# Design Criteria for Transportation for the Disabled: A Test of Equivalence

for the

Southern California Rapid Transit District

Board of Directors

by

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In this paper, some important considerations involved in providing public mass transportation for the physically handicaped are discussed, beginning with certain constraints introduced by the nature of the population to be served.

Criteria are developed for evaluating the extent to which various service alternatives do indeed provide full mobility to the disabled. Those alternatives are discussed and evaluated in terms of the criteria, with the conclusion that the only way to meet the criteria and provide full mobility in a cost-effective manner is with full accessibility.

discussion of the costs of full accessibility, some operational and safety considerations, a possible program of implementation, and some benefits to accrue to the general public fram such a policy end the paper.

## INTRODUCTION

The Urban Mass Transportation Act of 1964, as amended, declares it to be "...the national policy that elderly and handicapped persons have the same right as other persons to utilize mass transportation facilities and services; that special efforts shall be made in the planning and design of mass transportation..." and that all Federal programs offering assistance in ... mass transportation ... should contain provisions implementing this policy."

For all practical purposes, then, the decision to provide servies to the elderly and handicapped, including those in wheelchairs, has already been made. The question, therefore, is not whether to provide public transit for the handicapped but rather what type of service and how best to implement it.

The purpose of this report is not to design a detailed transit system, but to creat desi n criteria against which a given system may be evaluated. The actual mode, or mix of modes, may vary according to specifics of the service area, but the criteria can still be applied to determine whether the system (proposed or existing) actually meets the transit needs of the disabled. (For purposes of this report, "mode" refers to fixed-route, dial-a-ride, jitney, etc., which may be employed in a mass transit system.)

## MYTHS ABOUT THE HANDICAPPED

Before developing such criteria, however, it is important to deal with some of the prevailing misconceptions about the disabled held by the typical able-bodied individual, especially those in the transit industry.

1. Handicapped people are sick. Transit properties often assume the travel patterns of the disabled are unique and consist primarily of trips to doctors, hospitals and rehabilitation centers. Concurrently, the disabled are presumed to reside in or around hospitals and convalescent homes.

They fail to realize that there is a difference between individuals who are in an acute phase of a health problem and those who have a chronic disability. In reality, handicapped people are not necessarily more prone to illness than anyone else.

While some disabled persons do make regular trips to such facilities, (and probably the incidence is higher than for the general population) the fact is that all available information indicates that the disabled have travel needs much like the able-bodied. Also, available data, as given in another report indicates there are no significant geographical concentrations of the handicapped in Los Angeles County.

Thus, barring some unexpected new information, the conclusion is that the travel patterns of the handicapped will duplicate the patterns of the general population.

2. Handicapped people are helpless. Generally, handicapped people are not helpless, frail individuals who need to be sheltered

and protected from the real world. Certainly this is true of those whose "...use of public transportation would be a reasonable expectation were... (level change devices and tie-downs on full sized buses)...provided."(5) With certain external physical modifications, often minor, most of these handicapped people function independently. Such people's needs are not necessarily more extreme, just different.

There is also some confusion between "wheelchair confined" and "severely disable" individuals. Whereas most severely disabled persons are likely to use wheelchairs if they are at all mobile, it is certainly not the case that all persons who use wheelchairs are severely disabled. In fact, many wheelchair users are more mobile, active, and agile than some other disabled people who do not use wheelchairs. This includes some who, prior to the advent of sophisticated electronic systems, would have been classed as severely disabled.

A transit official once said that a particular bus line went through a high crime area and it would be very dangerous for the handicapped to ride that line. Such may be the case, but the statement forgets about the disabled who may in fact live near that line, and that is not a proper determination for a transit district to make.

