With me are Edward Stokel, coach sales manager for General Motors Truck and Coach Division and David Lyon, assistant chief engineer for the Electro-Motive Division of General Motors.

We are pleased to contribute this General Motors statement to the committee's discussion of "A Barrier-Free Environment for the Elderly and the Handicapped."

Few would disagree that the elderly and the handicapped deserve safe, low-cost, convenient transportation. Where this quality of service is not available to these citizens, an important social need remains to be filled. Unfortunately, this situation exists—in varying degrees—in most communities, confronting the Nation with a social problem involving a sizable segment of our population.

**AGED AND HANDICAPPED RELY ON PUBLIC TRANSPORTATION**

Many older or handicapped citizens must rely on public transportation. Yet, for a generation there has been a steady decline in the patronage of these public facilities which has led to a curtailment of transit service and, in many communities, to its abandonment.

There is today, however, a renewed interest in public transportation—in providing financial assistance, in upgrading existing service, and in system and equipment innovations with greater public appeal. General Motors supports these efforts, many of which can be of special benefit to the elderly and the handicapped.

Recognizing the need for improved public transportation, General Motors appeared, on March 11, 1970, before the Subcommittee on Housing of the House Committee on Banking and Currency. The purpose of this appearance was to present General Motors' support for urban mass transportation assistance legislation then under consideration.

Oscar A. Lundin, executive vice president of General Motors, presented a statement on behalf of the corporation. The following excerpt from this testimony is pertinent:

The decline in the quality and frequency of public transportation service has burdened many groups who are unable to use or cannot afford private transportation—particularly the young and the elderly, the physically handicapped and the poor among our inner city residents.

In essence, the statement recognized the need for expanded Federal financing to local communities on a long-term basis to help them meet the transportation needs of their citizens. The significance of restating this GM support for Federal assistance lies in our belief that the elderly and the handicapped will benefit from most any general improvement in local transit facilities.

Backing up this public position, General Motors maintains continuing research and development programs in public transportation. These involve entire systems as well as the vehicles.

At General Motors, design and analysis of new transportation systems is one of the responsibilities of the Transportation Research Department. Two recent projects have special significance for the elderly.

#### TWO PROJECTS TO AID THE ELDERLY

One of these is a new bus passenger distribution system for downtown areas that features an improved information display. At each stop along the downtown route, electronically controlled, changeable message signs are located at the exact boarding positions. The signs display the destination of the arriving bus as well as the bus to follow—which, of course, may have a different destination. This prominently displayed, pre-arrival information will be especially helpful to the elderly or handicapped whose vision may not be sharp enough to catch the sign on the front of a rapidly approaching bus.

Boarding aisles are also provided at each bus stop position to allow people to approach and enter the bus in an orderly manner—another aid to the elderly when boarding a bus in a heavily congested situation. General Motors is currently sponsoring and participating in a test and demonstration of this new system in Rochester, N. Y.

The second system is known as “demand-responsive transportation service” or as it is also called: “Dial-a-Bus.” This is essentially door-to-door service, and therefore particularly applicable to the needs of people, such as the elderly or the handicapped, who may find it difficult to reach normal transit service routes. As the name suggests, the telephone is used to call for a bus.

Through the use of a computer, the ability to meet the demand within a specific time period is determined. If acceptable to the customer, a vehicle—which may already be servicing other patrons—is dispatched to the customer’s location. It is expected that fares will be lower than for taxicab service because of the increased productivity of the vehicle that is achieved through ride sharing.

General Motors selected a typical low density, suburban community in Michigan as a case-study city to determine the merits of demand-responsive service. The study—considered by many to be the most complete of its kind ever made—concluded that for such areas, the concept is technically feasible and appears to be economically attractive from an operating standpoint, exclusive of capital costs.

This study—which incidentally was conceived and entirely financed by GM and took over 12 man-years to complete—served also to identify more precisely the transportation needs of various subgroups in the total population—including the elderly.

For example, of 31 system characteristics, the elderly demonstrated a distinct preference for these four: Having a seat, no need to transfer, low fare, and arrival on time.

The responsibility for vehicle design at General Motors is centered in the producing divisions: GMC Truck and Coach for buses and Electro-Motive for rail vehicles.

### THE RTX

In 1966, GMC began the development of an entirely new concept in bus design. In 1968, we completed an experimental prototype known as rapid transit experimental, or RTX. Concurrent with this General Motors project, the National Academy of Engineering, under a grant from the Department of Housing and Urban Development, was formulating a set of design criteria for the next generation of transit coaches. The RTX met, or exceeded, virtually all of the academy's objectives.

While the design of the RTX includes many advanced technical features, special attention was given to passenger-oriented characteristics. Among the features of interest to the elderly and the handicapped are:

A 12-inch lower floor height for easier entry and exit.

The capability of the bus to drop about 3 inches closer to ground level to make it easier to board the coach where there are no curbs.

Lounge-type seating providing additional space for each seated passenger.

Separately controlled heating and air-conditioning zones.

Carpeted floors to reduce the possibility of slipping and to minimize noise.

A new braking system for smoother stopping.

For the blind, a tapping strip in the center of the floor so that they know where they are.

From its first demonstration in 1968, the RTX has received many favorable comments from Government and transit industry leaders. Nevertheless, followup marketing studies within the transit industry indicated that, desirable as some of these features were from the standpoint of the elderly and the handicapped, there was not sufficient interest to justify including them on future production models.

Currently, we are working with the Urban Mass Transportation Administration on the details of a modified version of the RTX. This vehicle, designated the RTS, is being designed to meet the needs of transit operators and to be competitive on most equipment contracts involving Federal financing.

### HYDRAULIC RAMP FOR THE HANDICAPPED

As with current production model GMC coaches, the RTS is being designed to accommodate certain features which can be installed on a special order basis. Of particular benefit to the handicapped, for example, is a hydraulic ramp for wheelchairs. This ramp device is now

being installed on two coaches that GMC recently completed for the Veterans' Administration.

Electro-Motive Division also has a passenger vehicle under development for use in rail service along heavily traveled corridors. The basic body structure and many of the interior appointments will be substantially identical to those used in the new RTS bus being developed at GMC. This rail passenger car will also offer improvements in acceleration and braking for a smooth and comfortable ride and will have greater electrical capacity for improved lighting and air conditioning.

To sum up briefly, General Motors is keenly aware of the need to minimize any transportation barriers that limit the freedom of mobility of the aged and handicapped. Many of these citizens must rely on public transportation, and GM is committed to helping improve these facilities—through its support of Federal financial assistance and its own innovative developments.

In addition, the corporation is giving active support to the White House Conference on Aging. Key GM people are represented on both National and State committees, bringing their own as well as corporate expertise to this vital project.

Finally, it is gratifying to take note of the wide interest in solving this social problem. We are confident that this effort, by all who are involved, will add greatly to the quality of life in America.

Thank you.

Senator CHURCH. Mr. Spreitzer, we understand that about two-thirds of all buses purchased each year are made by General Motors. You have mentioned the RTX, an effort to design a motorbus that will have particular accommodations for the handicapped and the elderly, and you have testified that there was a definite need for such a bus.

You are working on a modified concept, if I understand you correctly.

Do you think this has to do with the design itself, the impracticability in some of the features in the design? What, in your own judgment, is the problem here? It seems to me we ought to be able to design a bus that would take care of the general need, and not be a barrier to people with handicaps.

Mr. SPREITZER. The practical situation of the rising costs of supplying public transportation. The operator is faced with the situation where the patronage is declining and costs are increasing, and he finds it necessary to analyze very, very carefully the benefits and the costs of any new feature. Quite frankly, in these cases, it has been the requirement on the part of the operators to make adjustments which are not intended at all to provide barriers to any segment of the population, but rather to exercise his responsibilities in providing public transportation service.

Ed Stokel, would you like to add anything to that?

Mr. STOKEL. When we showed the RTX—

Senator CHURCH. Could you give us your name, your title, so that we can have it for the record?

**STATEMENT OF EDWARD STOKEL, COACH SALES MANAGER,  
GENERAL MOTORS TRUCK AND COACH**

Mr. STOKEL. My name is Edward Stokel, and I am coach sales manager for General Motors Truck and Coach.

When we showed the RTX vehicles to the operators throughout the industry, and we displayed many of these features that were of an aid to the handicapped, they were interested, but they are caught in a cost squeeze, and in their judgment, they could not see specifying some of these items because of the obvious higher costs.

Senator CHURCH. Well, does it cost more to build a bus that is closer to the ground than it does one higher above the ground?

Mr. STOKEL. Yes, it does, Senator.

The CHAIRMAN. Why?

Mr. STOKEL. It requires a much heavier axle, smaller wheels, and decreases the number of axles to carry the load for which it is designed.

Senator CHURCH. I cannot see why building a smaller wheel is—the logic escapes me. I would not think it would be more expensive to build a bus lower to the ground.

Mr. STOKEL. Our studies show that it costs about \$4,000 more to build a bus closer to the ground than it does to build a conventional vehicle.

Senator CHURCH. Well, there must be reasons for that.

#### WOULD MASS PRODUCTION OFFSET COSTS?

Senator GURNEY. Is that higher cost because there would only be a few models produced, or simply because there is that much extra equipment on it?

If you mass produced that bus like you produce all your other buses, would that lower the cost?

Mr. STOKEL. That would depend upon the amount of building of the buses.

Senator GURNEY. Let me ask this one question. If all buses were built with these RTX specifications, would the increase in cost be \$4,000?

Mr. STOKEL. Yes, it would, sir.

Senator CHURCH. Is that 10 percent of the total?

Mr. STOKEL. Yes, it is.

Senator CHURCH. Is it not possible that that could be partially counterbalanced by larger usage? It seems to me that one of the problems of mass transportation is that fewer and fewer people are using it.

Mr. STOKEL. That is true. If I could elaborate on what Mr. Spreitzer says, a grant was awarded to an organization to develop new criteria and a new set of specifications for the vehicles of tomorrow, and we are working with them and the Department of Transportation in establishing new criteria. Some of the criteria will take into account aid to the handicapped.

Senator CHURCH. Let me ask you this: Is it not possible to design a step into a bus in such a way that an older person does not have to step up 18 inches to get aboard? Could not that be done rather cheaply, so that, rather than lowering the whole bus, you could provide a ramp or a step device that would make the bus more readily accessible to people who are handicapped?

Mr. STOKEL. We have done that, Senator, for the University of Illinois, Mantino State Hospital, as earlier indicated, and on special



order we can do that, but we built a set of specifications, and they would have to be written into the basic specifications.

Senator CHURCH. You mentioned something about a hydraulic device, hydraulic ramp for wheelchairs. What I had in mind is something much simpler. Just steps that are built in such a way that is more convenient for elderly people, or even for children.

I should not think that that would be very difficult.

Mr. STOKEL. If I may comment on that, we provided two possibilities in that regard. One was to allow the front end of the bus to kneel, actually lower itself at each stopping at the control of the driver, so that handicapped people would have a lower first step. That option is now available to the industry, and I might say that one major city is giving that very serious consideration right now in the development of its specifications.

Another possibility that we injected before the marketplace was the idea, as you suggest, Senator, a fold-down step, and we offered that as a possibility.

I might add this comment, though, that the operators of the vehicles thought that that was objectionable, because it would have a tendency to hit the curb, and it would cause damage to the vehicle, and they are more prone to the kneeling position, which would be on an extra feature, but would provide access to the vehicle of the handicapped.

Senator CHURCH. Yesterday we had some testimony about an especially designed taxicab, and we had a model of it here. It seemed to be a highly practical idea, and it included such features as: a plug-in motor that could be readily removed, and a new motor inserted; wide doors and level floors so it could be utilized by wheelchair patrons, and it was called the Prattaxi, and it has more space than a Cadillac, and it is hardly any longer than a Volkswagen, yet it has practically standup room in it.

It seemed to us to be—on questioning the witnesses—such a practical idea, an idea that would accommodate people. Are you familiar with this?

Mr. SPREITZER. Yes; we are familiar with the designs by the Pratt Institute, and other organizations in that area, particularly as it relates to taxicab service.

But again, getting back to the practical requirements, in vehicles and in initial cost, the tendency has been to utilize conventional vehicles, for the most part, for taxicab service. There is a small organization that builds a large number of taxis, but they are built to conventional automotive specifications. The total vehicle fleet with regard to taxi service is much smaller than you might expect.

I am not sure of the exact number, but I would estimate it is between 60,000 and 80,000 vehicles nationally.

Senator CHURCH. Each year?

Mr. SPREITZER. No; that is the entire vehicle fleet that exists in the Nation. Approximately 80,000 vehicles. The total vehicle fleet for the city transit buses, Herb, is 60,000 nationally?

Because of the small numbers that are available, then, in the market, there is little innovation for manufacturers to pursue specialized vehicles for this specific purpose.

## ECONOMICS INTERFERE WITH PROGRESS

Senator CHURCH. Well, here is another place where economics get in the way of public convenience and public accommodations.

Mr. SPREITZER. It is not simply a question of the manufacturer supplying the vehicle, but it is a question of supplying the additional funds to purchase a specialized vehicle for a limited purpose.

Senator CHURCH. Well, I think these attitudes may change. In the city of New York it is practically impossible to park on the streets of that city. It is clogged and congested and constipated to the point where these streets are hardly moved at certain times of the day, and I would think one thing they are going to have to face up to is clearing the streets. Bring the trucks in at night, and keeping the cars off the streets, and converting them to promenades, and then General Motors would have to design vehicles to accommodate these things.

Mr. SPREITZER. We recognize that, Senator, and Alex Mautner, responsible for taxi design in New York, visited with us recently and we talked not only of vehicle design, but also improvement of traffic regulations, such as in the city of New York.

