A1E07: Committee on Commuter Rail Transportation
Chairman: Walter E. Zullig, Jr.

North American Commuter Rail

WALTER E. ZULLIG, JR., *Metro-North Railroad*
S. DAVID PHRANER, *Edwards & Kelcey, Inc.*

This paper should be viewed as the opening of a new research agenda for the Committee on Commuter Rail Transportation and its sibling rail transit committees in TRB's Public Transportation Section in the new millennium. The evolution of the popular rail transit mode might be expressed succinctly, but subtly, in the change of terminology from railroad "commuter" to "rail commuter."

HISTORICAL CONTEXT

Commuter railroad operation once was a thriving business in the United States and Canada. Founded and operated by private railroads, the business became uneconomical when faced with rigid regulation, the need to be self-supporting, and the requirement to compete with publicly-funded transportation systems including roads. The all-time low was reached in the mid-1960s, when high-volume operations remained in only six metropolitan areas in the United States (Boston, New York City, Philadelphia, Baltimore-Washington, Chicago, and San Francisco) and one in Canada (Montreal).

The start of the rebound of commuter rail can be traced to the establishment of Toronto's GO Transit in 1967. Since then, new services have been established in Northern Virginia, South Florida, Los Angeles, Dallas, San Diego, Vancouver, New Haven, and San Jose. New services are poised to begin in Seattle and elsewhere. Moreover, new routes or greatly expanded service, or both, are being provided in the traditional commuter rail cities of Boston, New York, Chicago, Philadelphia, San Francisco, and Montreal. Accordingly, commuter rail will enter the new millennium at a time of record ridership and service levels.

COMMUTER RAIL NEW STARTS

Commuter rail rebounded in the metropolitan areas mentioned because of advantages that conventional railroad infrastructure and operations provide to meet commuter needs. Among the advantages are the following:

1. Rights-of-way and infrastructure are already in place. This is an important feature in a rail new start because it eliminates or reduces land takings, relocation effects, and the costs associated with creating an all-new right-of-way through dense metropolitan areas or recovering an abandoned right-of-way. Lapses in service, noise, inconvenience, and other dislocations associated with constructing a new rail line are minimized because the land already is assembled and the infrastructure in place. One might argue that because of the relatively little dislocation and the reuse of existing facilities, the environmental effects are more benign and easier for the public to accept.

2. Adapting railroad infrastructure to high-capacity commuter travel needs is easier and less expensive.
3. The host freight railroad track owner or freight operator may already be an experienced commuter rail operator. The railroad may be a landlord or a tenant on the proposed commuter route. The advantages of such partnering to a freight railroad include opportunities for overhead sharing, improvements of infrastructure, and enhancement of the company's image.
4. Well-developed standards exist for railroad infrastructure and vehicles. Commuter railroad equipment and rolling stock are built to a standard acceptable for interchange service and are compliant with railroad regulations (see the section on "Equipment" below).
5. Commuter or intercity passenger services may have existed at one time on the new-start route. The railroad passenger precedent exists, and the transition to passenger service is easier for the public to accept.
6. Capital costs can be modest in comparison with other rail modes because, as noted above, right-of-way is assembled, way and structure costs can be shared with freight and intercity passenger services, and equipment is standard. Used freight locomotives and cars often can be obtained on the second-hand market for an expedited start-up.
7. The use of existing real estate and infrastructure resources means that a commuter rail new start can be accomplished within the term of office of local elected officials. Absent long governmental processes, the public benefits by achieving rail transit on an expedited schedule.
8. In use of a railroad right-of-way for commuter rail, opportunities for conversion or upgrading to higher-capacity forms of rail transit are not foreclosed. Commuter rail can therefore provide a more easily justified and financed interim service while preserving the integrity of the right-of-way.
9. Numerous examples of commuter rail applications overseas provide North America with working precedents from which to draw research experience.
10. Compared with other modes, such as bus or subway, commuter rail service typically has low operating costs per passenger mile.

LIMITATIONS OF COMMUTER RAIL NEW STARTS

The speedy implementation, low capital cost, and relatively benign environmental effects of commuter rail new starts are somewhat offset by their limitations.

1. Sharing a rail corridor with a freight operator can impose operating limitations on schedule making and schedule adherence by both freight and passenger operators. This is especially true where the capacity of the plant must be enhanced to meet the needs of both services. Postponing the addition of needed capacity can lead to serious service disruptions and increased cost if the work is performed while commuter service is being operated. If the commuter rail operator is not the rail property owner, the freight operator traditionally provides dispatching and determines train movement priorities.
2. The use of an existing railroad may impose labor costs and work rules that limit the ability to control costs and management options to achieve a cost-effective operation. Thus what is saved in initial capital cost may be eroded by the costs of traditional railroad operating practices.
3. Railroad regulation in the United States does not permit the simultaneous operation of light rail derivative diesel multiple unit (DMU) equipment and conventional railroad

equipment on shared track. Unless time separation can be arranged, rail new starts using active railroad infrastructure as a foundation must use vehicles that comply with Federal Railroad Administration (FRA) rules and thus that are larger and more costly than lightweight types. This also limits the ability to integrate commuter and light rail services. However, railroad and rail transit modal integration has been achieved overseas on the basis of appropriate safety risk assessment and prudent safety mitigation.

