Economics

In the final analysis, economics and conservation of resources demand that new standards be set. Air quality, accident reduction, and land management are part of economics as is movement of more people per vehicle. Very little has been said to date about the economics of 40 to 50 buses compared with 1,200 to 1,400 cars in the context of accidents and loss to the community.

SUMMARY

In summary, change dictates new standards. If we do not make it work for us, it will work against us.

The remaining question then is, Are standards of design and operation of transit service satisfactory and applicable to today's conditions? I would have to say that they are not but that we know how to make them so, and we are working toward that end. The combined talents of the planner, engineer, sociologist, environmentalist, and psychologist can clearly identify the needs. We can then apply the necessary research and operative talent to solve the problem.

Standards should take into account customer desires, technical capability, land use and land planning, requirements of society now and in the future, implications of historical freedom of choice, and economics.

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I approach the topic "standards in transit service" with some trepidation. A standard can be quite useful as a broad guideline. And, of course, some standards must be absolutely literally followed to avoid catastrophic failure or malfunction. But there is also an ever-present danger that an unnecessarily rigid standard may wind up as an all-too-convenient weapon for killing off innovation and progress. Among a transit manager's tasks, a heavy burden is that of making judgments between the good and bad aspects of a standard.

Practically every aspect of transit service could be, and is, codified with standards. Actually, most standards are unwritten, but no less effective. Operations, maintenance, engineering, and planning are, of course, primary quadrants for transit standards; but, as one moves through that list, one finds the need for flexibility increasingly overtaking the need for rigidity. In a parallel way, the tasks to be performed are rather well structured at operating and maintenance levels but increasingly interact with ad hoc policy decisions at engineering and planning levels.

In the overall context of this conference, its primary orientation will be to standards applied at the planning level, but a few at the other levels might first be worth brief mention. A few of the more interesting standards that CTA uses in providing the second most extensive transit service in North America are discussed below.

EMPLOYEES

At operating levels, standards are applied to employee selection, training, and performance. Over the years one of the surprisingly difficult standards to define is that of employee appearance. Old photographs show that trainmen of the 1880s and 1890s commonly wore long sideburns, handlebar mustaches, and beards. The lack of heat in

early streetcars was reason enough in those days. Today, everyone accepts long sideburns (though many draw the line at mutton chops), and reasonable (whatever that means) mustaches cause no acceptance problem. But beards, hair down over the collar, and all manner of unusual hairdos, although acceptable on a doctor or an architect or a record shop employee, are causes of many complaints when on bus operators. Are passengers really going to reject our service on seeing a long-haired or bushy-faced operator? Is our imposition of hirsute standards an infringement of an employee's civil rights?

FREQUENCY OF SERVICE

Obvious service design standards are those relating to the maximum number of passengers per vehicle, usually called the "loading standard" in the industry. Yet at one of the conference workshops, there was little agreement as to how many standees would be acceptable in peak traffic. Typically, though, schedule policy in a given transit system establishes a range for the selection of service frequencies (trips per hour) or the reciprocal, headways (time between trips). Commonly, the maximum service is determined from the allowable crowding standard for passengers per vehicle, and the base or minimum service is determined from the headway so that the time between trips will meet the policy criteria of the transit system involved.

In Chicago, where flat geography and a rectilinear street pattern led to a gridiron pattern of long north-south and long east-west bus routes and an exceptionally active use of transfers by riders, a standard of rather frequent service, even in off-peak periods, was adopted. With interconnecting bus routes generally only a half-mile apart in a gridiron network, scheduled connections at many transfer corners are impossible. Poor frequency standards would severely jeopardize the sale of rides involving transfers, which are used by more than half our customers. In another city with mostly radial lines and little or no transferring, this would be a lesser consideration.

LENGTH OF ROUTES

Another standard relating to Chicago more than to smaller cities is that of maximum workable length of a bus route. Chicago is about 25 miles in length and 10 miles in width. At a practical average speed of 12 mph including stops, routes from one end of town to the other or from an outlying extremity to downtown and back would require very long journey times. Such trips would be so long that a bus operator would experience fatigue and his work output could be expected to diminish. Coincidentally, the total passenger load is almost never uniform for the full length of a route. Approaching a line's outer end, the total demand for service may be only a fraction of what it was in the inner part of the corridor. These 2 problems often result in schedule and route-design standards that provide "short-turning," that is, vehicles operating only part way out on a route.

VEHICLES

Maximum fleet requirements constitute a common control on service standards, as do the vehicle characteristics: length, width, door width, and seating and standing capacity. Rare as this may be, it is no less frustrating to find that bus size limitations, which cut back productivity, are imposed by such in-house constraints as rapid transit elevated structure columns sitting in roadways. So much has been recorded elsewhere on the subject of vehicle performance and comfort that they are simply mentioned here as obvious elements of comprehensive transit standards.

