Federal Highway Administrator Norbert Tiemann (center) and Henrik Stafseth, executive director of the American Association of State Highway and Transportation Officials (left), are presented with new highway law volumes by W. N. Carey, Jr., executive director of the Transportation Research Board.

The new publication is intended to fill the void in American legal writing on the subject of highways and the laws relating to them. The 2 volumes already published, and a third now in preparation, describe cases dealing with highways and provide for the first time a clearinghouse for analysis and discussion of the rules of law pertaining to highways.

The first 2 volumes deal mainly with problems in the field of eminent domain, and the third covers contract law, environmental law, intergovernmental relations, and tort liability of state highway departments and their employees.

Each volume is in loose-leaf form to allow updating and revision in the future.

PLANNING AND ADMINISTRATION

Route Selection Is Critical Factor in Design of Rapid Transit Systems

James H. Seamon*

A rapid transit system cannot be designed in isolation of the metropolitan area that it is intended to serve. Many complex and often conflicting factors must be considered and satisfied as nearly as possible in the design. Two of the more critical factors are the need to serve, as well as possible, the entire metropolitan area and the need to compete with the automobile, that is, to attract riders who have the option of travel by automobile. These 2 factors are significant in, and sometimes control, the selection of routes and the location of stations.

It is helpful to analyze the metropolitan area in terms of the central business district (CBD) distribution requirements, urban and suburban service, and major facilities. The ideal rapid transit system will deliver a person within walking distance of any CBD destination with no more than one transfer between trains. This implies a station spacing of no more than 0.8 km (0.5 mile); and for most CBDs it implies a need for more than 1 or 2 routes.

In suburban areas, and in the urban area outside the CBD, construction costs dictate a lower density of routes and fewer stations. More widely spaced stations also improve average operating speed and shorten trip time, but they require access by other means as well as by walking. Thus, bus bays for connecting bus service, automobile parking lots, taxi stands, kiss-and-ride areas, and bicycle facilities are required at these stations.

Major facilities, such as airports, railroad and intercity bus terminals, sports stadiums, shopping centers, factories, and large suburban office buildings will generally require their own stations or at least some form of connecting service, usually shuttle bus service, to the nearest station. Shuttle bus service is less suited to sports stadiums and office buildings because of their heavy peak volumes.

In light of the above, it is informative to examine the route layouts and station spacings of 2 new rapid transit systems: the Bay Area Rapid Transit (BART) system and the Washington, D.C., Metro.

BART (Figure 1) consists of 3 Eastbay routes (Richmond, Concord, and Fremont) that merge in Oakland, run under the bay, through San Francisco, and on to Daly City. BART's principal reason for existence is to provide service from the 3 Eastbay routes to San Francisco, although through service is also run from Richmond to Fremont. BART's configuration was greatly influenced by the requirement to cross under the bay and by the fact that the counties adjacent to San Francisco on the north and south chose not to join in the BART District. Nevertheless, BART's configuration presents some problems, the most serious of which are the following.

1. Although BART runs under Market Street, the principal San Francisco street in the CBD, BART cannot provide service to points beyond walking distance from Market Street without a transfer to city buses, streetcars, trackless trolleys, or cable cars.
2. Frequency of through service to San Francisco on any of the Eastbay routes is limited to one-third the frequency of service on the San Francisco line, since trains from all 3 Eastbay routes must share the same line through San Francisco.
3. A traffic interruption on the San Francisco line will disrupt service on all 3 Eastbay routes.

BART stations are closely spaced along Market Street, providing convenient walking access to points on that street and nearby streets; the same is true in the smaller Oakland CBD. They are more widely spaced on the other parts of the system, thus providing high average speeds through the urban and suburban areas, but requiring connecting bus service and parking facilities.

BART was not intended to be a local transit system. That service is provided in San Francisco by Muni (San Francisco Municipal Railway) streetcars, buses, cable cars, and trackless trolleys and in the Eastbay region by AC Transit buses. Muni and AC Transit provide connect-

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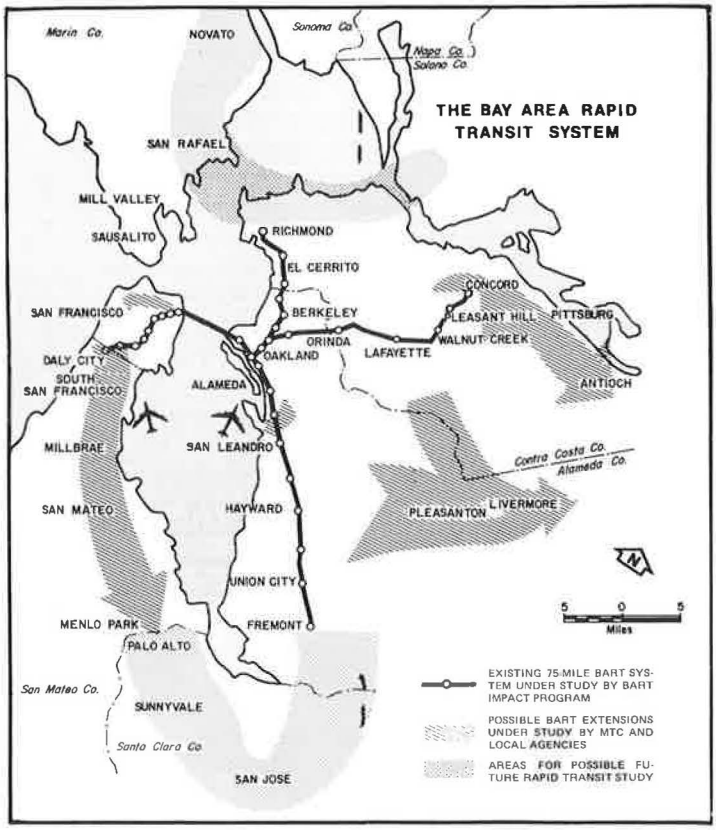