EQUIPMENT

Traditionally, commuter rail service operated with older cars and locomotives previously used on long-distance trains. This adaptation of railroad (freight and intercity passenger) rolling stock to commuter purposes is a quick and cost-effective means by which to start up and sustain commuter rail. Eventually, however, converted or non-purpose-built equipment places a limitation on operating performance and the level of commuter rail service amenity. Some of the higher-volume operations were electrified and converted to high platform with large fleets of purpose-built multiple-unit cars. These operations began to exhibit the characteristics of rail rapid transit systems in their capacity to handle crowds and in their operating performance.

Most commuter rail operators now use rolling stock designed especially for that service, and many systems use cars with seats on more than one level (bilevel or gallery cars). Nearly all the diesel-powered services use push-pull operation. A locomotive is at one end of the train and a cab control car at the other, linked with train-lined control, thus enabling the train to reverse directions. Time and labor savings are achieved by eliminating the need for turning the locomotive or running it around the train at terminal points. The use of modern electric and diesel-propelled push-pull trains has reduced the advantages of multiple-unit cars, since push-pull can mimic most of their operating convenience and economies.

Adapting freight locomotives to commuter rail applications, developing the push-pull and bilevel passenger train technologies, automating ticketing, and refining locomotive and car designs have brought commuter rail rolling stock technology up to date. To prepare for the demands of the new millennium, further productivity and fundamental changes in design, regulation, and operations are being considered. These changes will push the limits and scope of traditional *railroad* commuter operations and rolling stock beyond their traditional institutional role to become *rail* commuter. In this way, rolling stock evolution helps shape the new rail commuter mode research agenda through the following:

1. Reexamination of regulations directed solely at equipment safety standards. Such research is intended to balance public travel needs with prudent safety measures. Currently, safety and equipment standards are largely regulated separately from those of passenger service convenience and necessity.
2. Continued refinement of DMU technology to produce a new generation of DMU that is FRA compliant. Designs and adaptations of EMU and locomotive-hauled rolling stock are currently on paper.
3. Considerations in making commuter rail equipment more rail transit in character and less railroad derivative. This continues a trend already under way.
4. Separating railroad equipment regulations and regulators from rail transit equipment and its operations and properties that are to be governed by state-managed Statewide Safety System Program Plans.

5. Selective separation of rail commuter rolling stock operations from rail freight where right-of-way and track space and capacity limitations justify this measure. A distinction is made here between separation of passenger and freight institutions and passenger and freight operations, the former dictating separation for business expediency or safety regulatory traditions rather than for reasons of operational efficiency or passenger convenience.
6. Gradual integration of commuter rail with rail transit modes so that railroad corridor services and rolling stock can transition between operating environments without requiring passengers to change.
7. Research into ways to upgrade commuter rail mode equipment and infrastructure to higher forms of rail transit on a selective basis. These measures include further automation of fare collection, electrification, positive train control, high platforms (or level boarding at lower dimensions), design-build-operate partnerships, conversion of unused railroad freight corridors to rail transit purposes, and better integration between rail and nonrail modes of transit.
8. Reconsideration of areas of application of locomotive-hauled versus multiple-unit rolling stock.
9. Research into ways to enable cascading of rolling stock from operator to operator and from application to application as rail transit systems evolve. Lightweight DMUs appear to be particularly adaptable to cascading. For example, a former freight branch line may be adapted for rail transit purposes using low-floor, inexpensive, light DMU shuttles. As patronage outgrows the single-car light DMUs and through service is initiated, the DMUs are replaced by larger, higher-capacity rolling stock. The light DMUs are then redeployed to a new, speculative former freight branch line on the same or another rail commuter property.

INTERMODAL ROLES IN COMMUTER RAIL

Traditional suburbs were built around railroad stations, and the commuters walked to the train. With suburban growth into new areas, an increasing number of riders drive automobiles to the stations, creating a need for enhanced parking facilities. Other alternatives will have increasingly important roles to play in the home-to-station journey. Examples include the use of feeder buses, bicycles, light rail, and ferryboats. Environmental concerns and the high cost of constructing parking structures will compel use of these other modes. Commuter rail operators will encourage development of nonautomobile access to stations by selling through discount tickets and carefully coordinating schedules with operators of the other modes. Examples of these services include Metro-North's Hudson Rail Link, New Jersey Transit's acceptance reciprocity for selected commuter rail tickets on its bus routes during off-peak hours and weekends, and the generic guaranteed ride-home program adopted by several transit and commuter rail operators.

