

Issues Associated with Light Rail Transit Use of Freight Railroad Right-of-Way

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During the 1980s and early 1990s, through railroad mergers and consolidations, many less profitable and redundant freight rail services were eliminated, making abandoned rail right-of-way available for other uses. During this period, light rail transit (LRT) experienced a resurgence in the United States, and LRT operators became interested in abandoned and active freight railroad properties as locations for investment. The joint use of right-of-way by LRT and freight railroads is an approach being considered for several new light rail projects. These include the New Jersey Waterfront project, Tampa LRT proposal, expansion of the New Orleans waterfront trolley, and extensions in Denver, Dallas, Sacramento, St. Louis, and elsewhere in the United States. Issues pertaining to LRT utilization of freight railroad right-of-way are discussed, and successful LRT/freight joint-use experience in Baltimore, Maryland, and San Diego, California, are described. Regulatory requirements and lessons learned from the transit agencies are reviewed. Observations and recommendations for further research and study are made.

Many significant changes took place throughout the railroad industry in the early 1970s, beginning with the collapse of the Penn Central and the formation of Consolidated Rail Corpora-

tion (Conrail) in 1976. Railroad mergers and consolidations became commonplace. During the 1980s and early 1990s, many less profitable and redundant freight rail services were eliminated, making abandoned rail right-of-way (ROW) available for other uses. During this period, light rail transit (LRT) experienced a resurgence in the United States, and rail transit operators became interested in abandoned and active freight railroad properties as locations for rail transit investment.

Joint use should not be viewed as a revolutionary concept. Indeed, joint use has a long tradition in the United States with many innovative and efficient approaches utilized over the last century. One good example is the shared use relationship enjoyed between railroads and the electric interurban services in many locations across the country.

From the transit operator's perspective, use of freight railroad ROW offers a number of actual and perceived benefits, including the following:

- Minimized environmental impacts: Noise, vibration, visual, and neighborhood disruption impacts of LRT are less within an established rail corridor than in new LRT right-of-way.
- Minimized utility impacts: Utilities are already configured in a linear fashion.

- Fewer curves and flatter grades: Railroad ROW is generally relatively straight and flat, allowing higher LRT operating speeds than street ROW.

- Minimized and consolidated road crossings: At-grade railroad crossings are generally minimized, and major roadway crossings are concentrated at a limited number of grade-separated crossings.

There are four general approaches to LRT use of freight ROW:

1. Parallel an existing active freight railroad. This would place the LRT tracks adjacent to the freight trackways either in the same right-of-way or in a new one. Within the same right-of-way, clearance dimensions between centerlines are usually specified by the railroad. Clearances range from around 15 to 20 ft typically barrier-separated up to about 40 ft. Transit alignments in new right-of-way adjacent to a rail line are much less common. One of the key reasons is that the land use types normally found adjacent to rail corridors do not lend themselves well to acquisition of a 30- to 50 ft-wide strip for the LRT trackway.

2. Relocate an existing active freight railroad through consolidation with another railroad providing

comparable service. This provides benefits both to the railroad in the form of faster operating speeds through the periphery of urban areas and to the general public with less impact to at-grade street crossings owing to slow-moving freight trains.

3. Joint LRT/freight use on the same tracks, typically accommodated by limiting LRT and freight operation to mutually exclusive times of day. This approach requires close coordination and cooperation between the two operating entities. Quite often, the freight operations are performed by a short line railroad under contract or owned by the transit agency. This provides the necessary control by the transit agency to ensure reliable passenger operations.

4. Petition the Interstate Commerce Commission (ICC) for abandonment of the railroad ROW. In this approach, the rail right-of-way has suffered years of nonuse and neglect, often with leases of the property or encroachments. This approach can sometimes require significant time but provides a clean operating environment.