3. Handicapped people are not competent to make their own decisions. Virtually every report which claims that the handicapped do not want to ride the same vehicles as everyone else has reached this conclusion by interviewing able-bodied professionals - heads of hospitals, convalescent homes, and charitable organizations - not the handicapped themselves. The most widely circulated of these, done by the American Public Transit Associati n (APTA) (11) formulated

its plan for transportation for the elderly and handicapped from such sources. Handicapped and elderly people asked later to comment on this plan were enthusiastic. Unfortunately, such post-facto surveys are in violation of good research design, since the question is automatically biased. If anyone were asked "Would you rather wait on a street corner in the rain or be picked up at your door?" it would not be difficult to predict the response. Moreover, if the constraints to be imposed in providing door-to-door service were truthfully explained, the service would not receive such favorable attention from the elderly and handicapped.

Certainly there are many disabled people who would find it difficult, if not impossible, to get to a fixed-route transit stop. To many, a half block is as great an obstacle as a mile. Door-to-door service is one way to address the transportation problems of the very severely disabled. It may, in fact, be the only way. Furthermore, depending on service or geographical constraints of a particular area, dial-a-ride may be the primary mode of choice. The question is really whether such service represents the sum total approach to solving the transit problems of all the disabled in all areas.

## EQUIVALENT FACILITATION

In California architectural barriers law, the concept of "equivalent facilitation" is used to determine when a building may be excused from full accessibility to the handicapped. Thus, all parts of a building need not be fully accessible if, in the portion that is usable by the handicapped, all facilities normally sought and used by the public are available such that "...it is clearly evident that equivalent facilitation...is thereby secured." (Sec. 4451, Chap. 7, Div. 5 of Title 1 of the California Gov. Code).

The concept of equivalent facilitation needs to be extended to public transportation and criteria established to evaluate the adequcy of alternative service instead of full accessibility. In the case of public transportation, then, full accessibility means that, whatever system or mode is used, be it buses, fixed rail, jitney, mini-buses, or any combination thereof, ALL vehicles must be accessible to, and usable by, the physically handicapped, including those in wheelchairs. Short of such an ideal there are, of course, many possibilities. Some vehicles may be rebuilt; some alternative mode may be established; a gradual changeover may be initiated by ordering only accessible vehicles as expansion and replacement occur, or some combination of the above. With full mobility the goal, whatever system is proposed, in order to be a viable public transportation system meeting the legitimate needs of the handicapped, it must pass the test of equivalency.

TEST OF EQUIVALENCY

1. Equivalent origin/destination. (Purpose) The average able-bodied user of public transportation has a choice of destinations determined primarily by the matrix of the current transit system. In a reasonably extensive system, the user may choose equally between trips for the purpose of work, shopping, entertainment, visiting friends, etc. Demand-responsive modes which restrict options to only work, school, medical visits, etc., do not provide such equivalency.

2. Equivalent Trip-Decision Time. An equivalent alternative system must require no more advanced decision to travel than the average able-bodied user. Thus, on a system with an average 20-minute headway, for example, the typical user need decide to travel

a maximum of 20 minutes prior to departure, and can decide to change destinations enroute.

3. Equivalent Travel Time. Travel time between any two points should be no longer on an alternate system than it is on that used by the able-bodied population.

4. Equivalent Transfer Frequency. In a system in which, to get from any two points in the service area, one transfer is considered usual, two are considered acceptable, and three unacceptable, the same should be true of the alternate system.

5. Equivalent Service Range (Geographic) Service for the handicapped must ultimately extend over the entire geographic service area, and operate at least during the same hours as that system used by the able-bodied population.

6. Equivalent Fare. The fares, including transfer charges, charged on an alternate system must be no higher than those charged to the able-bodied using the primary system, reduce fare requirements notwithstanding.

## THE DEMAND-RESPONSIVE ALTERNATIVE

There are many kinds of demand-responsive service ranging from rigid pre-subscription service to on-call dial-a-ride. The subscription mode is easiest to coordinate and requires the fewest vehicles but offers limited transportation. The true dial-a-ride, on the other hand, can provide maximum transportation flexibility but requires more vehicles and is difficult to coordinate over large areas, often requiring sophisticated computer systems.