Mr. QUENSTEDT. Senator, in Stockholm they are already restricting some streets to cabs and buses and anticipate reserving some streets strictly for buses.

Senator CHURCH. Yes, and I heard last night an interesting thing that might give pause to General Motors, the way the trends are developing, and that is that the bicycle industry was down to next to nothing, but is experiencing a resurgence, because people are despairing of vehicular traffic and buying bicycles again. It would be conducive to good health, and also improving the quality of the environment, and people are finding that they can get around on bicycles better than they can in automobiles.

Our next witness is Herbert Scheuer. There has been a change in the panelists. He is appearing in place of Robert Sloan.

Mr. Scheuer.

**STATEMENT OF HERBERT SCHEUER, ASSISTANT TO THE VICE PRESIDENT, AMERICAN TRANSIT ASSOCIATION, WASHINGTON, D.C.**

Mr. SCHEUER. Mr. Chairman and members of the Senate Special Committee on Aging, I am Herbert Scheuer, assistant to the executive vice president of the American Transit Association.

I am appearing today on behalf of the association, which represents the urban transit industry and encompasses both local motor bus and rail transit systems throughout the United States and Canada. The transit system members of the American Transit Association carry 85 percent of those using public transportation.

We endorse the concept of "a barrier-free environment for the elderly and the handicapped," and we appreciate having this opportunity to discuss with this committee the transit industry's role in removing these barriers.

We are in the business of moving people, all the people, including the young, the poor, the aged and the infirm, and we stand ever ready

to seek improved ways and means of providing quick, low-cost, comfortable public transportation for everybody.

Two ATA members in particular are far advanced in the techniques of providing the handicapped easier access to public transportation. They are, of course, the newest rail transit systems now under construction: the Bay Area Rapid Transit System in California and the Metro System building here in the Nation's Capital.

Both systems will be totally barrier-free, despite the fact that the handicapped are but a small percentage of the patrons who will be using the system. The BART System has spent in excess of \$8 million over and above the original estimates to conform fully with American Standards Association specifications. The Metro System too, has geared its design to be in complete accord with, and even to surpass, the architectural barrier standards set by the American Institute of Architects.

The fundamental design of these systems eliminates twisting passageways and hard-to-find fare gates. They will have elevators or inclined passageways and ramps. Both systems have provided special safety devices with the handicapped in mind. People on crutches or in wheelchairs will find all doors at stations and aboard the trains wide enough for quick and safe access.

The Washington Metropolitan Area Transit Authority has applied to the Department of Transportation for a million dollar grant to conduct an engineering study of an inclined device based on a concept developed by the Architectural Barriers Committee of the President's Committee on Employment of the Handicapped.

Approval of that application by the Department of Transportation would add another handicapped-oriented device to the metro system.

Mr. Wilmot R. McCutchen, chief of design, San Francisco Bay Area Rapid Transit District and Mr. Warren Quenstedt, deputy general manager, Washington Metropolitan Area Transit Authority are here to further detail the work that their respective organizations are conducting.

#### ELIMINATE BARRIERS BEFORE CONSTRUCTION

New systems have the opportunity to eliminate barriers before they are built. Older rail systems, mostly built around the turn of the century, do not have this opportunity, but are constantly striving to eliminate barriers where possible, and to design replacement equipment to exclude barriers to the handicapped.

Urban bus transit systems, too, cooperate by assuring the handicapped of driver cooperation when it comes to handling wheelchairs and similar situations. For instance, physically and mentally handicapped are being taught the orientation and mobility skills which will aid them in using public transportation in year-round bus classes arranged by AC Transit in Oakland, Calif.

Currently taking advantage of instruction are blind youngsters in the bay area. A film, including a sequence on bus travel skills, has been produced with the cooperation of AC Transit and the Alameda County School Department for the parents and teachers of blind children. The film already has been shown around the United States and Australia.

The urban bus transit systems have extended cooperation in breaking down yet another barrier. Not architectural, but rather one of finances. Urban bus systems across the Nation, 68 of them, have cut fares for the aged. This has not, as you can well imagine, been a profitable endeavor.

In fact, without local support in the form of subsidies, most transit operations could not afford to grant this aid to mobility for the aged. In some cities the question of whether reduced fares for the senior citizens are, in fact, discriminatory has cropped up.

These cities stress three points:

1. That unless self-supporting or otherwise subsidized, a discount granted to a special group of transit users must be regarded as an additional burden on the remaining system patrons;

2. That when a discount is allowed for any purpose, such a discount becomes philanthropic in nature and therefore, not properly supportable from transit funds;

3. That it is inequitable and unjust to impose upon transit riders the support of welfare projects which are properly the concern of, and should be supported by, the entire community.

A list of cities providing reduced fares for senior citizens will be submitted for the record.\*

Finances, too, Mr. Chairman, strike at the very heart of the problem. A completely barrier-free environment for the urban transit industry in general, and the bus segment in particular, would necessitate a major revamping of the industry's rolling stock. Right now, an average city bus, without special equipment for the handicapped, is priced at approximately \$42,000. The cost of providing additional specialized equipment would be prohibitive to an industry that is currently weighed down by a yearly operating deficit in excess of one-third of a billion dollars.

#### PUBLIC TRANSPORTATION SHOULD BE PUBLICLY FUNDED

If the transit industry is to survive at all, we must face the fact that public transportation is a public service and must be funded as such.

Senator Harrison A. Williams, Jr., of New Jersey, and Senator Charles Percy of Illinois have recognized this fact and have introduced legislation, the Emergency Commuter Relief Act, that would provide, among other things, Federal operating subsidies for hard-pressed transit systems.

But, even if urban transit bus systems could afford to make buses totally barrier-free, we would question the advisability of doing so.

The goal of mass transportation is to move great numbers of people from point A to point B as quickly and efficiently as possible.

Fast loading and unloading of vehicles, particularly during rush hours, is essential to the total concept of moving mass numbers of people. And, time is of the essence to an industry intent on not only retaining the riders it has, but gaining new riders in an era when congestion and car-caused air pollution befoul our environment.

\*See app. 1, p. 200.

The problem of moving the handicapped—a very small percentage of the total ridership—is of special concern, outside the realm of mass transportation, and rather a welfare and community responsibility and function.

Schoolbus operators have found that special vehicles, separate from the standard fleet, are necessary to carry the handicapped.

In urban bus transit systems, too, a separate fleet of vehicles, with specialized equipment and personnel operating “on call” or on special schedules and routes would better serve the handicapped and free the urban transit bus to perform its basic role of moving the masses.

Thank you.

Senator CHURCH. Do I understand from your testimony that you have provided the designed features that have been incorporated into the BART system impractical?

Mr. SCHEUER. I do not, sir. I find these features very practical. I am distinguishing between the bus system and the rail system that provides features for the handicapped.

Senator CHURCH. I may simply be exhibiting my own prejudice in this matter. It seems to me that as I traveled around the world, that bus designs in some countries are well advanced beyond our own. Take the European buses that are so much less bulky, and have so much more glass space, visibility, and I wonder if we really are doing all that well in designing our buses.

Mr. SCHEUER. Senator, I have seen the buses in many European countries, and I have observed them very carefully in the aesthetics of the vehicle, as well as the power systems. Some of them have impressive features about them, but I think the buses we are able to have in this country, in general, surpass what I have seen in a number of European countries in transit operations.

Senator CHURCH. It may be that I have not seen our most recent designs. Many of the buses are old buses that are operating on our streets. I do not pass any definitive judgment, but I have been particularly impressed in other countries about their buses.

Mr. SCHEUER. I think our buses will match those of the European countries, sir.

Senator CHURCH. I would hope so.

To get back to one question, because it has come up so often, I have talked to handicapped people, and that is the question of access to the bus, and so far it has been indicated that there is no satisfactory solution, short of getting the bus to kneel down.

It seems like bringing the elephant to the mouse. Has any consideration been given to an inset door that would not entail the physical difficulty of a dropped down step which might strike the curb, or prove a hazard in its own way?

Mr. SCHEUER. The transit system operators are equally concerned about the height of vehicles. We acknowledge that it has been difficult for elderly people to enter and exist easily from buses. This is particularly so when our drivers are unable, because of traffic problems and blockades, to pull their vehicles to the curb for loading and unloading, when that step then becomes even higher, but unfortunately there has been an engineering problem in lowering the vehicle, in overcoming the height problem.

I do not know of a way about relocating the door. There will be other problems involved in doing that. Where steps are lowered upon the opening of a door, there are then possibilities of those steps being damaged by the curbs, or irregular approach areas might be involved, and these are all things we are very much aware of, very concerned of, and we hope that some day they will be overcome.

Senator CHURCH. But you have no solution that your designers and engineers have been able to come up with?

Mr. SCHEUER. Not at this stage, except the feature of the RTS vehicle.

Senator CHURCH. All right. Let us move on, then, to John Hirten, Deputy Assistant Secretary for Environment and Urban Systems, Department of Transportation.

Mr. Hirten.

**STATEMENT OF JOHN E. HIRTEN, DEPUTY ASSISTANT SECRETARY FOR ENVIRONMENT AND URBAN SYSTEMS, DEPARTMENT OF TRANSPORTATION; ACCOMPANIED BY IRWIN HALPERN, DEPUTY ASSISTANT SECRETARY FOR POLICY AND INTERNATIONAL AFFAIRS**

Mr. HIRTEN. Thank you, Mr. Chairman.

Let me first introduce the gentleman to my right, Deputy Assistant Secretary for Policy and International Affairs, Irwin Halpern.

I appreciate this opportunity to discuss with the committee one of the major problems facing our elderly and handicapped Americans, that of barriers to the effective utilization of our transportation system.

Twenty million of our citizens are 65 years of age or older. Further, it is estimated that approximately 6 million Americans of all ages suffer physical handicaps which limit their mobility. To deprive these people of transportation is to deprive them of their right to live normal and fulfilling lives.

Equally important, it is to deprive this Nation of the contribution that their maturity and experience can make.

**EQUAL OPPORTUNITY FOR THE AGED**

One of the founding precepts of the Republic is that all Americans, regardless of race, color or creed, are entitled to equal opportunity. We are now realizing that we must also extend this right of equal opportunity to those of all ages and physical conditions.

There is increasing appreciation that equality of opportunity for older and handicapped Americans requires equality of mobility to permit access to the resources and services to which they are entitled. Older and handicapped persons no longer seek to withdraw; they seek participation. After a lifetime of interaction with others, isolation is intolerable to the elderly and the infirm.

We must create a society where the aged can have the same opportunity as other persons to utilize public facilities and services and to participate fully in the life of the community. The elderly, like

everyone else in society depend on the ability to travel for acquiring the basic necessities of life, for gaining employment, and for receiving medical care. The ability to travel is also necessary for their participation in cultural, recreational and other social activities. To the extent the aged and handicapped are denied transportation services, they are denied participation in meaningful community life.

The problem is a highly complex one. The aging and the handicapped do not constitute a single monolithic group of 26 million people located in one area. Thus, any solution to the problem of the aged and the handicapped must be as variate as the members of the class it seeks to serve.

At this point, however, it appears that the problem breaks down into three categories. These are:

1. Financial constraints due to the low income of a large proportion of the elderly and handicapped.
2. Operational constraints in that public transit does not always take the elderly and the handicapped where they want to go.
3. Equipment constraints in that transit facilities are not always accessible to the elderly and the handicapped.

Yet, much can be accomplished by alerting planners and public agencies to the needs of the elderly and the handicapped. When so little has been done in the past, much can and must be accomplished in a short time.

#### TWO-PRONGED APPROACH

Based on this philosophy, the Department is moving ahead on a two-pronged approach to the problem. First, we have specific programs aimed at facilitating transportation for the elderly and the handicapped.

Second, we are assuring that our general programs and projects take account of the needs of this group.

I know time is short, Mr. Chairman, so I will just give you a sample of our specific programs in this area. A fuller account will be submitted for the record.\*

New specifications are being developed by our Urban Mass Transportation Administration to make transit vehicles more accessible to our elderly and handicapped. A number of these are included in our booklet "Travel Barriers," which I would like to submit for the record at this time.\*\*

In addition, we have a number of photographs of a specially designed GM bus, which we would like to submit for the record.\*\*\*

I think preparing these materials and keeping aware of what is going on in this area, as well as passing on the information we assemble, is part of the important educational program that is needed to achieve greater consideration of the needs of the handicapped in the planning and design of transportation facilities, and, I might add, in generating the kinds of public support necessary to support the additional financing which is always needed.

UMTA has funded several university studies directed at the transportation needs of the elderly.

\*See appendix 1, p. 187.

\*\*Retained in committee files.

\*\*\*Retained in committee files.

## "PEOPLE-MOVER"

A new "people-mover" system in Morgantown, W. Va., includes approximately 100 vehicles which are specially designed to be accessible to the elderly and the handicapped.

The Department believes, however, that the solution to this problem does not lie entirely in developing separate facilities for the elderly and handicapped, but in making all transportation facilities available to them.

Section 16 of the Urban Mass Transportation Act of 1964 seeks to deal with this problem by requiring that localities give special consideration to actions designed to meet the need of the elderly and handicapped when planning and designing urban mass transportation facilities and equipment. The Department has taken the position that no capital grant or technical study may be approved under the act until the applicant has demonstrated that this requirement has been complied with.

Let me just give you two examples of what we are doing in this regard.

The Urban Mass Transportation Administration has assisted the San Francisco Bay Area Rapid Transit in the purchase of 135 cars. All cars are specially designed to remove travel barriers with such features as extra wide doors and aisles, loudspeaker systems, and high visibility signs.

UMTA has on their staff a transportation specialist who deals specifically with the problem of the handicapped, and my office has a permanent staff member and a specialist consultant concerned with the elderly and the handicapped.