Table 1 summarizes issues associated with each of these four utilization strategies. Of the four approaches

TABLE 1 Summary of Approaches to LRT Use of Freight Rail Right-of-Way

Approach	Issues
1. Parallel Operation	<ul style="list-style-type: none"> • To help protect itself from liability, freight operator may require horizontal separation of up to 40 feet and possible installation of a crash barrier. • Freight railroad may require LRT agency to assume total liability and/or to carry very high insurance coverage. • Freight railroad may require that proposed LRT at-grade crossings (especially pedestrian crossings near station platforms) be reconfigured to grade separated crossings. • Adjacent land owners accustomed to rail traffic. • At-grade rail crossings grouped together. • At-grade rail service to customers located on the side of the LRT corridor is problematic. • Railroad-oriented development potential of land adjacent to the LRT system may be compromised.
2. Relocate Freight	<ul style="list-style-type: none"> • Existing utilities, because many have been located along the railroad ROW as linear features, might easily be avoided. • Following construction of LRT, redevelopment along the corridor can proceed unimpeded by freight influences/impacts. • Negotiations with the railroad can be slow. • The costs associated with relocation of the freight railroad may not be justifiable.
3. LRT/Freight Joint-Use	<ul style="list-style-type: none"> • May be the only approach if ROW is limited and abandonment not possible. • Efficient use of track facilities. • Car design pertaining to buff impact loads must conform to Federal Railroad Administration (FRA) requirements if traffic intermingles without separation on different tracks or by time of day. • Extent of FRA regulation of transit operator is dependent upon segregation of LRT and freight operations and whether trackage is connected to the "general system of railroads" regulated by the FRA. • Track design and conflicts with system components such as catenary and passenger facilities such as station platforms, including horizontal and vertical clearance requirements, on sections utilized by freight must conform to FRA freight regulations. • FRA regulation may extend to elements of the transit system which affect freight operations, including signals, track and dispatch.
4. Freight Abandonment	<ul style="list-style-type: none"> • Affected railroad will be responsive once formal proceedings are submitted to the Interstate Commerce Commission. • If successful, the LRT can be constructed as under Approach 2, <i>Relocate Freight</i>. • Approval process can be slow. • On-line rail customers, existing and potential, may petition to maintain rail service.

SOURCE: William D. Burgel, unpublished paper presented at Institute of Transportation Engineers 1994 District 6 Meeting; Baltimore Mass Transit Administration; San Diego Metropolitan Development Board; BRW, Inc., 1994.

described in Table 1, LRT/freight joint use allows continued operation of LRT and freight with the least amount of new investment in trackage, crossing control, and other infrastructure.

REGULATORY ISSUES

Two primary sources of regulation affect shared LRT/freight rail operations: the Federal Railroad Administration (FRA) and state public utility commissions. FRA regulations are contained in the *Code of Federal Regulations* (49 CFR 200.1–266.25). In some states, public utility commission regulations are promulgated as general orders. California is an example of a state that has developed general orders. By comparison, the Texas Railroad Commission enforces FRA regulations but does not promulgate its own.

Federal Railroad Administration regulatory issues pertaining to joint LRT/freight operation include the following:

- **LRT/freight traffic intermingling:** Under segregated LRT and freight operation (e.g., through time of day restrictions), FRA regulates only the portions of the transit-owned rail system affecting freight operations, which include signals and switching track. When freight and LRT traffic are intermingled, the system is typically subject to full regulation as a freight rail operator. A number of operating schemes, such as temporal mitigation, which assigns trackage use to specific portions of each day, can be used to address these regulations. Under such regulation, all transit employees would be considered railroad employees and therefore eligible for participation in the Railroad Retirement System, and the transit operator would be subject to the Federal Employer's Liability Act (FELA), which among other provisions removes the ceiling on employee injury and disability claims.

- **Minimum buff impact loads:** When freight and LRT traffic is intermingled, FRA requires that all rail vehicles, freight and LRT, meet minimum end (buff) impact standards. These standards relate to the end-to-end impact, which can be sustained without damage.

- **Side clearance:** FRA side clearance requirements for freight vehicles preclude the use of high level LRT platforms, which extend too far over the trackage.