In most proposed alternative demand-responsive systems, the "advantage" of door-to-door service is to be substituted for some or all of the points in the Test of Equivalency. Dial-a-ride alone, to the exclusion of an accessible main system, creates a service so intent on meeting the needs of the very severely disabled, that it may not meet the needs of the active disabled, who could most benefit from usable public transportation. In fact, such severely disabled individuals may not be reasonably expected to use public transit no matter what service is provided.

Furthermore, while it is not possible to completely specify the cost of a demand-responsive system without a detailed outline of the proposed service, it is possible to estimate some minimum figures. According to a previous report by the Southern California Rapid Transit District on providing dial-a-ride in a limited area (10,12), such service costs at least 30% more than a comparable level of service by fixed routes. This additional overhead is due to the need for dispatchers, telephone answerers, and special equipment such as radios. So far, no known existing dial-a-ride has come even close to this minimum. In order to survive for any length of time, such service has either been very limited or has depended on massive subsidies from federal, state and local sources. In case of limited financial support, such service is sually the first to go, as in Haddonfield, N. J., leaving those who have become dependent on the service with no alternative at all. (8).

Over an area as large as the SCRTD service area, a demand-responsive system faces serious problems, if vehicles are to traverse the entire

area. Once a particular vehicle goes beyond a given distance from its base of operations, it is no longer available to handle another service call near its base within a prescribed time limit. Thus, if the minimum wait time is to be maintained, additional vehicles must be kept ready to respond. However, most of the time, a portion of the vehicles and drivers will be idle. The shorter the wait time to be mainteined, the larger the number of extra vehicles required. But, since operating expenses consist primarily of labor , idle vehicles cost virtually the same as those in service. Thus, the usual response from transit district's is to abandon the short call time and/or limit the trip purposes allowed.

Alternatively, local community based dial-a-ride service can be established, restricted to operate within prescribed areas. If the area is properly defined, minimum wait time can be maintained with a minimum number of vehicles. Unfortunately, disabled people are either denied intercommunity trips or they must make many transfers between systems, thus increasing their travel time. Such multiple interface coordinations may be virtually impossible.

Clearly, a demand-responsive system cannot meet the test of equivalency and provide full mobility without an excessively high budget.

The best hope would be to optimize the service as a community based feeder/distributor network to a fully accessible main line system. In a transit district with an extensive fixed rail component, this may pose only slight difficulty. However, if no such component exists, fixed-route, line-haul bus service, de facto, must provide the regional network. But, unless the physical characteristics are unique or the disabled population relatively concentrated (so far, all indications are to the contrary), a demand-responsive system alone cannot hope to provide adequate transportation for the disabled.

The authors of Para-Transit (6) claim no single mode, be it buses, fixed guideway, or whatever, can hope to meet all the transit needs of all people. The corollary is also true: no single mode can hope to meet all the transit needs of a single group.

Moreover, while many handicapped persons could not utilize a fully accessible main line system, many others could. In fact, the mobile handicapped are likely to be the primary users of accessible public transportation since they have already solved many of their mobility problems. CALTRANS (California Department of Transportation) cautions against creating a transit system which meets only their needs (5), but a transit mode geared too

heavily to the needs of the very severely disabled will likely result in needless service delays to the entire disabled population and service duplications, transporting disabled people along the same route served by inaccessible buses.

## THE RETROFIT ALTERNATIVE

Another possible way to provide service to the handicapped is to retrofit existing vehicles. The costs can be minimized by equipping a limited number of vehicles, but passing the test of equivalency would then be difficult if not impossible. There are, however, three California properties seriously investigating this possibility. A demonstration project sponsored by CALTRANS and the California Department of Rehabilitation will soon be initiated to retrofit four 40 ft. buses with four different devices. Hopefully, this project will help answer some of the questions about the feasibility of retrofit. There are several important considerations in such a program. These problems can be divided into four general categories depending upon the entry point to the vehicle, and the level change device employed. This report is limited to discussion of retrofitting a full sized (40 ft.) transit coach since smaller fully accessible vehicles are already on the market.