As is the case with other criteria, one standard affecting fleet requirements sometimes comes into conflict with another. For example, having established a service

loading standard of X passengers per vehicle at the maximum loading point of a transit route, the schedule designer may find that rigid compliance with that standard would require in a specific case that a bus and its operator be brought into service from the garage at one end of a line after one or more others are already pulling into a garage at the other end of the same line because there is no further riding demand for them to serve returning. This condition, although commonly accepted for lack of an alternative in long-distance commuter service, will be pressing the transit system to rearrange its schedule so as to accept a heavier loading standard rather than lower productivity.

SPACING BETWEEN TRANSIT ROUTES

Based on an assumed reasonable walking distance to or from a transit stop of $^3/_8$ mile, more than 99 percent of the population of Chicago is covered by CTA service. Because of the gridiron route pattern and some radial routes, most of the population is within $^3/_8$ mile of more than one CTA service, usually one going east-west and another going north-south.

PERIOD OF SERVICE

Three-fourths of Chicago's 135 bus routes and 5 of the 6 rapid transit routes operate around the clock every day. Of course, the portion that runs in the late hours is run at a heavy loss, even though there are many well-loaded vehicles on certain midnight trips. In Chicago, policy standards are followed to provide the broadest possible period of service for those people who need it at night. A surprisingly large total number of persons would be unable to work if there were no public transit to move them in the owl periods.

SECURITY

Transit's very commitment to serve all the city at all hours makes it increasingly vulnerable to crimes. In countering the trends of crime in recent years, transit must constantly be alert to adjust its standards to optimize the defense of its riders. Within this area have developed exact-fare procedures, uniformed and incognito "decoy" police patrols, advanced communications, alarm techniques such as Chicago's bus monitor system, and upgraded lighting and station design standards.

FARE COLLECTION

In a rapid transit system, fare collection can involve as much as 16 percent of the operating costs; and, under some specific conditions, fare collection costs even exceed the revenues they yield. In bus operations, costs of processing fare collections at garages can be formidable. Naturally, a transit operator must be sensitive to disastrous situations and be alert for possible changes that will offset tendencies toward waste.

Standards for rates at which fares can be collected by agents and by turnstiles are used to determine the manpower and hardware requirements. Standards for pedestrian movement or standing are used to fix platform, passageway, stairway, escalator, and related requirements.

PLANNING ROUTE CHANGES

Standards are essential in evaluating proposals for route changes, extensions, or

cutbacks. Aerial surveys are a useful modern tool for quickly inventorying the possibilities of a route change. Photos taken from about 7,000-ft elevation provide a good scale for counting buildings and estimating heights, which in turn provide a base for population and riding estimates.

In the planning of a new route, one problem to be solved is that of the terminal. In Chicago, we almost always will need an off-street turnaround complete with passenger waiting area, employee toilet, and phone. If more than 1 bus route is to share a turnaround, the design must provide an operating lane at the loading point for each route plus a bypass lane that will be used by a bus from any route to pass any of its leaders.

Other standards to be met by route changes consider the pavement widths, strengths, geometry at turns, traffic controls, and limitations involved.

Potential new traffic is perhaps the most important criterion affecting a route change. The best available estimating techniques are more art than science, but they can be applied by an experienced planner with great effectiveness. In Chicago, the probable attraction to transit for every housing or working unit is related to its distance from the route under consideration. An estimating basis is provided by the calculated riding habits actually experienced on an existing route in an area of comparable density and economic status.

To further define the potential of a new line, CTA planners ask industries along the route to respond to questionnaires that inventory facts about the number of employees (male, female, skilled, unskilled, white collar, blue collar), the number of visitors, the availability of parking, and the 1-year anticipated changes in these figures. Suggestions as to possible solutions are invited from parties requesting change, with indications of order or preference when more than one alternative is presented.

When service extension proposals are being made as a consequence of a request from outside of CTA, typically from an industry that recently relocated to an outlying area and feels that transit is obligated to follow it, the existence of systematic analysis procedures from the industry provides reassurance that the proposal is receiving fair consideration.

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Planning is a rational process directed toward attaining objectives. The Southeastern Wisconsin Regional Planning Commission (SEWRPC), as part of its regional land use-transportation planning program, formulated a set of regional development objectives as a basis for land use and transportation plan design, test, and evaluation. Of a total of 15 specific development objectives, 8 related to land use development and 7 to transportation system development. One of the latter related directly to transit service; it called for "a balanced transportation system providing the appropriate types of transportation service needed by the various subareas of the region at an adequate level of service." Two additional transportation system development objectives related indirectly to transit service in that they dealt with a reduction of accident exposure and with the alleviation of traffic congestion and reduction of travel time between component parts of the region.

To be useful in the regional planning process, the objectives had to be sound logically and related in a demonstrable and, when possible, measurable way to alternative physical development proposals. The objectives were, therefore, refined by the formulation of a corresponding set of guiding planning principles and a supporting set of specific development standards for each objective. This refinement allowed the objectives to be related to physical development plan proposals and thus used in the processes of plan design, test, and evaluation.