- **Vertical clearance:** FRA vertical clearance requirements for freight cars and locomotives require significantly higher placement of overhead catenary than is typically required for LRT vehicles.

- **Connectivity to the "general system":** The single most important determinant of FRA regulation is whether the rail system connects to the general system of railroads. The basis for determination of connection

is not clearly defined and can be somewhat subjective and subject to subtle distinctions.

LRT/FREIGHT JOINT USE EXPERIENCE

Successful LRT/freight joint use arrangements in Baltimore, Maryland, and San Diego, California, are in existence and were studied for this paper. Key issues and recommendations gathered through interviews with transit and freight operations staff are presented below.

Baltimore: Mass Transit Administration of Maryland

The Mass Transit Administration of Maryland in Baltimore (MTA) has successfully shared LRT rail trackage on its Central Line with two freight railroads, Conrail and the Canton Company (a contract short line freight operator utilizing the former Baltimore & Annapolis Railroad ROW), for approximately 4 years. In 1988 the MTA initiated procedures to acquire right-of-way for the approximately 22.5 mile Central Line, a north-south LRT line bisecting the City of Baltimore and connecting the central city with outlying areas to the north and south. The line is depicted in Figure 1.

After approximately 3 years of planning and negotiation, MTA was successful in acquiring ownership rights to the right-of-way and establishing operating agreements with Conrail and Canton allowing LRT operation between 5:00 a.m. and 12:00 a.m. and freight operation between 12:00 a.m. and 5:00 a.m. ROW acquisition and the operating agreement were negotiated simultaneously.

The MTA is not currently regulated by the FRA, although the MTA and FRA are engaged in a debate over the question of connection to the general system of railroads and significance for future FRA regulatory involvement. The MTA currently utilizes FRA signal and track regulations as guidelines. MTA employees are not eligible for the Railroad Retirement System, and the MTA is not subject to FELA.

ROW Acquisition Issues

Key issues encountered in the acquisition of the freight rail ROW include the following:

- **Establishment of clear title/identification of ownership rights:** The trackage utilized by Conrail was established in 1823, and identification of the exact nature and extent of Conrail ownership rights required signif-