1. Passive vs. Active Devices. The majority of available wheelchair entry devices, especially those used on private vehicles, are of the "active" type. That is, they are lifts with platforms which fold up across the doorway. Their operation sequence

includes a fold-down/lower/raise/fold-up cycle. The fold-down/fold-up portion of this cycle is "dead time" when the device is performing no useful work. More important, the device blocks the opening and must be deployed each time access is desired through that opening.

A "passive" device, on the other hand, either does not have a cycle analogous to the fold-down/fold-up sequence or that part of the cycle is minimal. The critical aspect, however, is that it does not impede the ingress and egress of able-bodied passengers through the same doorway. Examples of such devices are those included in Transbus prototypes (although the AM General device requires an interfacing platform), the Transportation Design and Development Corporation lift used by Flxible, and some devices currently being used or developed in Canada and the San Francisco area. In fact, the power ramp of one Transbus, if it has the proper slope, is the fastest, since it need not recycle to load more than one wheelchair and able-bodied passengers can simply follow or precede the wheelchairs up the same ramp. In addition to speed, the ramp offers the advantage of permitting use by those with longer than average wheelchairs as opposed to lifts which have fixed platform lengths. Of course, lifts may be required in certain areas where adequate curbs do not exist, but if the ramp slope is made consistent with current architectural standards, the disabled population most likely to use public transportation would be able to use it independently. Those disabled individuals who are unable to negotiate such a slope would not likely be

venturing out without an assistant.

In line haul transit service, then, the passive device is more suitable than the active.

2. Front Door Entry. Clearly, front door entry requires a passive device, if service for the handicapped is to be provided within the main transit system. Given the proper device and "trained" user, the front door position allows the operator to remain seated and still be in a position to observe safe operations and provide assistance if necessary. Also, maneuvering the bus so that the front door is adjacent to an unobstructed portion of the stop area is significantly easier than for any other door.

Unfortunately, the front doorways of current 40 ft. buses do not meet minimum width standards for accessibility. Granted, 98% of all wheelchairs would pass through a 30-inch opening, but not only would 2% of the users be prevented from entering, but, as most able-bodied people fail to realize, the 32 in. minimum standard is necessary to prevent smashed fingers. Few wheelchairs are elctrically powered, though there is evidence this would change if accessible transportation were available; in fact, one transit planner has commented that a motorized wheelchair could be considered as one element of a fully accessible transportation system. Widening the front door requires either a change in state law allowing a bus greater than 40 ft, moving the front axle back, or changing the windshield configuration. Either modification could be expensive.

Some unanswered questions remain about maintaining the crashworthiness of the bus so modified. The right front bumper has the highestt collision incidence and may require additional reinforcement. However, while the maintenance aspects of a front door lift may cause problems, they are likely to be much less extreme than the operational problems introduced by other configurations. And then, the issue of accessibility does not concern only wheelchairs. A lift on a high floor bus does not solve the problems of the ambulatory handicapped faced with several high steps. And a "kneeling" feature is less than window dressing when, in an area like Los Angeles County, the distance from curb to first step is normally less than the height of the interior step. And a high floor makes a ramp device either impossibly steep or impractically long.

3. Rear Door Entry. In addition to many of the problems listed above, the rear door entry has some of its own. Even where all stops are placed on the far side of cross streets, drivers would have significant difficulty ensuring that the rear door is close to the curb. Couple this with the existence of benches, newspaper racks, utility poles, and bus stop signs, and positioning the bus for the loading of a wheelchair may be an operational nightmare. And then the loading operation would require the operator to leave the seat or may require extra employees. True, a more direct path to the securement devices is possible from the rear door, but the other factors seem to make the front door more desirable. Widening the rear door may be somewhat less of a problem than the front,but structural reinforcement will probably be required.