The projects which I have discussed are aimed both at developing better service and special design features to facilitate access to transportation for the elderly and handicapped. Quite frankly, we do not know yet whether subsidies for exclusive transportation services for the elderly is a viable approach.

For this reason, we are not in a position at at this time to recommend the establishment of permanent programs aimed exclusively at the problem of the aging and the handicapped. We believe the widespread dissemination of the results of our demonstration programs combined with revenue sharing will provide sufficient flexibility to local governments who would then be in a position to develop appropriate continuing programs aimed at the resolution of these problems over the longer term.

I know you want to get to the other participants in this hearing Mr. Chairman. In closing, I wish to quote from Secretary Volpe's introductory statement to "Travel Barriers." He said:

There must be within our society a continuing universal awareness that transportation for the handicapped is good business, good government, and good human decency.

Deputy Assistant Secretary Halpern and I stand ready to answer any questions you might have.

Thank you.

Senator CHURCH. Well, I do not think it would ever be feasible to design a separate transportation system for the elderly and handi-



capped. Certainly, a separate system designed for a very small percentage of the total population will not work.

You have some pilot projects, I understand. You mentioned one in Morgantown, called "People-Mover." Morgantown, W. Va., including 100 vehicles, costing \$23 million. What is this "People-Mover?"

Mr. HIRTEN. It has rubber tires, is computer-controlled, and moves on a guiderail. It is to serve the community of Morgantown and the university campus. It is being placed there as a demonstration to afford maximum testing and opportunity for experimentation.

It is financed under our urban mass transportation demonstration grant program.

Senator CHURCH. How far along are you with it?

Mr. HIRTEN. Construction has just begun, Mr. Chairman.

May I go back to my statement?

Senator CHURCH. Yes.

Mr. HIRTEN. We believe, within the Department, that there is a need to serve the elderly and the handicapped through a variety of methods. One method that certainly deserves consideration is a system which would enable either taxi service or minibus service to go into areas where the elderly live and take them where they need to go, that is to hospitals, clinics, and what have you.

#### "DIAL-A-BUS"

Each community has to be treated separately. In Helena, Mont., where there are no buses, UMTA is financing a demonstration of a "Dial-a-Bus" service which would serve the public, and particularly the elderly, in the absence of a public bus system. This is what I think we are talking about when we speak in terms of a separate service that would deal specifically with the problem of the elderly and the handicapped.

Sometimes the cost of this special service is not too great, particularly when one adjusts an existing system to take care of an additional service need.

Mr. MILLER. This would be a feeder system, I presume, from areas where you have elderly people?

Mr. HIRTEN. That is correct. I broke the problem down into the three basic areas that we see need attention. One of them is service. Even if you adapt your Metro systems, there is a problem of getting them from the home to the system. This is a problem for a lot of people, but it is particularly a problem for the handicapped and elderly. It is a problem on a lot of existing bus systems right now because they are on a fixed route that does not necessarily serve the peripheral areas, where the elderly and handicapped may live.

Senator CHURCH. I have been given a figure here that astonishes me, that 70 percent of the cost of new buses is financed by the Federal Government. Is that true? What does that figure mean?

Mr. HIRTEN. Well, basically, we have a capital grant program which is a matching program for local communities to acquire new rolling stock.

Senator CHURCH. That relates to Federal assistance to public transportation across the community?

Mr. HIRTEN. That is correct.

Senator CHURCH. Well, since the Federal Government invests such a substantial amount of money for communities to purchase new buses, are there any requirements which DOT insists upon regarding the handicapped and the elderly?

Mr. HIRTEN. I will have to ask some support from my staff concerning the specifics, but, in general, we are drawing up specifications for new buses which will be a required part of the capital grant contracts.

These will include not only considerations for the elderly and the handicapped, but also considerations for air pollution and other matters. This, we hope, will overcome the problem of the competitive bid situation under which most local communities are operating and in which precludes the \$4,000 to \$6,000 additional cost of the buses that you and I would like to see get on the road. I think this is an important step.

Further, under our current provisions we look at every program with the elderly and handicapped in mind. I would now like Harold Williams, Director of Civil Rights and Service Development of the Urban Mass Transportation Administration, to speak.

**STATEMENT OF HAROLD WILLIAMS, DIRECTOR OF CIVIL RIGHTS  
AND SERVICE DEVELOPMENT OF THE URBAN MASS TRANSPORTATION ADMINISTRATION**

Mr. WILLIAMS. As three of the gentlemen who testified earlier indicated Senator, UMTA is funding a study having to do with the design of buses. UMTA does not have, at the moment, a set of criteria which takes into consideration the particular problems of the aged and handicapped. As a result, during the past year we have been working with the President's Committee on Aging and also have funded a program which we expect will in 2 months deliver us design specifications that will take care of this gap. Our guess is that the first prototype of this type of bus will be ready within less than a year. After the testing of the prototype bus, we intend to issue new design specifications which will help meet the needs of the elderly and the handicapped.

Senator CHURCH. Well, I will be very much interested to see those designs when you have those perfected. I also would like to see the prototype.

Mr. WILLIAMS. We would be glad to have you take a look at it.

Senator CHURCH. How will this be different from the one we were discussing, the RTX?

Mr. WILLIAMS. Well, frankly, Senator, it might be best to submit the final specifications for the record.\* They have been changed four times; there is a possibility of changing them again within the next 2 months.

Senator CHURCH. Very well.

Mr. HIRTEN. Mr. Chairman, hopefully these standards will allow people in the industry to construct buses which take account of this

\*Retained in committee files.

need. We are also working with the District of Columbia to obtain 18 new buses to replace the minibus services. The specifications have been drawn up, and will include consideration of boarding problems of the elderly and handicapped. This is the direction in which we are going.

Senator CHURCH. Thank you very much.

Mr. HIRTEN. Thank you.

Senator CHURCH. Our last panelist is Mr. Timothy Nugent, director, Rehabilitation Education Center, University of Illinois, Urbana, Ill.

**STATEMENT OF TIMOTHY NUGENT, DIRECTOR, REHABILITATION EDUCATION CENTER, UNIVERSITY OF ILLINOIS, URBANA, ILL.**

Mr. NUGENT. Mr. Chairman, members of the committee, distinguished members of the panel, as I sat here, I realized my role is going to be far different from many of the others. I think it fair that I identify my involvement, which is far different than any of the other people that have appeared before this committee. I shall not speak or read from a prepared statement.

Twenty-five years ago I embarked on a task that forced me into finding answers on transportation, the usability of facilities, and many other things. I would say, first of all, that the presence of a problem, is the absence of an idea, and rather than fragmented examples here and there, I think we must attack this thing with a philosophical base, and a commitment to people.

I have brought some examples of things that we have done for 20 years in transportation of the disabled and aging, not that they themselves are absolute answers, but ideas. We know there are refinements that can be added.

Before I do that, Mr. Chairman, I would like to reciprocate some of the thoughts that have come before the committee. We have heard many times of the low income of the disabled. We have heard it mentioned as though it were a fixed factor. I would like to say that these things are reciprocal by nature.

**BETTER TRANSPORTATION WILL INCREASE INCOMES**

When transportation becomes available, income will increase, and attitudes will change tremendously. We already have positive proof that people considered to have to be confined to the home years ago are no longer confined to the home because of this overall approach to solving their problems. Therefore, these findings must be considered limited, if not inadequate. These too, will change as we open up avenues of approach for the disabled or aging, which you and I take so much for granted. I have heard cost mentioned here many times, as though it was fixed cost, and had to be identified with disabled people only. Also, this would be a one-time expenditure amortized over many, many years. They do not make mention of the additional income to be realized by facilitating people who need and want to use public transportation and who have been denied public transportation. I'm not so sure that the extra income may not more than equal the "extra cost" over that same period of time, if we put it all together properly.

I could offer evidence of people who made the challenge to me years ago that such efforts would be extra cost, who will now state that they have extra income by becoming involved in some of the things

that we are here committed to looking into and, hopefully, getting done. I do not think that any public transportation system should be geared to the numbers identified within one community only, because we now know that these people will travel from place to place, and in Washington, D.C., particularly, you have a lot of visitors and tourists who are disabled. I would like to take opposition to Mr. Stokel. When they refer to extra cost, I cannot accept this. I think we are saying that we have to live with the bad habits of the past, obsolete tooling. I think a new company could tool up for a vehicle that would serve all people for the same cost that they could tool up for a vehicle that is today's standard.

Some mention has been made of the small van. We actually operate small vans and buses, and the cost of the small van is much greater per passenger than the cost of the bus, particularly when you think of commercial involvement, because the driver's wage is fixed. Insurance is almost fixed, because it becomes a public conveyance. Longevity is less, and operation and maintenance costs not that different. Therefore, when you divide fixed costs by the number that can be accommodated, in a commercial sense, the cost of a small van becomes far greater than the cost of a conventional vehicle.

#### DESIRES AND SKILLS OF HANDICAPPED SAME AS PHYSICALLY ABLE

I would like to emphasize two things.

First, the aspirations, interests, talents, and skills of the people who are handicapped are the same as yours and mine. Second, if those present who are able bodied were confined to a wheelchair tomorrow by injury or disease they would be faced with many denials in performing their daily tasks or pursuing their aspirations and interests or exercising their skills because of the problems to which we are addressing ourselves today. The great expense is the loss of human resources. I would emphasize the figures quoted on disability today are good for as long as it took to obtain them.

In essence, what I am able to bring you is 25 years of involvement with this problem, and I repeat, the presence of a problem is the absence of an idea. I am not going to say that you are going to see a total answer, but I am going to illustrate or demonstrate answers to some of the questions raised today and always. This is not a projection, not a theory, nor a hypothesis. It is an actuality.

I believe that one of the causes of the problems that confront the mass transit operators and I know they are not wholly responsible for this, is that they have not been serving the people that need the service the most in the areas that need it the most. They have a fixation on the average man. I truly feel that proper concern for this will actually result in greater income, and a sensible amortization of the cost necessary to put into operation transportation that will serve everyone.

I would also like to reemphasize one other thing, because the term "public buildings" has occurred many times today. The national program was not for public buildings and facilities, but rather buildings and facilities used by the public, regardless of the source of funds for construction and operation.

(Mr. Nugent then presented a color film.)

Mr. NUGENT. First of all, I would like to say that we have been operating buses that accommodate the able bodied and the disabled

and aging simultaneously for 20 years. These buses are used in the elementary school system in the community, by the aged in the nursing homes, and on campus.

You saw able-bodied people enter by the front door of the bus. It is a regular General Motors 3102 transit bus. Now, you will see wheelchair people enter by the same front door of the same bus. It takes less than 4 seconds even for those using power chairs, those paralyzed in the arms and legs, to get on and off this bus, independently. This is not the proper speed. This was taken by one of my wheelchair students, incidentally.

This film will illustrate four types of vehicles. These buses run 14 hours a day on four distinct routes and schedules, like any bus system. They accommodate 200 to 300 facilities an hour. The newly established mass transit district in Champaign is willing to incorporate this into their system if we can get additional help to make the improved prototype. We do know how this can be refined.

I might mention that many of the people that have gotten involved insist on putting the door that would accommodate the aging and disabled behind the front wheels or on the side wall of the bus. This is very inappropriate. It should be a conventional pusher type transit bus. For safety reasons, the usable entry door of the bus should be ahead of the front wheels of the bus, where it would be in direct view of and proximity to the driver of the bus regardless of parking and traffic could still pull in obliquely and accommodate all people.

One of the refinements that we have tried to develop, and know it is possible, is to install both hydraulic steps and a hydraulic lift in the same front door which will answer some of the questions you had asked earlier, Mr. Chairman. There you see how the lift is a part of the floor, when up, and as the lift comes outward and downward, it reveals steps, and here the lift becomes the lowest step.

Now, this was done entirely without any financial support. It has been operating for about 20 years. We know that it can be refined. Interestingly enough, our varsity baseball team, hockey teams, track teams and others are continuously requesting the use of our buses. This, now, is a Bluebird bus. It has a higher floor, which is problematic. We moved the secondary or rear entry door to space behind the rear wheels. It allows two definitive nonconflicting traffic patterns. Here you see the lift mechanism in the front door operating on the Bluebird bus. It reveals steps as it goes down, and becomes the bottom step in the operation. This has facilitated, as I said, able-bodied and disabled and aging people as well. Each of these is a little different because we are in practical field trials all of the time. There you see able-bodied, as well as wheelchair individuals using the bus. The driver does not have to leave his seat in order to operate the mechanism, whether it is ambulatory or wheelchair people. The fact that the entry is on the front door, the driver has ability to see all entrances.

Here is our smaller van which we find is more expensive to operate for comparable uses. We had a flash rainstorm here and some of the film was damaged. This is a 1953 model GM highway bus. A reg-

ular Greyhound silversides, I think it would sell now for \$55,000, and you will see that the same mechanism has been incorporated in this bus, but there are changes in the interior which I think are applicable to public transportation, such as the rapid transit and other transit buses.

Again, able-bodied people walk in the front door, and individuals on wheels and crutches also enter by the front door.

One hundred of these buses have been sold over the years, not only in this country, but in foreign countries, and if the industry would make this a concern, I would be willing to put my reputation on the line that this would become of major demand.

Mr. MILLER. Any chance of a tip back?

Mr. NUGENT. We have had no accidents of that sort in 20 years of operation, and we have had many people of all causes and manifestations of disability. You notice the aisles are wide because there are two rows of seats on one side, and one on the other. We have done observations and studies that reveal that 80 percent of the day, in most of your transit system, a lot of the seats are vacant, and you have your peak periods in the morning, evening, and noon hour, and on shopping days.