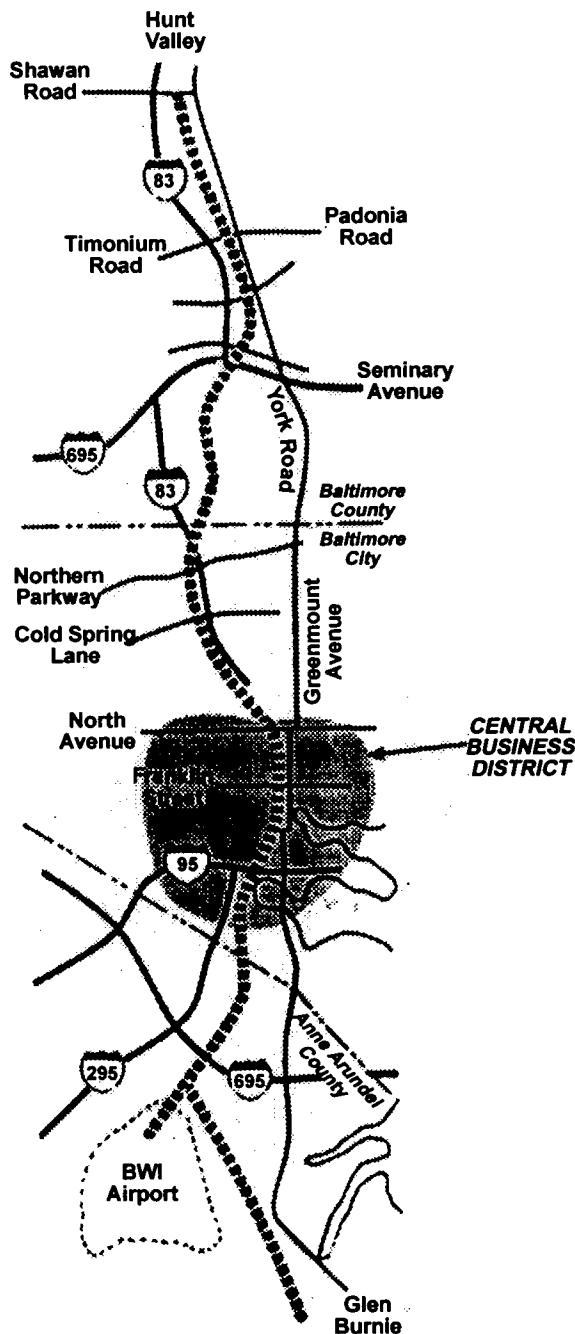


FIGURE 1 Baltimore's Central Rail Line, running along existing railroad corridors north and south of downtown.

icant research and was one of the first steps in negotiations.

- **Dispatch rights:** Dispatch rights describe the authority to schedule rail operations and were one of the most important issues for MTA. The MTA required dispatch rights in order to allow flexibility in scheduling special event LRT service, including baseball games at the new Camden Yards ballpark.

- **Maintenance of freight service:** Ensuring continued service to key freight customers was an important objective in negotiations. Success in maintaining service was due in part to the fact that the shipping needs of one of Conrail's major customers were not time-of-day sensitive and could be accommodated within the limited freight operating hours established in the agreement.

- **Liability:** Conrail's concern about liability for damages to LRT patrons and vehicles, along with design issues relating to LRT/freight compatibility, including FRA buff end loading standards, was an important reason why simultaneous LRT/freight operations were rejected as an option. Negotiation of liability was complicated by MTA's status as a state agency and its inability to indemnify.

Operational Issues

Critical operational issues encountered by the MTA include the following:

- **Employee operating rules:** Freight employees operating on transit system-owned trackage must be trained in both transit and freight operating rules. Effective integration and communication of these rules is critical. The MTA approach has been to provide freight employees with transit system operating rules supplemented with a list of exceptions applicable to freight operation.

- **Freight operator compensation:** Freight operator compensation to the transit operator for use of trackage can be negotiated into the initial ROW purchase price (as done with Conrail) or made on a percentage of gross revenue basis (as done in San Diego) or on a carload basis (as done with the Canton Company). When paying by the carload, it is to the advantage of the freight operator to maximize carloads. This incentive can affect freight car vehicle selection and the resulting rate of track wear and maintenance needs.

- **Significance of "general system" connectivity:** Connectivity to the "general system" of railroads is a key determinant in FRA regulation. When connection exists, the FRA may regulate a transit/freight operation. The determination of connectivity can be somewhat subjective, may hinge on subtle distinctions, and can change in response to relatively minor changes in freight connections. Obtaining a definitive and lasting determination by the FRA can be difficult.

- **Station platform design:** FRA side clearance requirements preclude the use of high-level LRT station platforms. The MTA approach to senior and disabled boardings uses Sacramento-type LRT vehicles and a high block bridge system featuring a small portion of ramped platform interfacing with an on-board ramp,

which is extended by the transit operator from the LRT vehicle.

Lessons Learned

Baltimore MTA staff offer the following conclusions and recommendations on the basis of their successful LRT/freight joint use experience:

- Get all that you pay for. Ownership consists of a bundle of rights, including ownership of the physical property and various operating privileges. An important point is that the price paid for ROW fairly reflects the degree of ownership and current and future control given by the transit operator. As operating rights and other privileges are granted to the freight operator, the value of the ROW to the transit operator is reduced.
- Transit operator control of dispatch can be critical. Special events, such as sporting events and conventions, and the flexibility to provide special transit service to these events require transit operator control of dispatch. In order to address FRA regulations such as the intermingling of traffic versus buff-strength requirements, separation of the two operations by time of day is practiced.
- Avoid track and ROW sharing if possible. Owing to the complications imposed by joint LRT/freight use, including employee work rules and ongoing susceptibility to full FRA regulation, separate LRT and freight facilities may be preferable. Obviously, reserved ROW for transit lines is preferred but not always possible considering costs and other considerations such as local impacts.
- Consider long-term transit vehicle needs. Consideration should be given to designing to freight vehicle standards even on portions of the LRT system that are never expected to be used by freight vehicles. This allows maximum flexibility in future transit vehicle use, which may involve vehicles with requirements similar to freight vehicles.
- Operating agreements should reflect long-range plans. When using time-of-day segregation of LRT and freight operations, long-range transit operating needs and the implications for freight operating and maintenance time windows should be considered in negotiating the initial operating agreement. If freight operator compensation is to be based on freight carloads, operating agreements should also limit the size and weight of freight vehicles.

San Diego Metropolitan Transit Development Board

The San Diego Metropolitan Transit Development Board (MTDB) purchased the 108-mi San Diego & Ar-

izona Eastern Railway Company (SD&AE) from the Southern Pacific Railroad in 1979. Since 1981, MTDB (through its wholly owned subsidiary, San Diego Trolley, Inc.) has operated LRT service along a portion of the railroad trackage, and beginning in 1984 has shared a portion of that trackage with the San Diego & Imperial Valley (SD&IV) Railroad, a short-line freight operator. The MTDB agreement with SD&IV allows exclusive LRT operation from approximately 5:00 a.m. to 1:00 a.m. and exclusive freight use from approximately 1:00 a.m. to 5:00 a.m. The SD&IV pays MTDB a percentage of its revenues for use of the trackage. Figure 2 shows the South and East lines constructed within the railroad ROW.

San Diego Trolley is regulated by FRA for signals, trackage, and controlling (dispatch). San Diego Trolley is not classified by FRA as a freight railroad operator, however, and is not subject to FELA, and its employees are not eligible for participation in the Railroad Retirement System.

ROW Acquisition Issues

The greatest challenge faced by MTDB in acquiring the freight railroad ROW for LRT use was locating a freight contractor able to ensure the maintenance of freight service required by ICC.

The agreement reached between MTDB and the SD&IV was the culmination of a 5-year effort to establish a successful freight partnership. In 1978, before MTDB acquisition, ICC denied the Southern Pacific Railroad's request to abandon the SD&AE, ruling that freight service must be maintained. After purchasing the SD&AE in 1979, MTDB initially contracted with Kyle Railways to provide freight service. Unable to operate successfully under Federal Railroad Administration short-line freight regulations, Kyle Railways ended operations in San Diego in 1983. In 1984, MTDB signed an agreement with RailTex to provide freight service as the San Diego & Imperial Valley Railroad. Under the RailTex agreement, LRT and freight operations are segregated by time of day, a form of temporal mitigation.

Operational Issues

The following issues have been significant in MTDB's shared trolley/freight operations.

- Shrinking freight operating window/expanding LRT service: Since service began in 1981 LRT operating hours have expanded several times, shrinking the freight operating window. Since 1984 the demand for freight shipping has remained and even increased periodically, and periods of simultaneous operation of freight and LRT service have become more frequent, jeopardizing