4. Third Door Entry. If a third door, used only for wheelchairs, is cut in the side of the bus, the requirement for a passive lift is relaxed somewhat. However, the third door must be cut in the vicinity of the maximum "bending moment"; that is, the place where the most structural stress occurs. This would require even more reinforcement than widening the rear door.

Finally, third door entry has all of the drawbacks of rear door entry, and creating such a door would require the removal of one or more seats.

## THE GRADUAL CONVERSION ALTERNATIVE

Given the inadequacy of demand-responsive systems as the total solution, one alternative is to gradually replace, through normal attrition, all present 40 ft. coaches with accessible 40 ft. vehicles. Of course, this program requires the production of such a bus.

From a design and engineering standpoint, as well as cost, it makes more sense to build accessibility in rather than add it on. That was the original intent of the Transbus project, through for all intents and purposes that program has been abandoned. According to information from UMTA, the December 1974 Transbus specifications, and UMTA's July 27, 1976, decision on floor height, the original human engineering design principals have been dropped. The claim from the transit industry has been that the Transbus design, especially the low floor, has been modified in response to the prototype testing. The low floor design must be relaxed, goes the argument, because of possible increased maintenance. However, this may not be the case.

In response to questions before a group of lawyers involved in suits against transit operators, a representative from Booz Allen Consultants admitted that the concern over increased maintenance was largely imaginary. According to reports prepared for UMTA (15,16), the Transbus prototypes actually had greater approach, breakover, and departure angles than the baseline G.M. Coach used for comparison. Thus, the design modifications, especially

to the "accessibility" package, appear to be more a result of pressure from manufacturers than of test results, and the April 30, 1976, UMTA regulations continue to confuse accessibility with wheelchair access only.

In fact, response from SCRTD's attempt to secure accessible 40 ft. buses indicates the obstacles are purely financial, not technological.

Contrary to the claims of some manufacturers of alternative equipment (who would like nothing better than to see plans for an accessible 40 ft. bus scrapped), the problem has not been solved. The 40 ft. bus is not on its way out, to be replaced by fixed guideway and small community buses, as they claim. It costs no less to operate a small bus than a large one, and rapid transit is efficient only when stops are far apart. Thus, heavily traveled lines will not necessarily be replaced by rapid transit corridors. And if high capacity vahicles are justified once during the day, it is less expensive to operate them for the duration of service.

If a viable transit system for the disabled is ever to be created, that system must be designed with the mix of services tailored to the specific district. Currently, in the absence of a production version of an accessible 40 ft. bus, dial-a-ride is the only available option. Until such a vehicle is put in production, transit districts may choose only between poor service to the handicapped or an extremely high budget.

It is clear, from the experience of SCRTD, that given cooperation from UMTA, such a vehicle would be forthcoming. As stated earlier,

financial support is the major obstacle. Barring a change in the inadequate UMTA regulations, such obstacles could be removed if transit properties were to realize that their resistance to full accessibility and reliance on demand-responsive modes leads them to false economies.

FULL ACCESSIBILITY/FULL MOBILITY

The only way to provide full mobility for the handicapped is to provide a fully accessible multi-modal transit system. That is, one in which the passenger chooses between a variety of existing modes (including the private automobile) depending upon origin, destination, time available, distance, and a host of other considerations. That is, truly flexible transit, full mobility. This is not the same as some incorrectly believe, as a system in which one mode serves one population, a second serves another, and so on. Unless the passenger can freely and easily choose subsystems, the overall system is not multi-modal but simply a collection of parallel transit systems which do not allow for optimizing each component. The result is service duplication and financial waste.

Again, full accessibility and demand-responsive service are not mutually exclusive. A fully accessible transit system may in fact include a deman-responsive subsystem. Moreover, depending on the characteristics of the district involved, regional service with full-sized vehicles on fixed routes may be the only system that makes sense. In Los Angeles County, for example, the only demand-responsive system that would work would be community based, local feeder/distributor service to such fixed route regional service.