Figure 1. Bay Area Rapid Transit System.

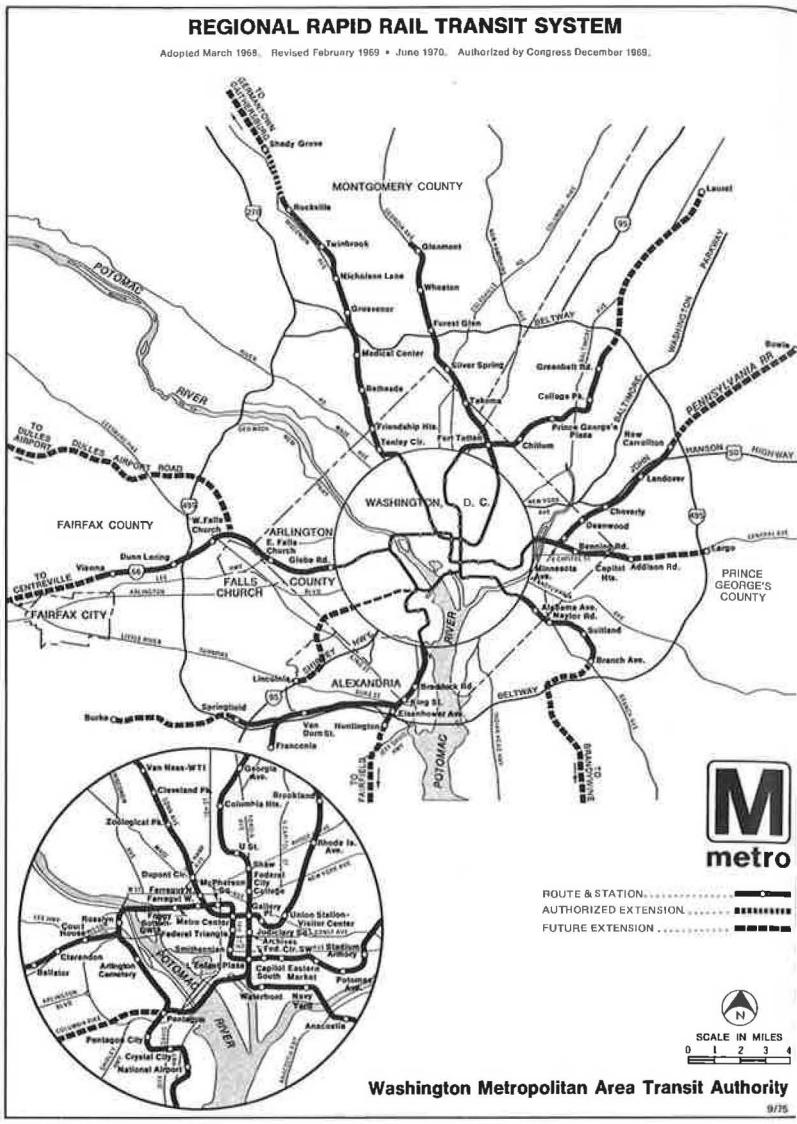

Figure 2. Washington, D.C., regional rail rapid transit system.

ing local service to most BART stations. Parking facilities are provided at most non-CBD stations. BART provides direct service to the Oakland Coliseum, but it does not serve any other sports facilities, nor does it serve directly any airports, railroad terminals, or intercity bus terminals. BART's route pattern and station spacing provide a service pattern that is similar to that of commuter railroads, although BART's CBD distribution is superior to that of most commuter railroads. BART's route pattern is not too unlike that of some of the earlier interurban trolley systems. All BART routes are in service, although they are not yet operating at their full design capacity.

The Washington Metro (Figure 2) consists of essentially 3 separate through routes that intersect each other in the CBD-federal area (CBD-FA). Each of the 3 routes originates in the suburbs, passes through the CBD-FA, and terminates in the suburbs. Several of the lines divide outside the CBD-FA, providing a total of 9 widely spaced terminations in the suburbs. The Metro route configuration provides several advantages:

1. The 3 intersecting routes make it possible to go directly by subway to almost any point in the CBD-FA with at most 1 transfer from train to train;
2. Frequency of service on the suburban portions of the system is not restricted by any need to merge traffic in the CBD-FA since each of the 3 routes passes through the CBD-FA on its own line; and
3. A traffic interruption on 1 line in the CBD-FA will not disrupt service on other lines.