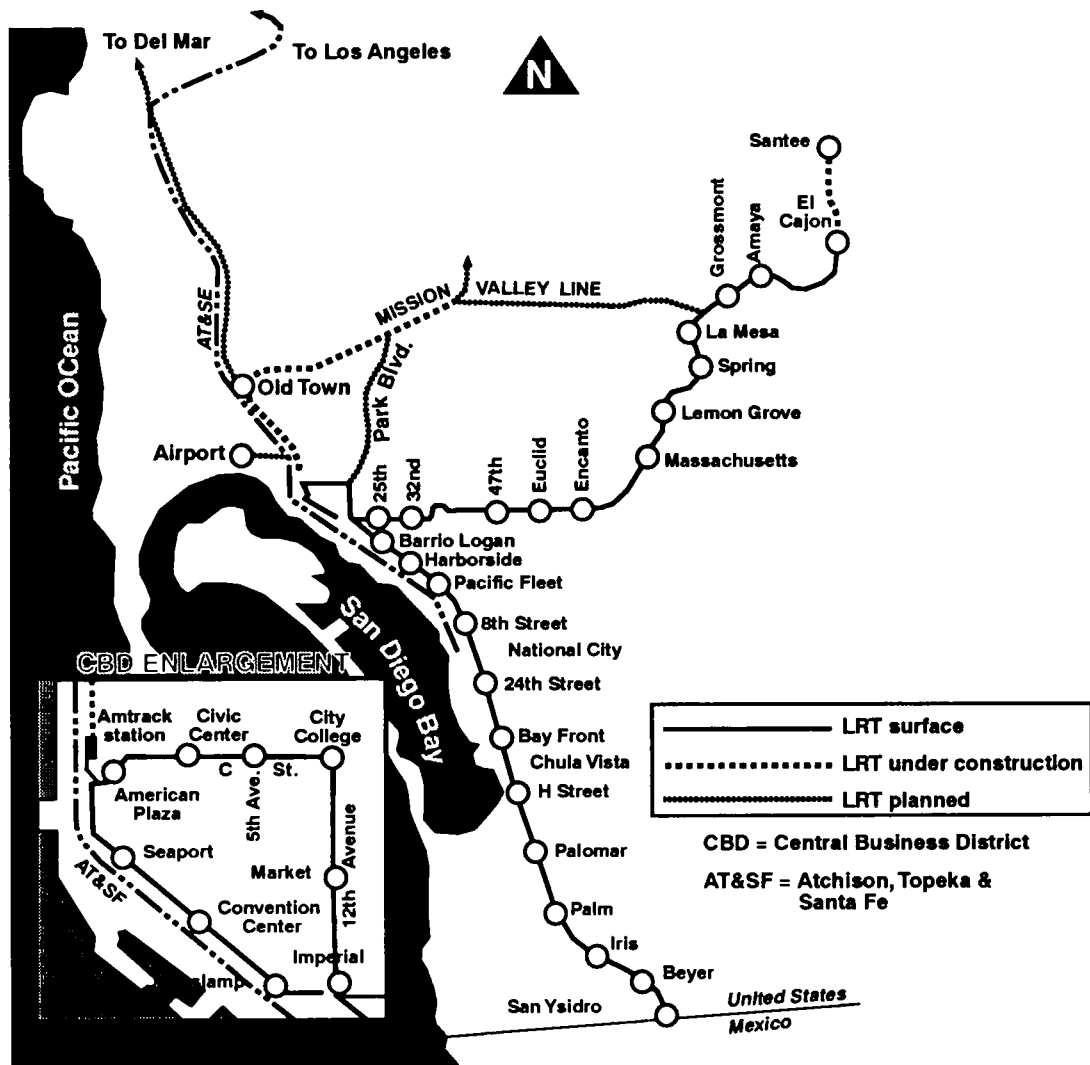


FIGURE 2 San Diego's South and East lines, within abandoned freight rail right-of-way.

exemption from full FRA regulation. As a result of FRA inquiries, MTDB is now formulating a new operating plan, which will more effectively restrict simultaneous LRT/freight operation.

- An approach to better deal with freight and transit vehicle interface mentioned by MTDB would be to undertake regulatory reform of the vehicle rules. Significant experience exists with recent transit/freight operations in the United States that could be used in the revision work. Similarly, substantial experience exists from European sources on buff end strength that could be applied.

- Station platform design: Because of California PUC and FRA side clearance requirements (8 ft 6 in.), no high-level LRT platforms have been used on the portion of LRT line shared with the SD&IV.

- Employee operating rules: In response to FRA requirements, the San Diego Trolley Rules and Instructions for Employees includes regulations for trolley and SD&IV employees.