Even assuming all fixed route lines in a community are not intended to provide accessible service, it still makes sense for all buses to be (eventually) accessible, because: (1) standard accessibility features would have a lower unit cost than optional ones and would likely have increased reliability; (2) as buses are normally shifted among lines, the ability to interchange buses used heavily by the handicapped with those less frequently used would decrease equipment "down time" and extend equipment lifetime; (3) when equipped with passive devices, other accessibility features, such as low floors, wide doors, and shorter steps, benefit everyone.

Why then are transit properties so opposed to full accessibility? Partly because of the myths about the handicapped mentioned earlier and partly because of some fears of what might happen.

SERVICE DEGRADATION

A frequent objection to allowing wheelchairs on line haul service is the assumed service degradation that would occur. "Loading a wheelchair is a lengthy process," goes the argument, and schedules would be seriously interrupted, discouraging use by the able-bodied, and decreasing revenues. This assumption is partly true, based on the slowness of many commercial lifts. Some of this concern is corrected by the characteristics of passive devices; also, most commercial devices are presently slower, albeit not for technical reasons.

All available information indicates that the handicapped are well dispersed in the general population (13). This means regional service must be provided, but also this dispersal makes it unlikely

that there will be enough wheelchairs on one line simultaneously to create significant schedule disruption. Providing two wheelchair spaces per bus not only minimizes such delays, but, assuming 20-minute headways, allows the movement of six wheelchairs per hour in each direction.

Additionally, given the choice (i.e. if they are unemployed), disabled people generally travel during non-peak hours.

But perhaps more important, tests with the Transbus prototypes showed that the low floor and wide door speeded the loading and unloading of able-bodied passengers by more than 50%. This increase, coupled with the faster loading of the semi-ambulatory handicapped and elderly, who currently slow service, should more than compensate for wheelchair loading.

One APTA report claims that, since the Transbus would have had better acceleration and speed, it doesn't make sense to slow it down by loading wheelchairs (10). On the contrary, the fact that it would have these characteristics means it would be ideally suited to negate any such delays.

## COST OF FULL ACCESSIBILITY

Many reports, including the aforementioned APTA paper, stress the exorbitant cost of full accessibility. Unfortunately, none of those reports provide any documentation. Moreover, in reading the APTA paper, it becomes clear that the enormous cost stems from an assumption of immediate conversion. There is no question that this would be exorbitant, but gradual change to new accessible vehicles would not be.

For example, the initial cost of any vehicle should be amortized over its life expectancy. While no one yet knows what such a vehicle will cost, Booz Allen estimates 10% more (in full production) (2) and Metropolitan Magazine estimates 30% higher (but gives no documentation) (9). There is also an assumption of higher maintenance cost (Booz Allen disagrees) (2). But most operating costs are involved with labor; even if double maintenance costs are assumed, and the 30% higher purchase price is correct, the maximum total increase is less than 15% (see table 1). Of course, this is not an insignificant number. But compared to some costs of providing equivalent demand-responsive service, it is considerably more economical.

Furthermore, according to a financial impact statement prepared for UMTA (16), the ability to attract riders who cannot now utilize public transit and the predicted patronage increase because of the low floor and wide door would not only pay for the increased cost but would actually generate enough additional revenue to help decrease operating subsidies.

IMPLEMENTATION

Most transit improvement projects, especially those which involve expansion of bus service, proceed along a predictable path. That is, a consulting firm is hired to survey the area, identifying trip generators, traffic arteries, geographical features, existing service, etc. A plan is drawn up and submitted to the local transit district, which modifies it according to its own particular information. When the plan has been reviewed by affected communities,

and modified, it is implemented on a trial basis. Those lines which do well are augmented or left the same, and those which do poorly are removed, changed, have headways increased, etc: "fine tuned" according to use.