#### ACCOMMODATING THE HANDICAPPED

We would be lessening the cost of the initial purchase of the vehicle, increasing the income to the operator, and making transportation available and more convenient by having three seats abreast, rather than four, because it increases the standing room during peak periods, and the seats are not required during the long term part of the day, and by making the aisle wider, we are accommodating wheelchair, brace, and crutch people.

In this instance, the bus has reclining seats. They use it for 1000-mile trips. Wheelchairs are stored in the rear after they transfer from the wheelchair into the seats. In other buses that run on an urban type schedule, they remain in their wheelchairs.

Again, this is hopefully to trigger your imagination, and to also say that it has been done, not asking whether it can be done. With a little ingenuity, it can be done to a more refined degree. You see how much of a space it can bridge. If the steps were hydraulic, the lift would not have to operate and become the bottom step. The lift would remain part of the floor when not needed and the steps would come out hydraulically from beneath the lift or floor, bridging the space to the curb. It is the last step that is problematic.

There you see a part of our group heading off on a trip somewhere.

There you see a GMC bus, Bluebird bus, and other buses departing from the front of the Rehabilitation Education Center. I am going to stop this now, if I may. The rest of the film is not pertinent to your deliberations, Mr. Chairman.

But, with all due respect to those people in the transportation business, I say to you that the things you are hearing about cost and difficulties are the same things that we heard 20 years or more ago about buildings and facilities. Although I think there will be some extra cost, I do not think it will be as identified, and I think the usage of this will offset the investment made, whether it be of private or Government funds.

In answering some of the questions you asked of me, Mr. Chairman, I did bring other slides, but I will not use them, unless you ask me to deal with other problems.

One of the questions you asked was of the inconsistencies in legislation. The inconsistency exists because most people are afraid of new things, and as the American Standards were placed into the various States of the United States, different thinking came into being, and they were cautious. They referred to public buildings (public financing) not all buildings used by the public. Many States are rewriting their laws strengthening them in many ways, now, and saying buildings used by the public. Others actually rewrote the standards into the law.

#### FEAR OF NEW THINGS

Unfortunately, too many people, out of fear or unfamiliarity, and this is not uncommon, the fear of new things, put the word "feasible" into the legislation, but they did not define who was to make the judgment of feasibility, or what the criteria for feasibility would be.

This has allowed people to dodge this issue in many instances.

I think the concepts are quite adequate. I think the American Standards which will continue to be revised, are basically adequate. They were written many years ago, and, were tempered by the readiness of the general public and others, but they are like anything else. The law says 35 miles an hour. We all know how many people go 50 miles an hour in a 35-mile-an-hour zone, and are not caught. There now is a way that people can make appropriate demands on buildings and facilities. I think that we do need a monitoring method or means of inspection at all levels.

I have a little analogy. I admit that I could not substantiate it, but I do want to advocate it, because I think it has significance, based upon involvement, not in theory. If there were 1,000 people in a given community, perhaps 100 able bodied of that 1,000 would rely on public transportation, or transit buses, on an irregular or infrequent basis. If of that same 1,000 population, 100 have disabilities of a definitive nature, or occurring to the aging processes, I believe that 90 percent of these people would use public transit if it were possible.

Now, I think this analogy has significance, and I would like to have these people think of the potential that exists among these people. When we tried to open up colleges to these people, we were told that they would be an extra cost demoralizing, distracting, et cetera, and there were not enough such people to be concerned.

Since 1952, we have been turning away 15 people for every person we admitted. We do not know about these people because there is no legislation that requires the recording of a disability, but they are there. They represent a substantial segment of the population, perhaps the largest segment with which any legislation has ever dealt.

They also represent potential income, and the reasons these figures on income are not known is because of the inaccessibility of buildings and transportation.

Thank you, Mr. Chairman.

Senator CHURCH. Thank you.

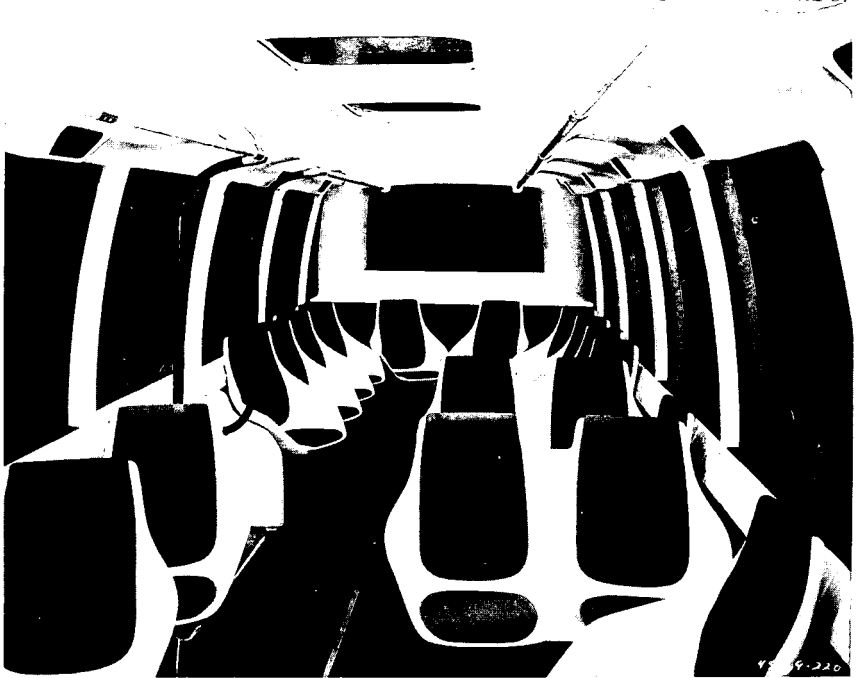
Now, with that summation, which was a spirited one, are there any comments from the panel? Any questions that have been raised by any of the testimony today? Any member of the panel that would like to be heard?

Mr. STOKEL. Sir, you said earlier you would like to see a prototype of the RTX, one which included items for the handicapped. I have a series of pictures I would like to place into the record.

Senator CHURCH. Thank you very much. We appreciate that, sir.  
(The photographs referred to follow :)







Senator CHURCH. Now, one thing about the bus. It is certainly good looking. It looks somewhat like those European buses I was mentioning. [Laughter.]

Mr. WILLSON. Will that bus accommodate the wheelchair?

Senator CHURCH. Will this bus accommodate the wheelchair?

Mr. STOKEL. That one can.

Senator CHURCH. One thing that Timothy Nugent's testimony made me think about, it might be a lot more practical to lower the sides to the handicapped than to lower the whole bus, and with our engineers and designers, I would think there ought to be a way that we could so work this out, so that you could have a stair or a platform that is adaptable for general use, and for special use for those people who are handicapped, and need assistance.

Mr. SCHEUER. We are very aware of that, Senator, but you know we carry many people on many streets, and to make a facility available for the vast number of passengers precludes the use of such devices in regular operation.

Now, in contrast to bus operation and railway, you have a fixed platform, and you can get easy access. Such does not exist on the streets of our cities.

Senator CHURCH. Yes; but after all, you do not have the long lines of people in wheelchairs that would hold up the bus. Occasionally you have someone in a wheelchair. You could stop long enough to lower

a platform for him without imposing any serious difficulty on the ordinary ambulatory people.

Mr. SCHEUER. We would like to have such a vehicle available for our use, but we have not yet had one engineered to accommodate two types of passengers.

Senator CHURCH. Well, that is clearly the need.

I would like just to say, in the way of summation, for the past 3 days of hearings, that we are now concluding, that one point which has been made again and again, whether we were dealing with vehicles, dealing with building designs, whatever, is that the improvements in designs for the elderly and handicapped tend to benefit all other age groups. They do not impose any impediment for the physically able. They are generally acceptable for the use of all.

Second, it is clear that a very large number of studies have been made on the technical and social issues involved as far as the barriers in the environment. What is needed is an effort to put this information to work.

Third, if we can draw a conclusion from these two observations, it would be this: Two lines of action are suggested. A review of existing legislation, with an eye to providing more explicit language, and perhaps introducing such legislation, and looking toward a total package to show what is really needed to get the job done, and I think the testimony that we have received will be helpful in that connection.

#### ATTITUDES CAN CHANGE

Second, in encouraging, as far as the Federal level can, a broad educational effort that will change attitudes, not only on the part of designers and educators, but on the part of the public, too. Attitudes can change.

Once, for example, people who dropped perishable trash on city streets were widely regarded as nuisances. Not any more. Today they are generally regarded as litterbugs.

There has even been a new word introduced in the language. Those who believe the total environment can be made livable and successful may have hard work to do, but they can eventually prevail, so this committee will attempt to assess the testimony of the past 3 days, attempt to draft particular legislation that may be helpful, and we will circulate these hearings and do what we can to assist in the general educational effort that is going to be required to change attitudes on the part of designers, on the part of manufacturers, on the part of the public as a whole, that will help to remove many of the barriers now that do exist, making much of our society accessible to many elderly and handicapped people.

I want to thank all of you gentlemen for coming and participating today. I am sorry that we have kept you so long, but one thing we have learned in these hearings is that a seven-man panel cannot be accommodated in the morning hours.

In any case, I appreciate your being here, and I appreciate your patience in this long session.

With that, the hearing stands adjourned. Thank you very much. (Whereupon, at 1 p.m., the hearing was adjourned, subject to the call of the Chair.)

# APPENDIXES

## Appendix 1

### ADDITIONAL MATERIAL FROM WITNESSES

#### ITEM 1. SUITABILITY OF TAXIS FOR SOLVING SOME OF THE TRANSPORTATION PROBLEMS OF THE AGED

(Submitted by John E. Hirten,\* Department of Transportation)

##### SUMMARY

People over age 65 make about 89 percent of their daily vehicular trips as auto drivers or passengers compared with 88 percent for people 20 to 64 years old. Compared with 20 to 64 year olds, the elderly make more of their daily trips as auto passengers and less as auto drivers. The elderly apparently make slightly more of their vehicular trips by taxis but less by busses and other public transportation than younger people.

In rural areas, elderly people make about 60 percent of their daily vehicular trips as auto drivers but only about 4 percent by bus or other public transportation. In areas of over 5,000 population, the elderly make a smaller portion of their vehicular trips as drivers (52 percent) and more by public transportation (11 percent). In larger urban areas, public transportation is used more, for example, for 26 percent of the total trips of the elderly in Pittsburgh.

Certain physical and psychological barriers and a low level of income of elderly people limit their use of existing transportation modes. It appears that many of the transportation needs of the elderly persons can be suitably met by taxis because of the flexibility and convenience of taxis and the lack of architectural and psychological barriers to their use. But their are strong deterrents to more widespread use of taxis by the elderly, including (1) the cost, (2) driver attitudes toward the elderly, and (3) restrictive legislation and administration practices in the taxi industry which limit the supply of taxis.

One possible method of enabling the elderly to afford the service is to provide them with transportation stamps or coupons. A possible alternative is to increase their income sufficiently to enable them to purchase the amount of transportation and other goods and services that they need. Either of these actions would significantly remove the cost deterrent.

The Washington, D.C., experience may provide some indication of the effect of repealing local legislation and practices limiting the supply of taxis in major cities. With virtually no restriction on the supply of taxis and a consequent number of taxis per capita four times higher than any other major city, the demand for taxi service in Washington is still so high that it supports a fare structure not significantly different from that in other major cities.

##### INTRODUCTION

From November 28 to December 2, 1971, the White House Conference on Aging will focus the attention of the Nation on the problems of our elderly population. The importance that is attached to transportation among these problems is suggested by the title of the 1970 report of the Senate Special Committee on Aging, "Older Americans and Transportation: A Crisis in Mobility." The magnitude of the attention given to possible highway and mass transit solutions to

\* See statement, p. 173.

transportation problems tends to overshadow possible small-scale solutions to the problems of individuals or groups of people. The results of an investigation of one such solution—taxi for the aged—are presented in this paper.

#### CHARACTERISTICS OF THE AGED

The aged or elderly are generally characterized as those persons in the age group 65 and over. A reduction in overall physical capacity which causes some difficulties in moving about is more common for this group than for other age groups. The magnitude or severity of the transportation problem for the aged is probably shown more clearly, however, by the size of the age group 75 and over. Associated with advancing years and slowdown in physical capabilities are reduced employment and income and lower rates of motor vehicle ownership, trip-making, and travel.

#### *Definition*

"Aged" or "elderly" usually refers to those persons over the age of 65. (1), (2)\* In considering the usefulness of taxis in meeting some of the transportation needs of the aged, it is well to recognize the limitations of this chronological age cutoff as a measure of an individual's physical ability and mobility and his need for taxi service. About 81 percent of those over 65 have the capacity for mobility without assistance. (1) Approximately 8 percent have some trouble getting around but can manage, possibly using a mechanical aid. Another 6 percent need the help of another person; only 5 percent are homebound. (1) Most of the incapacitated can be expected to fall in the older group; that is, over age 75. (2)

From the viewpoint of need for taxi service, the definition of aged could therefore be narrowed to include only those persons over 65 who have trouble getting around (8 percent) and those who need the help of another person (6 percent). (1) Many other elderly persons might be taxi-dependent, not because they are physically impaired but because they do not own autos and are therefore dependent on mass transit, taxis, or auto trip-sharing.

#### *Proportion of the population*

The age group over 65 now numbers about 20 million persons (almost 10 percent of the total population), and in 1985 it is expected to increase to slightly more than 25 million and slightly more than 10 percent. The group 75 and over numbers almost 8 million, or 40 percent of the aged population, and is growing faster than the group from 65 to 75 years old. Over 5 percent of the elderly are 85 or more.