Metro stations in the CBD-FA are closely spaced, and this spacing, combined with the 3 intersecting routes, provides convenient walking access to most points in the CBD-FA. They are more widely spaced in the urban area outside the CBD-FA, and still more widely spaced in the suburbs.

The Metro system was designed with the intention that the existing bus service would be closely integrated with the rapid transit system. Subsequently, the transit authority has taken over the several bus companies and consolidated their operations in the Metrobus Division. Connecting local bus service will be provided at some of the urban stations and at most of the suburban stations. Bus bays, parking lots, kiss-and-ride areas, and bicycle facilities have been planned as an integral part of the overall station plan wherever possible.

Metro routes will directly serve National Airport, Union Station, the Pentagon, RFK Stadium, the National Zoo, the Smithsonian Institution, George Washington University and its hospital, and Catholic University. In the suburbs, Metro will provide a service somewhat like that of a commuter railroad; in the CBD-FA, the service will be much like that of a traditional rapid transit system. At this time, Metro is operating less than 8 km (5 miles) of the planned 160-km (100-mile) rail system.

BART, then, is a commuter system that complements the local transit systems; Metro, less constrained by geographical and political impediments, will become the backbone of an integrated regional transit system.

OPERATION AND MAINTENANCE

Most Automobile Commuters Immune to Higher Costs, Survey Shows

Two-thirds of New York area residents who ride to work in their cars are not likely to change their habits if higher costs—including increases in bridge tolls—are imposed on them, says the Tri-State Regional Planning Commission of Connecticut, New Jersey, and New York.

For Manhattan-bound automobile commuters in particular, the imposition of tolls on East River bridges is even less likely to cause a change, according to a survey of automobile users conducted recently for the commission.

The sample survey of automobile commuters showed that their behavior in the event of higher costs or other impositions would produce some desire to change modes, but most of these would prefer to car pool rather than take public transportation.

Raymond T. Schuler, head of the New York State Department of Transportation and chairman of the commission, said, "The attitudes reflected in this survey should be carefully considered before any precipitous changes in policy are undertaken." Schuler pointed out that the poll revealed public preferences on both private and public transportation issues. Among other things, survey respondents reported the following.

1. Crime is a major deterrent to off-peak bus and subway use. Respondents reported that an increased presence of police on trains and in stations would make them feel safer, but rated other crime-reduction techniques as less important.
2. When faced with the dilemma of higher fares or cutbacks in transit service, both city and suburban residents preferred higher fares. The preference was greater in the suburbs than in the city and greater among workers than nonworkers.
3. A metropolitanwide solution to transit finance was preferred to increased fares as a way of raising additional money. Suburban residents were about equally divided on whether additional money should come from transit users or everyone in the region; city residents strongly favored the regional approach. No clear consensus was evident on what fund-raising techniques should be used.
4. People feel they are already saving fuel by walking instead of driving for short trips and driving within the 88.5-km/h (55-mph) speed limit. The only energy-conservation and pollution-reduction measure many respondents plan to adopt in the future is the purchase of fuel-saving automobiles.

The commission posed this statement to automobile commuters:

> Following are some actions that might be taken to encourage people to car pool or use public transit to work. Tell me for each one if it would probably, might, or would not change your trip to work.
>
> Higher prices for single-occupancy automobiles
> A 30-cent increase in gasoline prices
> Rationing gasoline to 10 gallons per week per car
> Parking restrictions or high parking fees.

Respondents reported that gasoline rationing would induce a bigger shift than the other measures, but that no action would cause a probable change to another mode of travel among more than one-third of the motorists.

The entire transportation survey covered principal wage earners in 2,000 of the region's households. The results are available in a report, ***Transportation: The Public Viewpoint,*** which is available upon request to the Commission, One World Trade Center, New York 10048.

Search for Gas Conservation

The Transportation Systems Center of the U.S. Department of Transportation is setting up a laboratory to study methods to promote conservation of gasoline by increasing fuel economy of automobiles. This work, according to James Constantino, TSC director, is an essential element of the department's commitment to reduce gasoline consumption.

TSC has awarded a $788,000 contract to Bick-Com Corporation of East Boston, Massachusetts, for alterations to an existing building on its site in Cambridge.

Two dynamometers, which are apparatus for measuring energy output of entire vehicles or engines, will be housed in the new laboratory. One, a chassis dynamometer, is basically a roller assembly that imposes a controlled breaking factor on the drive wheels of a vehicle to simulate road load conditions. In this manner, vehicle performance can be evaluated under known reproducible situations. An engine dynamometer is an accurately controlled brake that is used to simulate the performance of engines, separately or in combination with the transmissions.

The new laboratory is expected to be completed early next year and the dynamometers, already on order, installed shortly thereafter.