When the subject of transportation for the handicapped is raised, however, suddently reams of extra information is required first: how many handicapped in the area?; what types of disabilities?; where do they live:; where do they want to go?; at what time and how often?; etc., etc., etc. However, it is possible to design a process for implementing transportation for the handicapped which corresponds more closely to the usual procedure. The Southern California Rapid Transit District, serving Los Angeles County, has attempted to do just that.

First, major generators were identified:

1) Colleges and Universities, many of which have handicapped student programs and are actively recruiting disabled students (The California Department of Rehabilitation last year granted $1,430,000 for the removal of architectural barriers on college campuses).
2) Major centers of employment, including the Los Angeles Central Business District. California law now requires new construction to be accessible if a handicapped person could be employed therein, and physical disability had been added to the California Fair Employment Practices Code.

3) Major transportation centers, including Los Angeles International Airport which provides accessible vehicles for some shuttle service, and the Greyhound lines, whose new "Helping Hand" program is designed to assist the handicapped traveler.

4) Major entertainment centers, such as Disneyland, Knotts Berry Farm, the Music Center and others.

5) Major hospitals and rehabilitation centers such as Rancho Los Amigos and Northridge Hospital Rehabilitation Center.

6) Existing community based dial-a-ride services, of which there are several operat. ɟ, and several proposed.

The existing and proposed demand-responsive systems will provide the feeder/distributor network and SCRTD will be able to fulfill its legal mandate to provide regional service.

Having identified the above generators and the appropriate lines, and given the number of buses to be expected in the first order (530 in this case; 200 on the initial order with 330 to follow) the lines can be selected which connect the maximum number and varieties of generators which will allow base period headways to be maintained. If properly planned, a skeletal grid system can be established which assures base period headways at all times with inaccessible trippers in between during peak. This service can then be fine tuned according to demand and usage. As new equipment is purchased, new lines can be made "accessible" or headways decreased on existing lines. Already, several small cities and councilmanic districts have drawn dial-a-ride plans to augment the regional lines as they go into effect.

Such a plan has two advantages over so-called "interim" demand-responsive systems: (1) it establishes regional service immediately, and (2) it does not produce such a financial drain that expansion of service to the handicapped becomes untenable.

SAFETY

Most industry concerns about safety are based on the misconceptions held about the handicapped. But there are some real concerns to be addressed; however, these considerations should be discussed in light of the real, rather than imagined, capabilities of the isabled. One improtant fact to remember is that some disabled people will never use public transit and others will never use it without an attendant.

The safety problems likely to occur in transporting disabled passengers are not necessarily more numberous or more serious than those of the able-bodied population, although many safety considerations are different. For example, it is doubtful that a 100% universal tiedown device is possible without cooperation from wheelchair manufacturers. However, one available design will accommodate about 98% of all wheelchairs, provided a simple bracket is attached to some chairs. While the particular device is not suitable for use under jump seats, its design constraints were different. Certainly, good securement devices are possible given sound engineering and technical knowledge and consultation with competent disabled individuals.

Furthermore, while some new safety problems may arise by transporting handicapped individuals, many existing safety hazards will be removed because of the wide door and low floor (and, consequently, only one low step) (2).

In addition, some assumed safety problems may evaporate given properly informed passengers, disabled and otherwise. Similarly, other problems may arise in practice. In short, attempting to address all such possibilities before the fact is counterproductive and should not be used as an excuse for delaying full accessibility. In the end, the only way to find out what the problems are is to proceed, and solve them as they arise.

## THE PUBLIC IMAGE

Actually there are larger issues than just transporting the handicapped. The whole future of public transportation is involved. Consumer Reports points out that buses are really designed so as to be convenient for only a small segment of the population (6). So the question of an accessible bus is really whether there is to be public transportation or transportation for the minority only.

If public transit is to become a viable alternative to the automobile, it must be made attractive to the maximum number of people. Transit operators often assume that the necessary and sufficient condition to do that, is to improve schedules. Even with the best schedule possible, there will still be a significant number of people who will find the physical design of a bus unacceptable, and that number is much larger than just the elderly and handicapped.