The greater number of chronic illnesses and decline of some physiological functions among the aged (65 and over) is due largely to the rapid increase in those 75 and over. Transportation needs and problems are directly related to these bodily changes, which, of course, have a much higher rate of incidence among persons 75 and over than among those 65 to 75. (1)

#### *Extent of various chronic disabilities (handicaps)*

Physical disabilities among the aged that present transportation problems include declining vision, loss of hearing, reduced efficiency of nervous system and motor skills, and psychological disturbances. An estimated 10 percent of the elderly are afflicted with diseases that seriously impair vision and 2 percent are legally blind. Up to 15 percent have some loss of hearing, while 4 percent use hearings aids.

#### *Income*

The elderly are income poor. Their income is approximately half that of younger people. According to a report of the United States Senate Special Committee on Aging (1), an estimated 25 percent of all the elderly live in households with below-poverty-level incomes. The 1968 poverty level was established at \$2,079 for 2 member households whose head was 65 years old and over. (3)

#### *Residential location*

Of the 20 million elderly people 39 percent reside in rural areas, 33 percent in central cities, 28 percent in suburban locations. Of the total population, 35 percent reside in rural areas, 29 percent in central cities, and 36 percent in suburban areas.

\* See list of references at end of text.

In rural places (total population less than 2,500), many activity centers are beyond walking range, and there is little bus or rail transportation. The incomes of rural elderly people are generally lower than those of the city and suburban elderly, but their living costs may also be lower. (4) The central city elderly are usually better off than their rural or suburban counterparts in terms of public transportation service by rail, bus and/or taxi. However, the higher cost of urban living limits the rate of tripmaking for many central city elderly. The suburban elderly generally have poorer mass transit service than those in the central city, but this suburban deficiency may be partially offset by the availability of autos owned by relatives and friends, who share trips for all purposes with the elderly.

#### *Travel patterns*

As people enter the elderly stage they decrease their total travel and change the destinations of their trips from predominantly work trips to shopping, recreation, social, and other trips. The diminishing number of work trips reflects the small portion (20 percent) of elderly persons who are regularly employed. Those who do not work usually travel between the morning and evening rush hours. They seldom travel after evening mealtime.

In their travels elderly persons are more concerned with the safety, reliability and accessibility of transportation than they are with fast service. (2) Frequency of service is often important, since many elderly persons are fearful of waiting more than a few minutes at a bus stop. (1) There is also evidence that many elderly are too frightened to walk to the bus stop, train, or subway station and then wait for transportation to arrive. (1)

The travel pattern of the urban elderly is similar to the nonrush-hour pattern of the general populace in its increasing dispersion of points of origin and destination away from the radial pattern into and out of the downtown areas. (2) Increased dispersion of urban activity centers, low income, a low level of motor vehicle ownership, and poor mass transit service are some of the important reasons for the low level of tripmaking by the elderly. Only 40 percent of the persons aged 65 or more made at least one daily trip, compared with about 74 percent of those 20 to 64 years old, according to a 1969-1970 survey. (5)

The travel modes used by the elderly differ from those used by persons in the age group from 20 to 64 years old, as shown in the following comparison:

Age group	Modal use percentage of daily vehicular trips			
	Auto driver	Auto passenger	Other except taxi	Taxi
65 and over.....	53	36	10	Over 0.5.
20 to 64.....	65	23	12	Under 0.5.

The rural elderly make a larger percentage of their total trips as auto drivers (60 percent) than do the urban elderly (52 percent). The urban elderly utilize public transportation on a larger percentage of their total trips than do the rural elderly; for example, public transportation accounts for 11 percent of total trips by elderly people in areas of over 5,000 population but only about 4 percent of these trips in rural areas. In larger urban areas, public transportation is used more, for example, for 26 percent of the total trips of the elderly in Pittsburgh.

Elderly heads of households own fewer cars and these cars are older than those owned by younger household heads.

Age group	Car ownership percentages			
	No Car	Car	1 car	2 or more cars
65 and over.....	45	55	46	9
20 to 64.....	16	84	53	31

Of the households whose heads are 65 years old or more, only 20 percent own cars less than four years old, which are usually more reliable than older models. Among younger households, 47 percent have newer models (i.e., less than 4 years old).

## TRANSPORTATION PROBLEMS OF THE AGED

The aged suffer from a compounding of the problems of mobility that affect other groups. Transportation itself is a major barrier to their enjoyment of a fully satisfying and fruitful life. The changes in their personal life situations resulting from their position outside the labor force, with the attendant income problems, and the physical, psychological, and social problems that accompany the aging process tend to produce isolation from the mainstream of society. Studies of the transportation problems of the elderly have shown that the two most important factors inhibiting mobility are health and income. (6), (7)

*Health barriers*

Chronological age alone may not signify more serious problems with transportation than those experienced by other groups. However, the incidence of disease and disability does increase with age, and the individual's assessment of his health has been found to be the most important variable related to the frequency of going places and to a favorable opinion of the means of doing so. In a study of retired persons in San Antonio, 52 percent of those interviewed said that health was the most important factor in their mobility. (8)

Nationally, more than 30 percent of the older population has been estimated to be limited in activity by chronic illness, according to an estimate made by the Administration on Aging of the U.S. Department of Health, Education, and Welfare. (9) A prime disability factor is the change in perceptual-motor functioning, which decreases the ability to respond to situations occurring in an environment geared for speed and complexity. The problem is accentuated by decreases in agility, strength, endurance, balance in standing and walking, and by such handicapping physical conditions as loss of sight and hearing acuity, arthritis and rheumatism.

*Income barriers*

As stated earlier, the elderly are heavily concentrated at the lower end of the income scale. Generally, retirement cuts income in half, and the ability of many able-bodied elderly to supplement their income is restricted either by lack of adequate transportation or by such a high cost for the service that it virtually wipes out the additional income.

In studies of the mobility of older people, lack of money has been mentioned as a deterrent second only to health. Poverty intensifies the transportation problem. The elderly poor suffer both from the inability to pay for service and from the unavailability of adequate transportation in the areas where they live.

As stated in the paper, *Transportation Background and Issues*, prepared for the White House Conference on Aging, some studies of consumer expenditures indicate that expenditure patterns are similar for all age groups among higher income families, "suggesting that the needs of the older population are not less, but that they cannot afford to buy everything they need." (4) Data from the Bureau of Labor Statistics presented in the same report show that "as the amount of income in the hands of retired people living in urban areas increases, the amount spent on transportation increases both absolutely and relatively." (4)

Differences in income tend to be reflected in different assessments of the transportation problem. In the San Antonio study referred to earlier, it was found that "Those (retired persons) with good incomes either had no mobility problems or their problems were not amenable to solution in terms of dollars, while the very poor thought they could get about much better if they had additional funds." (8)

*Psychological barriers*

The health and disability problems of the elderly plus their income problems cause fears that further hamper their getting about. One of the greatest of these is the fear of dependency: the need to ask favors of others and the loss of ability for self-maintenance. Adequate transportation to obtain needed goods and services is the key to the preservation of independence.

The tendency to physical instability along with perceptual problems, the tendency for bones to be broken easily and to mend slowly all contribute to the fear of falling, which in turn contributes to the fear of being pushed in crowds. The change in sensory-motor response contributes to the fear of being hit by a car.

The elderly fear being alone and without help in an emergency situation, particularly in a medical emergency. They fear attack on the streets. Their tendency to disorientation gives them cause to fear being lost. Their slowness of movement causes apprehension in situations involving time pressure, and they fear the reaction of the able-bodied to the waiting or delay that they cause.

#### *Barriers in the transportation system*

The health and physical disabilities of the handicapped elderly make it difficult for them to perform the functions required of them by the transportation system. In the first place, there are such architectural or design barriers in terminals and within the vehicles as walking distances, steps, overhead grips in vehicles that must be grasped, and lack of space for maneuvering. Handicapped persons may have difficulty sitting or rising from a seat, manipulating an exit door, or reaching to pull a signal cord.

These obstacles are more serious when the problems of motion are added. The elderly find difficulty in taking a seat on a moving vehicle or getting to the exit door. Acceleration and deceleration of the vehicle is a hazard. According to the study of the transportation needs of the handicapped by Abt Associates, "Fifty-five percent of the . . . sample said they would have difficulty staying on their feet in a typical subway start, and many indicated that they had trouble standing in an accelerating bus." (10) There is an additional danger or discomfort in the unexpectedness both of the presence of physical barriers and of the changes in motion.

#### TRANSPORTATION MODES AVAILABLE TO THE ELDERLY

The various transportation modes used by the elderly include such conventional modes as autos and buses and special systems. The special systems include those using jitneys or other small vehicle operating along a fixed or semi-fixed route.

#### *Conventional modes*

In the Nation as a whole, as shown earlier, nearly 90 percent of the vehicular trips made by the elderly are by automobile. The fact that the automobile is the primary mode of transportation is confirmed by a study of 709 retired persons in the area of San Antonio, Texas. Table 1, taken from that study, shows that most of the persons surveyed who went to the library walked, but for the other 12 destinations given, the proportion of persons using automobiles ranged from a low of 50 percent of those visiting friends to 73 percent of those attending sporting events. Many of those using automobiles went as passengers rather than as drivers.

TABLE 1.—TRANSPORTATION MODES USED BY THE ELDERLY IN SAN ANTONIO, TEX., TO REACH VARIOUS DESTINATIONS

Destination	Percentages of total number of elderly making trips by each transportation mode <sup>1</sup>					
	Automobile		Bus	Walk	Taxi	Train and plane
	As driver	As passenger				
Friends.....	29	21	8	42		1
Children.....	24	45	8	16		7
Other kin.....	30	31	15	16	1	
Doctor.....	28	32	20	16	4	
Church.....	26	32	7	34	1	
Grocery.....	31	31	4	31	3	
Other stores.....	29	24	23	23		
Meetings.....	32	34	6	25	2	
Entertainment.....	26	32	10	31	1	
Senior center.....	16	38	1	45		
Library.....	19	6	6	61	1	
Sports.....	37	36	16	8	1	1
Travel.....	22	32	22			23

<sup>1</sup> Total varies with destination.

Source: Carp, Frances M., "The Mobility of Retired People." U.S. Department of Health, Education, and Welfare, Social and Rehabilitation Service, Administration on Aging, Washington, D.C., (preliminary report).

The San Antonio data indicate that walking is also an important mode of transportation for the elderly. It was the primary mode of transportation for 67 percent of those who went to the library, 45 percent of those who went to senior citizen centers, and 42 percent of those who visited friends. More than 25 percent of those who went to church, entertainment centers, meetings and grocery stores also went on foot. Taxis accounted for 4 percent of the trips to the doctor and 3 percent of the trips for grocery shopping.

San Antonio people used other modes of transportation much less often than they used either the automobile or walking. This does not imply that these other modes are not important to the elderly. Indeed, at times some form of public transportation is the only transportation available or appropriate to meet their needs. The handicapped, including the elderly handicapped, in the Boston sample studied by Abt Associates, Inc., (See Appendix A) made similar use of the various transportation modes, except that they used taxicabs to a greater extent than the retired people in San Antonio did.

#### *Special systems*

Such systems as minibus and dial-a-ride that provide a type of service varying from that of conventional modes have not been found to be economically feasible, even if they perform flawlessly and attain a high level of ridership. Consequently when the funds provided for demonstrating their feasibility are exhausted, the services are significantly curtailed or terminated. (See Appendix C for list of special systems.)

#### *Jitneys and "liveries"*

Jitneys date back to about 1914, when the first known jitney appeared on the streets of Los Angeles, California, offering to carry riders for a jitney (one nickel). (11), (12) Jitneys pick up one or several passengers and leave them at one or more destinations. It is likely that some form of jitney service that can be regarded as a modified taxi service would help to solve some of the transportation problems of the aged.

A livery automobile is one kept for rent or hire. In ghetto areas especially, liveries serve a useful function by providing transportation for the aged, the handicapped, and the poor.

#### *Satisfaction (or attitude) by mode*

Despite personal handicaps and the limitations of various transportation facilities, most elderly people use existing transportation modes with varying degrees of satisfaction. Some idea of the degree to which the elderly are satisfied may be gained from the sample of retired people studied in San Antonio.

Most of the elderly people who had cars were satisfied with their then present ability to get about. They expressed strong negative feelings in anticipation of being unable to drive. They were concerned both with the prospect of inability to get to various destinations and the prospect of loss of independence.

Nearly one-third of the trips that the elderly made in San Antonio were made as passengers in automobiles. In fact, 88 percent of those interviewed indicated that they were given a ride at least upon occasion. (13) The major problem in being a passenger in an automobile was the insufficiency of opportunity. Most non-drivers and many drivers stated that they needed and wanted more such rides. Other problems associated with going places as a passenger in an automobile were those of dependency and of obligations that could not be repaid and the inconvenience of tailoring times and destinations to fit the plans of the driver.

Although a majority of the elderly used their feet as a means of transportation every week and about one-fifth went somewhere on foot every day, walking was not highly regarded as a means of transportation. Only three percent of the walkers said that walking was a "satisfactory" means of getting places. About fifty percent of the respondents said walking met their needs very poorly or not at all. (13) The outstanding problem was that the places to which the elderly wanted to go were beyond walking range. Women, to some extent, complained of aching feet.

In San Antonio, public transit is a bus system. In the San Antonio study referred to earlier, over 40 percent of the elderly "never" took a bus to the destination specified in the questionnaire and only one person in five usually went somewhere on a bus as often as once a week. (13) The retired people who



used the bus found a number of serious problems with it and used it infrequently. The bus provided transportation for less than a fifth of the respondents who went to the doctor, to the grocery store, or to visit relatives; it was used to gain access to leisure pursuits by far fewer people.