- Vertical clearance: Because light rail and freight vehicles are used on the same track, LRT overhead catenary has been installed higher on share trackage than elsewhere in the LRT system in order to comply with PUC/FRA clearance requirements.

- Block signal issues: Timing of railway crossing signals on share trackage is based on the stopping distance and other requirements of freight vehicles, which are much greater and result in longer signal timings.

- Unionization: Freight operator union work rules can make coordination with LRT operations more difficult. Successful cooperation between the San Diego

Trolley and the SD&IV has required the sort of flexibility that sometimes does not exist under railroad union labor agreements.

Lessons Learned

San Diego Trolley and San Diego & Imperial Valley Railroad staff offer the following conclusions and recommendations on the basis of their successful LRT/freight joint use experience.

- Expect LRT operating hours to expand. If time of day LRT/freight segregation is used, plan on LRT operating hours to expand. Build into the operating agreement procedures that address contraction of the freight operating window and maintenance of freight service under such conditions. Transit operators should not assume that the demand for freight movement will decline over time or that LRT operating hours will not increase.
- Employee cross-training is important. Operating practices or equipment design issues relatively insignificant for LRT may significantly affect freight operations and vice versa. Successful cooperation between LRT and freight operations requires mutual understanding of the two operating environments throughout the planning, design, and operations phases. In some cases, the emphasis among rail transit planning and operations staff is on transit rather than rail, since many rail transit professionals come from a transit background. Conversely, many freight operators are unfamiliar with transit operations. Employees with transit and freight backgrounds are an asset for both operators.
- Expect the nature of freight operations to change and plan for it. The nature of the freight operation (e.g., material transported, length of trains, weight of cars, etc.) can significantly affect equipment and operating requirements. The LRT/freight operating agreement should address how changes in freight operations and requirements will be addressed.
- Avoid ROW sharing if possible. On the basis of difficulties in finding a successful freight partner and the ongoing and escalating complications generated by the need to accommodate equivalent or increasing freight operations within a shrinking operating window, MTDB's advice is to avoid shared LRT/freight operation if possible.

OBSERVATIONS AND RECOMMENDATIONS

Significant experience has recently been gained in the joint use of freight rail trackage by transit services, par-

ticularly LRT lines. Two major properties in the United States that have operating experience with joint use have provided many lessons, several of which can be applied elsewhere or used to guide further research.

1. Avoid track and/or ROW sharing if possible. This subject was mentioned by both the Baltimore MTA and the San Diego MTDB as a preference from the transit agency's perspective. Reserved ROW is the preferred operating condition of all rail operators, both transit and freight railroads. However, shared ROW can be a cost-effective means to implement transit service earlier than would otherwise be possible. Although both agencies would prefer exclusive ROW and track, each readily agrees that the more important objective is to provide the transit service and to do so in a safe and cost-effective manner.
2. Plan for changes. Rail transit lines are built to last 50 to 100 years. Many will be around much longer, similar to the railroad lines they are replacing and joining. Because we cannot be certain of the future, we need to plan effectively for changes. Growth in ridership is often thought of in planning for transit, but planning for increases in freight service is also important in a shared use arrangement.
3. Vehicle compatibility remains a key constraint. The compatibility of freight rail cars and transit vehicles remains a major constraint to joint use operations. Because of significant differences between the two types of vehicles and the possibility of accidents between them, regulations have been promulgated that constrain joint operations. Two of the more important areas that directly affect LRT use and should be addressed in further research are clearances and buff end strength.

Low platforms are required for LRT along joint freight lines to accommodate lateral clearances. ADA accessibility requirements and other issues have caused transit agencies to look for solutions. Low-floor light rail vehicles (LRVs) may help, but these also introduce questions about buff end strength and telescoping as a result of nonuniform coupling heights. Issues such as these demand that more research be undertaken.

Significant experience exists with joint operations in this country and with additional studies on buff end strength in Europe, and regulatory reform of FRA standards for LRVs is appropriate. Additional review and research could be conducted to assist with reform of the regulations.