In all the concern about slow schedules caused by loading wheelchairs, where is the concern about slow schedules caused by high floors and narrow doors? Why haven't transit operators invested as much time and effort trying to improve schedules by specifying a low floor and wide door as they have invested in resisting full accessibility? In terms of cost, those two items, which would benefit all passengers, are the most expensive; after that, a lift or ramp is pocket change.

This is not to say, of course, that a bus designed with a low floor and wide door will cause the masses to flock to public transit, but it would go a long way to improve its image. Far from causing service degradation and discouraging use by the general public, an accessible bus would likely attract many more than it would turn away.

One more concern is that a large portion of the able-bodied population is uncomfortable in the presence of the handicapped. True enough, but with architectural barrier laws creating a more accessible environment, rising public awareness, and increasing opportunities, more and more disabled are becoming visible. Those who are uncomfortable will have to get used to it.

PASSING THE TEST OF EQUIVALENCY

An official of HEW objects to full accessibility on the grounds that it may not serve the needs of the handicapped. "How we meet the needs of the elderly and handicapped should be tempered with our knowledge of their real needs not our perceptions of their needs..." (emphasis hers). She later writes "...How can we talk of anything but door-to-door service for the disabled...?" (4). The "professional" who "knows what's best" for the disabled have begun using the phrase"full mobility" to describe demand-responsive advantages. In fact, however, full mobility can only be achieved by full accessibility without an astronomical budget.

Some knowledgeable sources from UMTA believe full accessibility is inevitable; the only question is when and how. The missing ingredient is a full-sized accessible coach. Only when such a vehicle is available will transit properties be able to design.....

the optimum mix of services for their particular area characteristics: the mix to optimize service and minimize cost. The longer the production of that bus is deferred, the more likely political pressure will force the creation of inadequate, financially draining, demand-responsive systems.

But will the disabled use such buses if they are placed in service? And, since the disabled are a small number, is the provision of service justified? Aside from the legal answers, there may be some statistical ones. In a survey by Mark Battle and Associates, it was determined that 40% of those disabled interviewed would use the service if available (1). And these were non-institutionalized individuals who could most likely use public transit except for the design of equipment. If, for example, the estimates of the disabled population of Los Angeles County are correct, this percentage would be more than one-quarter of the total daily ridership for SCRTD.

In the interest of self-preservation, then, transit properties across the country should be pressuring UMTA and manufacturers to create an accessible (40 ft.) bus. Manufacturers will continue to create vehicles to suit themselves as long as the customers delude themselves into believing that an accessible bus is not in their best interest. So long as transit properties are servants to manufacturers, public transit will continue to suffer.

The case for full accessibility is in reality the case for public transit.

TABLE I

SCRTD BUS OPERATING EXPENSES (1974)

| Item | Hourly | Assumed Double Maintenance |
|---|---|---|
| Driver | $6.15 | $6.15 |
| Fringe Benefits | 2.03 | 2.03 |
| Supplies | 1.10 | 1.10 |
| Maintenance | 2.04 | 4.08* |
| Overhead | 1.67 | 1.67 |
| PL & PD | .55 | .55 |
| G & A | 1.02 | 1.02 |
| Cost | $14.56 | $16.60 |

* Assumption made for sake of argument only. There is no reason to believe maintenance costs will actually double.

Cost Per Bus Per Year:

Current = $14.56 x 14.19 hours x 26 equiv. workdays x 12 months
= $64,443/bus/year

Accessible = $16.60 x 14.19 hours x 26 equiv. workdays x 12 months
= $73,493/bus/year (increase of 14%/year)

Purchase Price (Approximate)

Current Bus-- Initial Cost - $60,000

Life Expectancy - 15 years

Annual Cost - $4,000 Total Annual Cost $68,443

Accessible Bus (estimated) Initial Cost - $78,000

Life Expectancy - 15 years

Annual Cost - $5,200 Total Annual Cost $78,693(max).(increase 14%)

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