In summary, the San Antonio study showed that the automobile satisfied 15 percent or so of the retired people who could drive "anywhere," but driving was totally irrelevant to the mobility needs of two-thirds of them. Many elderly people were offered occasional rides, but these offers were too infrequent, limited in destination, and restrictive in timing. In addition, they entailed obligations that could not be reciprocated. Public transit was used by over half of the respondents, but infrequently by most, who evaluated it rather negatively. About half the group resorted to their feet to get places, but walking was seldom considered to be a satisfactory means of transportation. Because of the cost, taxis were used infrequently by the elderly, and were regarded as unsatisfactory because of lack of dependability and promptness.

#### TAXIS AS A SOLUTION FOR THE ELDERLY

The taxi has considerable potential for satisfying the transportation needs and desires of older people because of its comfort, convenience, and flexibility. While there are deterrents to using taxis, possible financial assistance to the elderly and a better legal and regulatory environment for the operator hold promise for eliminating or greatly minimizing the obstacles.

##### *Usefulness of taxis*

The taxi offers the comfort of the private automobile and provides service on demand to all points with no in-route delays for transfers. Along with the "handicab," a variation of the taxi equipped to carry riders in wheel chairs, the taxi is well suited for fulfilling the requirements indicated by several studies for a point-to-point delivery system activated on demand with specialized vehicles to fit many of the transportation needs of older people, particularly those who are physically handicapped. (2)

Low density land development often makes it uneconomical for fixed-route bus or rail rapid transit systems to serve the varied needs of autoless households, including those of the elderly. (14) For such low density areas, demand-activated and subscription systems can reduce walking distance and waiting time.

Conventional taxis, liveries, and modified jitney systems are flexible and provide convenience in reaching a variety of destinations. Many other recent proposals for personal transportation or adaptive routing systems, upon close examination, bear a striking similarity to the taxicab system. (15)

##### *Fewer architectural barriers*

Like the automobile, taxicabs have fewer architectural barriers associated with their use than most other forms of transportation. There are no steps or mechanically operated doors making it difficult to enter and leave the vehicle. The elderly rider is sure of a comfortable seat, and he is not jostled by others who are unaware of (or are unresponsive to) the problems of the elderly traveler.

Taxis do not have the metal supports or hand grips commonly found on public transit vehicles, which, though helpful to passengers under normal operating conditions, can be a menace to the elderly when the vehicle accelerates or stops suddenly. This problem is particularly acute to a person who must stand holding a package or two. According to the Abt Associates' study in Boston, a better chance of getting a seat ranked first among 19 proposed qualitative improvements in public transportation. (See Appendix B.)

##### *Fewer psychological barriers*

The use of taxis reduces or eliminates many of the psychological barriers that tend to affect the elderly in using other modes of transportation. For example, fear of the pressure of crowds is eliminated, since taxis are usually occupied by single individuals or small groups. Group riding in taxis gives elderly individuals an opportunity for casual acquaintanceship with others traveling to or from such common destinations as clinics or senior citizen centers.

Through the use of taxis, the fear of falling is minimized to the extent that walking is diminished or eliminated from the trip. With door-to-door service, the elderly individual is no longer so concerned with the problems of personal safety

or disorientation that can arise in using public transit. Further, he does not have the problems of reading signs or street numbers while vehicles are in motion, of getting off at the wrong stop, or of transferring to the wrong vehicle and thereby adding to the other frustrations of the trip.

#### *Reduction of waiting time*

Of the San Antonio sample of retired people, 94 percent said they felt lonely and afraid while waiting for the bus, and 59 percent found the wait too long. (16) Among 19 proposed transportation improvements, the Abt Associates' Boston sample of the handicapped rated shorter waiting time second only to a better chance of getting a seat.

By doing away with the perceived waiting time, taxis appear to have the potential for eliminating its negative aspects. Waiting is much more pleasant in the comfort of one's home (or, for that matter, in a clinic or grocery store) than at an unsheltered transit stop.

#### *Reduction of accident fatalities*

Because the taxicab can provide door-to-door service, it has the potential for diminishing the pedestrian accident fatality rate among elderly people. Accident statistics indicate that elderly pedestrians are particularly susceptible to traffic accidents. Of 10,000 pedestrians killed in 1969, 2,800 were elderly. (1) Thus, while they comprise only about 10 percent of the population, the elderly accounted for 28 percent of the pedestrian fatalities.

Door-to-door transportation service can help to reduce their need to walk excessive distances across wide streets where the time allotted to the "walk" phase of the traffic signals might be too short for their walking pace. Increased use of taxicabs by the elderly would also reduce their exposure to the possibility of accidents by lessening the amount of walking now required to fulfill their essential needs.

#### *Deterrents to use of taxis*

Although taxis have the potential for satisfying many of the transportation needs of the elderly, there are significant problems to be considered in developing a feasible system. From the point of view of the elderly person, the primary problem is the cost of the ride. From the point of view of the operator, a particularly important deterrent is the problem of legal and regulatory constraints.

#### *Cost*

While taxicabs and specialized cab services for disabled persons are fine for single trips, they are too costly for the employed disabled who must use them daily. (17) The Abt study indicated that a high proportion of the respondents avoided using taxis primarily because of the cost involved. The research concluded that an economically viable specialized system for the handicapped might be feasible in cities with population of 100,000 or more. (10)

The problem of inability to pay on the part of the elderly is not confined to the use of taxis. The concept of the point-to-point specialized vehicle or dial-a-bus service would appear to provide much of the needed service for both older pedestrians and handicapped persons, and tests of these systems indicate that they are operationally feasible and highly attractive to the older passenger. However, although the subsidy requirement is unknown, evidence from present testing suggests that subsidy rates at or above 50 percent of costs may be needed for this highly specialized dial-a-bus service. (2) If this high level of subsidy is indeed necessary for the specialized system, there is merit in trying to quantify the amount of subsidy or special funding that might be required for a given level of taxi service to the elderly. Such a comparison might show that the cost of providing various levels of service by taxi compares favorably with that of providing the same levels of service by specialized systems.

The problem of inability of the elderly to pay for transportation is widely recognized. Several urban areas have attempted to cope with the problem through a reduction in fares, a plan that has been largely successful in terms of increased use of public transit by the elderly. New York City, for example, has

instituted a reduced fare program for the elderly on buses and subways during non-rush hours. Over 500,000 elderly persons are reported to have registered for this program within one month of its initiation in July 1969. (18) In Washington, D.C., a reduced fare program allowing a 15-cent discount on the normal fare permitted an increase in ridership by older people of about 20 percent between May and August 1971. (19)

#### *Legal and regulatory constraints*

Virtually every major city has some form of restrictive legislation or control on the number and use of taxicabs. In New York, for example, the number of "medallions" (authority for the owner to operate a cab) has been limited to 13,566 since 1937.

Like New York, other areas limit the number of cabs that may operate in the city. In Boston, the limit is 1,525; in Detroit, 1,310; and in Chicago, 3,761. (11) Other cities limit the number of cabs by establishing a per capita cab ratio. Miami, for example, specifies one cab per 1,500 population.

In contrast to many of these areas, Washington, D.C. allows virtually unrestricted entry into the taxicab market. As shown in table 2, among the 17 cities surveyed in 1967, Washington, D.C., had by far the highest number of cabs per 1,000-population. It also has a representative fare structure. Cost for the typical cab ride of 2.5 to 3 miles were approximately the same in Washington as in other large cities. Costs for the first mile appear to be lower in Washington than in other cities analyzed.

The variety of regulations and restrictions currently applicable to the taxicab industry in hundreds of municipalities will probably present serious problems to implementing a program of widespread use of taxis by the elderly. Perhaps the primary reason why taxicab service is not at a higher level at present is that regulation may stymie initiative and growth of usage. Without a change in this area, the taxicab will continue to play a minor role in urban transportation. Feasible means of removing the restrictions on the number of licenses issued may be difficult to find, since cab operators will object to the loss of the asset they have in the scarce franchise. Unless problems in regulation are resolved, any extension of taxicab or similar services may be very difficult to bring about. (15)

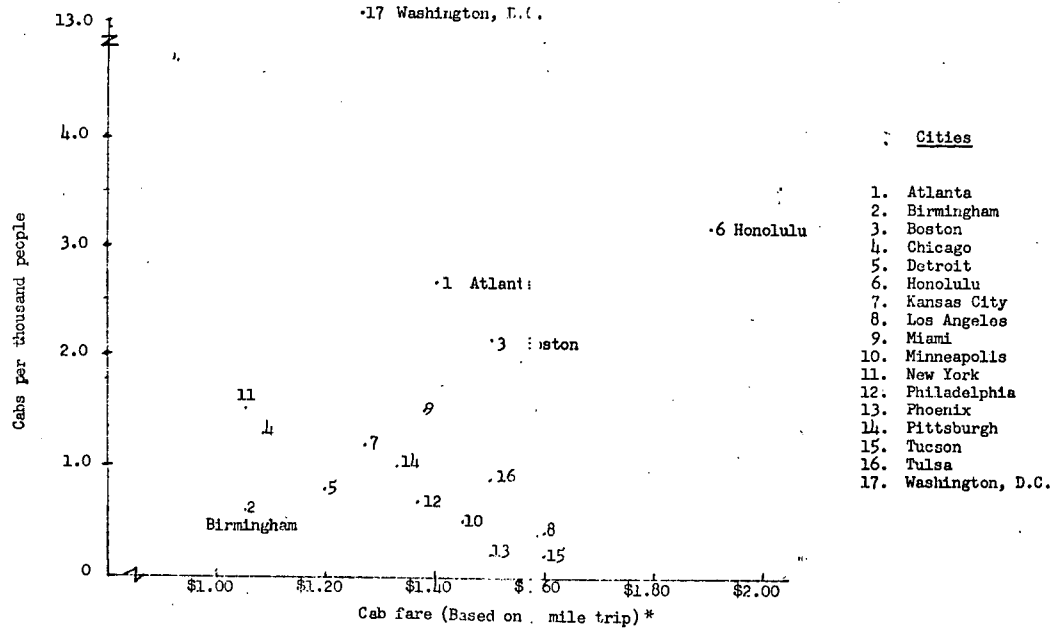
TABLE 2.—NUMBER OF CABS IN SURVEY CITIES

City	1960 population	Number of cabs		Fare	
		Total	Per 1,000 population	1st mile rate (cents)	Additional mile rate (cents)
Atlanta.....	487,455	1,300	2.7	60	40
Birmingham.....	340,887	195	.6	55	25
Boston.....	697,197	1,525	2.2	70	40
Chicago.....	3,550,404	4,600	1.3	58	25
Detroit.....	1,670,144	1,310	.8	60	30
Honolulu.....	294,194	947	3.2	90	50
Kansas City.....	475,539	542	1.1	67	30
Los Angeles.....	2,479,015	885	.4	80	40
Miami.....	291,688	431	1.5	58	40
Minneapolis.....	482,872	248	.5	75	35
New York.....	7,781,984	11,782	1.5	55	25
Philadelphia.....	2,002,512	1,480	.7	67	35
Phoenix.....	439,170	99	.2	70	40
Pittsburgh.....	604,332	600	1.0	73	30
Tucson.....	212,892	33	.2	80	40
Tulsa.....	261,685	238	.9	70	40
Washington, D.C.....	763,956	10,180	13.3	50	38

Sources: 1960 census and replies to General Research Corp. inquiries in 1967 as reported by S. Rosenbloom in "Characteristics of Taxicab Supply and Demand in Selected Metropolitan Areas."

Figure 1

Taxicab density and cost compared for 17 major cities (1967)



\* An average cab fare is considered to include 2.5 miles plus 2 minutes waiting time. ("Taxicab License and Rates 1970," International Taxicab Association.) For purposes of this analysis 3 miles was chosen since data on the charges for waiting time were not available. Also, a simple linear regression analysis of taxicab density and cost (based on fare for first mile only) resulted in a coefficient of correlation of 0.55.

The regulations and restrictions of the taxicab industry have encouraged a supply shortage. Lifting of the restrictions on the number of cabs in all restricted cities would probably put more cabs on the streets. The high market value of the medallion in New York, Boston and other cities provides evidence that an unfulfilled demand for cab service exists in these cities. (12)

Another indication of the existence of unfulfilled demand for cab services is the appearance of private "liveries" or jitneys in some eastern cities. In New York, liveries must pay an annual operating fee of \$100 and must conduct business by phone. They may pick up passengers on the streets in some suburbs but are forbidden to do so in Manhattan.

#### *Other deterrents*

Another deterrent to the use of taxis by the elderly is the attitude of some taxi drivers. Many elderly and handicapped people need special help to get in and out of taxicabs. The driver quite often is not disposed to take the time necessary to assist the older person. Time is important to the driver, and many prefer to spend time cruising for an able-bodied passenger who does not require their assistance in getting in and out of the cab at both the origin and destination of the trip. In addition to the time element, perhaps rather small tips or none at all contribute to this unwillingness to pick up elderly passengers.

#### FEASIBILITY OF TAXI SERVICE

The feasibility of instituting a program for providing taxi and taxi-like service to the elderly will depend on many factors. Perhaps the most important steps that need to be taken would be designed to (1) eliminate or relax some of the legislative and administrative restrictions on entering the taxicab market in order to increase the supply of taxis, (2) change the attitudes of some taxi drivers toward elderly passengers, and (3) make funds available for such a program.

Before use of taxis by the elderly can become more widespread, some method must be devised for providing the elderly with the necessary purchasing power for transportation. One possible method is to provide eligible elderly persons with special identification cards and transportation stamps, tickets, coupons, or script that will permit them to "buy" a certain amount of transportation by taxi or by any other appropriate mode.

Another possible alternative is the so-called "income strategy." This implies increasing the incomes of the elderly to a sufficiently high level to enable them to purchase the amount of needed transportation and other goods and services. The transportation share of the budget can then be spent for taxi service or whatever other mode of transportation seems desirable to the individual.