GO Transit's use of buses to cover off-peak schedules uses the most cost-effective mode for a given ridership volume. This "train bus" concept has contributed substantially to the viability of peak-hour train service by giving riders the option of many off-peak departures.

Another innovative practice related to intermodalism is in its early stages and requires more research. It involves linking local zoning to commuter rail transit facilities and investment. Creating walkable transit villages around suburban rail stations and requiring developers to provide station shuttles as a condition of their high-density residential

permits are examples of this type of innovation. Again, research will disclose that overseas precedents abound.

Commuter and intercity rail are natural partners. As intercity service is improved in many corridors, operators of both services will avail themselves of the frequent opportunities for through ticketing and scheduled connections so that both services can feed or complement each other. At Chicago's Union Station, for example, an entire network of commuter trains can efficiently act as feeder service for Amtrak trains en route to such destinations as Milwaukee, St. Louis, and Detroit. Commuter rail service operates nearly the entire length of the Boston-Richmond Northeast Corridor, and the two services interface at numerous locations, such as Philadelphia, Baltimore, Washington, New York City, and New Haven, thereby enabling an easy interchange of passengers.

FOCUSING ON THE COMMUTING CUSTOMER AND NEW MARKETS

As commuter rail has evolved, it no longer exclusively serves a suburb-to-downtown peak-travel market. Today and into the millennium the following markets are being explored:

- Traditional suburb-to-downtown;
- Reverse commute downtown-to-suburb;
- Longer distances as suburban housing spreads 60 to 80 miles away from the city centers;
- Intermediate growing suburban and urban markets such as Stamford, White Plains, Fort Lauderdale, San Jose, and Fordham;
- Weekend market-to-city and city-to-suburb;
- Off-peak services due to such factors as increased leisure time, part-time workers, and earlier retirements; and
- Special events and sporting venues.

Future commuter rail operators will learn the differing characteristics of each market and submarket and develop services to accommodate them. Research into and quantification of these markets must support business planning to infiltrate them. Among the services will be new express service from distant points, new reverse-peak trains, seasonal and special event trains, and off-peak leisure market excursions.

Public information services will become more user friendly. Today, callers get a courteous response with accurate information. The millennium will bring increasing use of information services for persons with disabilities and computer web pages containing detailed information concerning schedules, fares, station facilities, location, and accessibility. Included will be schedule and fare information for connections with other modes including ferryboats and intercity rail. Finally, a single combination ticket will cover entire intermodal trips.

A LOOK TO THE FUTURE AND RESEARCH AGENDA THEMES

Traffic congestion, air pollution, and other quality-of-life factors can be expected to create demand for expansion of existing commuter rail services and development of new ones. In many areas further highway construction simply is unacceptable and unaffordable.

The use of freight railroad trackage will become an increasingly popular method of providing commuter rail service. The challenge will be to develop mutually beneficial

partnerships with freight railroads. In most cases, publicly-funded capacity and infrastructure improvements will benefit both freight and passenger operations.

Public support of commuter rail services is essential and will continue. The trend away from all functions being performed by a single entity probably will continue. Especially with the new starts, there will be more contracting out of functions to the private sector. For example, Florida's Tri-Rail has separate contractors for (*a*) train operation and equipment maintenance, (*b*) station operation, (*c*) station maintenance, (*d*) ticket sales, (*e*) ticket checking and security, and (*f*) dispatching. Equipment maintenance also can be separated from operation, as at GO Transit and Los Angeles's Metrolink and as is proposed for the Massachusetts Bay Transportation Authority in Boston. New operations should be able to choose the most economical and efficient combination to suit local needs and to ensure continuity in maintenance standards.

Although compliance with the Americans with Disabilities Act will continue to be a challenge, the accessibility improvements resulting from this law will lead to new opportunities for senior citizens and disabled persons to use commuter rail services and, therefore, to increased ridership.

Within the next few years, commuter rail service will be viewed as but one component of an intermodal public transportation system having joint tickets and coordinated schedules. More employers will provide rail commutation tickets rather than parking spaces. Convenient connections will enable customers to originate on a commuter rail line, transfer to an Amtrak intercity train, and finish the trip on a bus or light rail service meeting the train at the destination station. Information for such intermodal travel will be routinely available by telephone or computer web pages.

Hence, the following are research agenda items in addition to those mentioned previously:

- Methods for commuter rail and freight railroads to develop mutually beneficial partnerships for joint use of trackage and facilities;
- Provision of ticketing, coordinated schedules, and state-of-the art information services for intermodal travel;
- How to realize the inherent advantages of the rail mode by operation of through equipment over various types of trackage (e.g., light rail and commuter rail) to eliminate the need of passengers to change vehicles;
- Exploitation of the potential applications of self-propelled railcars that comply with FRA regulations;
- Linkage of local zoning to commuter rail facilities and investment to reduce urban sprawl and enhance the quality of life; and
- The significance of e-commerce: Is there a long-term growth potential for work-related travel as working at home becomes more common? What will be the demographics of those who do commute?