State conferences meeting last year to prepare for the White House Conference on Aging considered two possibilities for enabling older people to afford transportation: (1) to subsidize transportation system or (2) to make payments to the elderly user. The resulting policy proposals favored subsidy, though a few States recommended a flexible policy, the choice to depend on the availability of public and private transportation.

As suggested in the Abt report referred to earlier, some form of specialized transportation system, using taxis or some other type of vehicle, might be feasible in the larger cities. A case study of the Boston area indicates that a carefully designed and dynamically routed system could supply 4 trips per week (the desired number of additional trips) to each of 18,000 customers at a cost of \$2.00 per round trip and still break even or make a slight profit. (10) It is reasonable to assume that, if the ridership is extended to include elderly people who may not be physically handicapped but who are "transportation disadvantaged," then such a system would be an even more financially attractive venture. The concept might then be put into operation on a sound financial basis in cities where the population is less than 100,000 persons.

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## APPENDIX A.—PERCENTAGE DISTRIBUTION OF TRIPS BY MODE, ABT SAMPLE OF THE HANDICAPPED

Mode	Percentage distribution
Walk (more than 1 block).....	28.2
Private automobile driver.....	21.4
Private automobile passenger.....	21.3
Taxicab.....	9.8
Special taxi service for handicapped.....	.7
Bus or trolley.....	10.6
Subway or streetcar.....	6.4
Train.....	.3
Total.....	100.0

Source: "Transportation Needs of the Handicapped," Abt Associates, Inc., U.S. Department of Transportation, Cambridge, Mass., August 1969.

APPENDIX B.—RANKING OF PROPOSED QUALITATIVE IMPROVEMENTS IN PUBLIC TRANSPORTATION, ABT SAMPLE OF HANDICAPPED AND NONHANDICAPPED

Proposed improvements	Handicapped	Nonhandicapped
Better chance of getting a seat.....	1	4
Shorter waiting time.....	2	1
Less crowding in vehicle.....	3	2
A transportation system designed so that you will arrive at your destination on time.....	4	5
Better protection from bad weather.....	5	5
Direct route with no transfers.....	6	5
Stations closer to home and destination.....	7	11
Better provision for personal safety.....	8	6
More comfortable waiting areas.....	9	10
Better information system (maps of routes, stops announced, etc.).....	10	13
Improved pedestrian traffic.....	11	8
More comfortable temperature for waiting and riding.....	12	7
Brighter, more modern stations.....	13	12
Better maintenance of terminals and vehicles.....	14	9
Increased reliability so that you will arrive at your destination on time.....	15	3
More courteous service from drivers and other personnel.....	16	14
Better provisions for storing parcels or packages during the trip.....	17	17
More privacy while in the vehicle.....	18	16
Better provision for reading.....	19	15

<sup>1</sup> The responses were weighted, 2 points for most important, 1 for important, and the sum becomes the final determinant of the items rank.

Source: "Transportation Needs of the Handicapped," Abt Associates, Inc., U.S. Department of Transportation, Cambridge, Mass., August 1969.

APPENDIX C—SPECIAL TRANSPORTATION SYSTEMS FOR THE AGED

[Note: Local, State, and Federal agencies and other groups have shown an interest in the transportation problems of the aged and, in various ways, have supported the development of special transportation systems such as taxis, buses, minibuses, and jitneys. The following table describes projects that illustrate the many differing approaches for fulfilling the transportation needs of the elderly.]

Area	Kind of system	Provided for	Kind of service
Chicago, Ill.....	Minibus.....	Senior citizens.....	Home to destination.
Do.....	Not available.....	Handicapped.....	Home to selected neighborhoods.
Menlo Park, Calif.....	Dial-a-bus.....	Senior citizens.....	Home to multipurpose center.
New York, N.Y.....	Passenger vans.....	Handicapped.....	Door to door with escort.
Knoxville, Tenn.....	"Handi-cab".....	Senior citizens.....	Door to clinics, designed for wheelchairs.
Bismarck, N. Dak.....	Minibus.....	Poor, including elderly.....	From rural areas to Bismarck and return (proposed).
Fort Berthold, N. Dak.....	Bus.....	Indians, including elderly.....	Bus from reservation.
New York, N.Y.....	Taxis.....	Elderly.....	Door to door (proposed).
Washington, D.C.....	Taxis and buses.....	Local residents.....	Door to bus (proposed).
Salt Lake City, Utah.....	Not available.....	Elderly.....	Survey of needs.
Vancouver, Wash.....	Taxi/auto.....	do.....	Reduced fares or free ride for those unable to use bus.
Buffalo, N.Y.....	Jitney.....	do.....	Door to door within neighborhood.
Morgantown, W. Va.....	Special vehicle.....	Elderly and handicapped.....	Not available (proposed).

ITEM 2. TRANSIT SYSTEMS WITH SENIOR CITIZENS FARES, SUBMITTED BY HERBERT SCHEUER,\* AMERICAN TRANSIT ASSOCIATION

- Fresno Transit; Fresno, California.  
 Gardena Municipal Bus Lines, Gardena, California.  
 Long Beach Public Transportation; Long Beach, California.  
 So. Cal. Rapid Transit District, Los Angeles, California.  
 Montebello Municipal Bus Lines; Montebello, California.  
 City of Oceanside Transportation System; Oceanside, California.  
 Oxnard Transit; Oxnard, California.  
 Sacramento Transit Authority; Sacramento, California.  
 Ventura City Transit; San Buenaventura, California.  
 San Diego Transit Corp.; San Diego, California.  
 San Francisco Municipal Railway, San Francisco, California.  
 Santa Barbara Metropolitan Transit District; Santa Barbara, California.  
 Torrance Transit System; Torrance, California.  
 Pueblo Transportation Company; Pueblo, Colorado.  
 The Connecticut Company; Hartford, New Haven, Stamford, Connecticut.  
 City & County of Honolulu; Honolulu, Hawaii.  
 Chicago Transit Authority; Chicago, Illinois.  
 Springfield Mass Transit District; Springfield, Illinois.  
 Fort Wayne Public Transportation Corp.; Fort Wayne, Indiana.  
 Municipal-Coach; Michigan City, Indiana.  
 South Bend P. T. C.; South Bend, Indiana.  
 Terre Haute Transportation Utility; Terre Haute, Indiana.  
 Sioux City Transit; Sioux City, Iowa.  
 Trombly Motor Coach Service; Andover, Ma.  
 Department of Street Railways; Detroit, Michigan.  
 Grand Rapids Transit Authority; Grand Rapids, Michigan.  
 Municipal Transit; Greenfield, Mass.  
 Marinel Transportation, Inc.; Chelmsford, Massachusetts.  
 Union Street Rwy. Co.; New Bedford, Mass.  
 Twin Cities Area Metropolitan Transit Commission; St. Paul, Minneapolis, Minn.  
 Albuquerque Transit; Albuquerque, New Mexico.  
 Asheville Transit Authority; Asheville, N. Carolina.  
 Statesville Motor Coach Co.; Statesville, N. Carolina.  
 Las Vegas Transit System; Las Vegas, Nevada.  
 Broome Transit System; Binghamton, New York.  
 Ithaca Community Transit; Ithaca, N.Y.  
 Jamaica Buses, Inc.; Jamaica, N.Y.  
 N.Y.C. Transit Authority; New York, N.Y.  
 Regional Transit Service Inc.; Rochester, N.Y.  
 Lane Transit Dist.; Eugene, Oregon  
 Mt. Ashland Stage Lines; Medford, Oregon.  
 Tri-Met; Portland, Oregon.  
 City of Salem; Salem, Oregon.  
 Garfield Heights Coach Line, Inc.; Bedford, Ohio.  
 Cincinnati Transit, Inc.; Cincinnati, Ohio.  
 Cleveland Transit System; Cleveland, Ohio.  
 Euclid Municipal Transit System; Euclid, Ohio.  
 Maple Heights Transit System; Maple Heights, Ohio.  
 Toledo Area Regional Transit Authority; Toledo, Ohio.  
 Mahoning Valley Regional Mass Transit Authority; Youngstown, Ohio.  
 Port Authority of Allegheny County; Pittsburgh, Penna.  
 Transportation & Motor Buses for Public Use Authority; Altoona, Penna.  
 R. I. Public Transit Authority; Providence, R.I.  
 Sioux Transit, Inc.; Sioux Falls, S. Dakota.  
 Dallas Transit System; Dallas, Texas.  
 D.C. Transit System, Inc.; Washington, D.C.  
 Department of Transportation, City of Seattle; Seattle, Washington.  
 Tacoma Transit System; Tacoma, Wash.  
 Yakima City Lines; Yakima, Wash.  
 Massachusetts Bay Transportation Auth.; Boston, Mass.  
 A C Transit; Oakland, Calif.  
 Erie Metropolitan Transit Auth.; Erie, Penn.  
 Metropolitan Transit, Inc.; Dearborn, Mich.  
 Saginaw Transit Co.; Saginaw, Mich.  
 Southeastern Penna. Transpnr. Auth.; Phila., Penna.  
 Iowa Regional Transit Authority; Des Moines, Iowa.

\*See statement p. 169.



ITEM 2. TRANSIT SYSTEMS WITH SENIOR CITIZENS FARES, SUBMITTED BY HERBERT SCHEUER,\* AMERICAN TRANSIT ASSOCIATION—Continued

Regional Transit Authority; Cedar Rapids, Iowa.	Public Utilities Commission; Kitchener, Ontario.
Davenport City Lines, Inc.; Davenport, Iowa.	Ottawa Transportation Comm.; Ottawa, Ontario.
CANADA	
Calgary Transit; Calgary, Alberta.	Border Transit Limited; Peterborough, Ontario.
Red Deer Transit System; Red Deer, Alberta.	Sault Ste. Marie Transportation Comm.; Sault Ste Marie, Ontario.
Metropolitan Corp. of Greater Winnipeg; Winnipeg, Manitoba.	Toronto Transit Commission; Toronto, Ontario.
Guelph Transportation Commission; Guelph, Ontario.	S. W. A. Railway Co., Windsor, Ontario.
Kingston Public Transit System; Kingston, Ontario.	B. C. Hydro & Power Authority; Vancouver, B.C.

ITEM 3. TRANSPORTATION NEEDS OF THE HANDICAPPED

Prepared for Department of Transportation, Office of Economics and Systems Analysis, Washington, D.C., by Abt Associates Inc., Cambridge, Mass., August 1969

I. SUMMARY

*Purpose and scope of the research*

The purpose of the research undertaken by Abt Associates was to determine the extent to which public transportation is inaccessible to the physically handicapped, and to recommend ways in which it might be improved. More specially, the study had the following objectives:

1. To develop design and operating guidelines suitable for use by local transportation planners and operators and new system designers in meeting the needs of the physically handicapped.

2. To identify an analytical technique suitable for use at the local level for measuring the costs and benefits of implementing the proposed guidelines.

3. To assess the extent and nature of economic and social impacts which would be likely to occur as a result of adopting the guidelines on a nationwide basis.

In other words, the aim of the study was to formulate transportation requirements for the handicapped, to provide a rational analytic method for selecting the best of alternative responses to the requirements, and to assess the national impact of those solutions selected for implementation.

In pursuing these objectives, national data about the chronically handicapped were studied to provide a general information base. In addition, a sample of 212 handicapped people were interviewed about their specific transportation requirements. Analysis of these data yielded information about the demand for transportation by the handicapped, as well as a statistical profile of their physical capability to perform the functions required by public transportation. This information was used as a basis for developing design guidelines for the local planner, and for measuring the impact of their nationwide adoption. A case study approach was used to analyze how decisions are currently made in public transportation and to assist in identifying a methodology which a local planner or operator would use to select alternative transportation improvements for his population.

### *Identification of the handicapped*

The chronically handicapped<sup>1</sup> currently comprise about 3% of the national population. Of these 6,093,000 people, 5,693,000 are potential riders of public transportation. In addition, the population over sixty-five is continually increasing, so that there are now more than 18,000,000 citizens who may have difficulty using available mass transportation. A significant proportion of the aging and handicapped populations are denied equal opportunities to work, shop and participate in social activities as a result of inaccessible low-cost transportation.

The second group of handicapped with which this study is concerned are those who experience mobility limitations as a result of an acute medical condition, or one which lasts less than three months. Analysis of the available data on this population group indicates that it contains about 4.6 million people with short term illnesses or injuries, plus about 23 million who are over- or under size, pregnant, or advancing in age.

The third important group of handicapped is those people who find using public transportation difficult or impossible because of the circumstances in which they are traveling. While most of these disabilities are voluntarily assumed and seldom thought of as handicaps (carrying bulky packages, leading small children, carrying a suitcase), they are relevant to the general public's willingness to use public transit. While these last two groups are important, it is less likely that improvement in public transportation will significantly affect their lifestyle. Consequently, descriptions of life style and estimates of travel behavior are based on the results of interviews with 212 chronically handicapped people.

### *Life style of the chronically handicapped*

#### *Transportation and employment*

Employment seems to be the area in which a handicap is most severely felt, but improved transportation, by itself, can change this situation for a limited proportion of the population. At present, 36% of the national handicapped population aged 17 to 64 are members of the labor force,<sup>2</sup> compared with 71% of the non-handicapped population of the same age group. About 32% of the population is employed.

The handicapped person faces a number of obstacles in seeking and gaining employment, of which transportation is but one. These include limited education and job training, insufficient mobility training, employer discrimination, his own lack of confidence in his ability to perform well on the job, and the obvious mobility limitations arising from his physical impairments. All of these factors contribute to the handicapped person's assessment of whether he is ready for a job. When he has decided that he is prepared to work, then transportation becomes an important factor in the choice of a particular job. Fifty-three percent of the employed handicapped residing in SMSA's<sup>3</sup> use public transportation to go to work and for half of this group it is a factor in their choice of job. For 30% of those looking for jobs, inadequate transportation is one of the reasons they have not been able to find a job, and 67% of this group would be able to return to work if transportation were no longer a problem.

When this information is applied to data compiled by the National Center for Health Statistics, it indicates that 13% of the chronically handicapped population aged 17 to 65 would return to work if transportation were no longer a problem. Assuming that only the handicapped persons located in Standard Metropolitan Statistical Areas would be likely to benefit, a metropolitan trans-

<sup>1</sup> The chronically handicapped are defined by the National Center for Health Statistics as those who have one or more long-term diseases on the "Check List of Chronic Conditions" or have had any disease or impairment for more than 3 months. The Social Security Administration estimates that 18.2 million non-institutionalized adults aged 18-64 in the United States were limited in their ability to work because of chronic health conditions or impairments. When the definitions of chronic conditions and impairments are made comparable, these estimates are almost twice those of the national health survey. The large discrepancy is due to differences in the procedures for identifying the population. Since data from the Social Security study were not available, all of the estimates are based on information from the national health survey.

<sup>2</sup> Labor force members are defined as employed persons, or unemployed persons who have engaged in specific job seeking activity within the past 4 weeks, are waiting to be called back to a job, or are waiting to report to a new job, according to the criteria established by the Department of Labor, Bureau of Labor Statistics.

<sup>3</sup> Standard metropolitan statistical areas.

portation program designed to help the handicapped could return 189,000 people to work. Employment of this group at salaries at the level prior to their disability would result in total yearly economic benefits of more than \$824,000,000.

#### *Income*

As a result of minimal labor force participation, the incomes of the handicapped are very low. Fifty-nine percent of the Abt handicapped sample receive incomes of less than \$3000 per year. This factor makes them particularly dependent on low cost public transportation.

Despite the very low income of most of the handicapped, they are willing to spend more than the average transit rider on public transportation that they can use comfortably and safely. Respondents in the Abt handicapped sample reported that they spend \$5.40 per week on transportation, or an average of \$1.37 per round trip. The average respondent was willing to pay \$1.05 for accessible public transportation. While this appears high at first, it is considerably lower than the usual taxi fare.

#### *Residence*

Handicapped people who are employed tend to locate their residences closer to their jobs than do the population as a whole, due primarily to the high cost of their transportation and the general inconvenience of the impairment. This does not mean, however, that they live in areas with better transportation accessibility, as demonstrated by a comparison of the transit availability indices for handicapped and non-handicapped samples in the Boston area. The handicapped appear to make their residential location decisions on the same basis as non-handicapped persons. If travel barriers were removed so that the system could be used more easily, then transport accessibility would probably be more important.

#### *Travel barriers of the handicapped*

The handicapped presently travel about half as much as the non-handicapped, with the greatest differences between the two groups being in the number of social and recreational trips and the number of work trips. The Abt handicapped sample take an average of .24 social and recreational trips per day, per person, compared with .67 for a sample of able-bodied drawn from the same area. Only one third as many work trips are taken by the handicapped as by the non-handicapped.

Relative to the total number of trips taken, the handicapped were less likely to combine trip purposes than were the non-handicapped. Many of the handicapped interviewed indicated that they tired easily, and this may be why they took relatively fewer, extensive, multi-purpose trips. This finding suggests that flexibility for multi-purpose trips, which is characteristic of the automobile, may not be the most relevant criterion on which to evaluate alternative schemes for providing the handicapped with adequate transportation.

A comparison of the frequency of trips taken at various hours of the day by the handicapped and the non-handicapped shows that the travel of the handicapped peaks between 9:00 and 11:00 a.m., rather than between 8:00 and 9:00. This is probably because fewer handicapped take work trips. The concentrated travel during off peak periods suggests that reduced fares might be offered the handicapped and aging for travel at this time.

#### *Influence of travel barriers on mode choice*

The mode-choice decisions of the handicapped appear to be more complicated than those of the non-handicapped. If they have access to an automobile, as a driver or passenger, then they prefer it. If not, then they must make a choice between more comfortable, high cost service and a barrier-ridden low-cost mode. If the public transit is truly inaccessible, then the necessity of making the trip must be weighed against its high cost by taxi. The handicapped currently take about 14% of their trips by taxi, compared to 2% for the non-handicapped population.

The primary reason for avoiding public transit are the presence of barriers in the systems, fear for personal safety, and the inconvenience of the routes. The barriers that are unique to the travel environment, appear to present more difficulty to the handicapped passenger than do the architectural barriers. The most distinctive characteristics of these barriers derives from the essential quality of

travel itself—movement. Though there are many similarities between barriers in buildings and physical impediments in travel systems, motion in and around the travel environment changes the character of the obstacle so that it has an even more profound effect on the handicapped traveler.

In addition to the difficulties of physical barriers that move, the handicapped also encounters severe problems when trying to cope with some of the secondary effects of the travel process, among them acceleration and deceleration, crowd movement, time pressure, and long walking distances. More than half of the handicapped are unable to maintain their balance in a moving vehicle as it starts, stops or goes around a sharp curve. Sixty-one percent of the population is sufficiently fearful or embarrassed by crowds to avoid public transportation. Slightly less than half can cross a street in the time allowed by a pedestrian light. This same proportion could not climb a long flight of stairs, even with a railing for assistance. Bus and train steps pose problems for 30% of the population, and surprisingly, almost as many could not use a regular, low-speed escalator. While physical obstacles in transportation systems are barriers to a significant proportion of the handicapped population, the movement related barriers appear to be more limiting, and also more difficult to remove.

The difficulty of transferring from one mode to another contributes significantly to the handicapped person's unwillingness to use public mass transportation. The pressure of crowds and time, as well as the architectural barriers, are more prevalent and at the modal interfaces. The handicapped take fewer than half as many trips to change modes than do the non-handicapped, and also demonstrate much less tendency to combine several tasks in a single trip.

The challenge of eliminating travel barriers is compounded by the fact that both physical difficulties and travel barriers occur in combination, rather than individually, within any person or transportation mode. Hence, the elimination of one barrier, regardless of its importance, will not make the system accessible to a large portion of the population. In order to make mass transportation available to just half of the handicapped population, requirements for moving in crowds, standing in a moving vehicle and maintaining balance while the vehicle starts and stops will all have to be eliminated. If 75 percent of the handicapped are to be accommodated, then alternatives will have to be found for each of the following, in addition to the above: bus and train steps, long staircases, escalators, waiting room chairs, unprotected bus stops, overhead support grips, and baggage handling procedures.

#### *Latent demand for transportation*

The latent demand by the handicapped seems to be greatest for social and recreational trips. About two-thirds of the handicapped population would participate more frequently in social and recreational activities if they had access to a safe, low-cost, barrier-free travel mode.

More than half of the handicapped would like to use public transportation to take more shopping trips. Over half of the handicapped's shopping trips are now done walking, indicating that most of the shopping is done in small amounts from local suppliers. Since the handicapped are usually poor, they would benefit greatly from the opportunity to shop in more competitive markets.

While one would expect a large latent demand for additional medical trips, this was not substantiated by responses of the Abt handicapped sample. The state medical assistance programs required by June 1969 under Medicare frequently reimburse the cost of transportation to medical facilities. Since most of the medical trips by public transportation are by taxi, this service, although free to the patient, is costly to the sponsoring agency.

#### *Institutional constraints on implementation*

There are a number of institutional constraints which are likely to impede the implementation of new transportation technology, once the design and engineering problems have been solved. There is presently no incentive for either of the major bus manufacturers to thoroughly redesign their vehicles. This approach is considerably more costly than the modification of existing capital equipment, and the manufacturers appear unwilling to make this large investment themselves. Although the opportunity for a larger share of the market might ordinarily be a strong incentive, this does not appear to be the case in this industry. During an interview with the sales and marketing management of the major bus manufacturer, it was stated that the company was constrained

by antitrust legislation which discourages any activities that might increase market share. The other major manufacturer is dependent on the first for principal drive line and suspension components, and hence cannot afford to undertake a large scale re-design and engineering effort himself.

The modal operators see little reason to make their systems accessible to the handicapped, since the revenue from this group would add little to their fare box. Furthermore, they lack knowledge about the problems of the handicapped and are usually unaware of opportunities to alleviate them. Finally, since most public transit authorities operate in the manner of a traditional bureaucracy, innovative system and hardware design is generally discouraged.

A third constraint exists in the present federal legislation concerning the authority of the Department of Transportation. At the present time, DOT is not authorized to provide capital subsidies to non-routed transportation systems, such as CARS or Dial-A-Bus. This legislation would require amendment before a specialized non-routed system for the handicapped could be implemented.

State legislation requiring the accessibility of public buildings and facilities to the handicapped often leave compliance with ASA<sup>4</sup> Standards to the judgment of the contractor, with no provision for review or enforcement. Since there is no incentive for the local contractor to comply, enforcement is left in the hands of local pressure groups. This situation is likely to impede the implementation of improvements in existing transportation systems.

#### *A specialized system for the handicapped*

While it is certainly more desirable to provide handicapped travelers with an opportunity to use public mass transit systems, the difficulty and expense of modifying existing systems make this reality a distant one. Hence it is all the more important that new systems being planned incorporate guidelines that will make it accessible to the handicapped.

Where neither of the two above alternatives are feasible, specialized systems to serve the chronic, acute and situationally handicapped may offer an interim solution.

It appears from an analysis of the existing demand for travel that the operation of an economically viable specialized system for the handicapped is feasible in cities with populations of 100,000 or more. This system would be likely to succeed where marginal special taxi or "handicab" services have failed, primarily due to improved price-demand relationships. These services are ordinarily part of the regular taxicab establishment with the implied weak service, poorly trained drivers and lack of adequate special equipment. Resulting high prices discourage demand for the service, and the number of vehicles available and trips taken are small in proportion to the resident mobility-handicapped populations. A case study of the Boston area indicates that a carefully designed dynamically-routed system could supply 4 trips per week (desired number of additional trips) to each of 18,000 customers at \$2.00 per round trip (a price that almost 60% of the handicapped population is willing to pay), and break even, or make a slight profit.

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<sup>4</sup> American Standards Association specifications for making buildings and facilities accessible to, and usable by, the physically handicapped, sponsored by the National Society for Crippled Children and Adults and the President's Commission on Employment of the Physically Handicapped, Oct. 31, 1961.

## Appendix 2

### STATEMENT FROM POTOMAC VALLEY CHAPTER OF MARYLAND, THE AMERICAN INSTITUTE OF ARCHITECTS

There is no such thing as an "average man" and yet designers of human space have always designed for him.

In creating human facilities it is past time to consider those many people who are not remotely close to the average man. There are those with a high degree of visibility, the wheel chair occupant, the lost limb, the blind. Rarely thought about are those who have heart diseases or nervous disorders, persons of advanced age with their loss of perception and mobility, and the temporarily handicapped, people with broken legs, eye injuries, etc.

One increasing group of people never thought of in terms of architectural barriers are little children living in a basically adult environment; midgets living in a giant world.

In a March 1968 report to the Rehabilitation Services Administration, United States Department of Health, Education and Welfare, the American Institute of Architects pointed out that there is good understanding of the concept and desirability of barrier-free architecture by architects, but not by their clients or other members of the building community. Also, they pointed out that there is little understanding of the true physical characteristics of the population by all members of the building community.

The public and the design professions must be educated on the elimination of barriers in all areas of the environment in order to allow those who can't do so, lead more normal lives and to make life easier for everyone. There is a need for concise instructional and reference materials for the design professions. There is a great need for encouraging client acceptance of barrier-free design, both as a matter of public responsibility and as a service to the real market, through development of a climate of concern and understanding.

The American Institute of Architects, working with the Presidents Committee on Employment of the Handicapped has initiated and implemented a program of education on barrier free design. They have been holding a series of seminars and workshops, in various parts of the country. The A.I.A. and Presidents Committee also present an annual Bartlett Award, named after the late Senator Bartlett, for providing access and usability for handicapped persons in the design of buildings. This encourages more interest and brings more recognition to the program of barrier free design.

The A.I.A. through its Potomac Valley Chapter developed, for H.E.W., with a grant from Congress, a design for an inclined lift for the D.C. Metro system. This device would allow anyone, including wheelchair users, access to the subway system. With R & D funding, possibly from Congress, a prototype lift could be constructed and tested in the first Metro Station to be opened. This device was published in the report of a hearing before the Subcommittee on Public Buildings and Grounds of the Committee on Public Works, House of Representatives, 91st Congress, First Session on H.R. 14464, December 6, 1969.

An educational program should be initiated in order to make the building industry, not only aware of barrier free environment, but inform them about what can be done to bring it into being. This can be done with workshops, seminars and a public information program. In addition, design information in the form of manuals and posters should be disseminated to architects, schools of architecture, landscape architects, civil engineers, industrial designers, financial institutions, builders and building associations and anyone else involved in designing or constructing the human environment.

Probably the most effective way to implement a barrier free environment is through legislation and code reform. Initiation of new Federal and local legislation and strict enforcement of existing laws must be done. National and local building codes must have all of the barrier free criteria incorporated into them; the wheelchair being the maximum design parameter. In addition, all Federally financed or insured construction should require barrier free design. Revision of F.H.A. "Minimum Property Standards" to include barrier free parameters would have a great impact on the building industry.

We of the Potomac Valley Chapter A.I.A., who have pioneered in barrier free architecture and the national American Institute of Architects are dedicated to creating a human environment that is usable by all people everywhere and we stand ready to assist all who also seek this goal.

