SECTION 2 – PLAN ADMINISTRATION GUIDELINES

2.1 Governance

It is assumed for the purposes of this System Plan that the ownership of commuter rail assets throughout the State of Minnesota would be in the public interest. In other words, the citizen taxpayers of the state would own the system – specifically those commuter rail assets that are separable from the freight rail facilities, systems, equipment and/or rights-of-way that are owned by the relevant freight railroads. There are several considerations that validate the assumption of public ownership:

- The public sector is the logical administrator and overseer of public transportation services provided over rights-of-way owned and operated by multiple freight rail carriers.
- Public policy dictates that commuter rail service be provided within the framework of a regional and potentially statewide, publicly funded multi-modal transportation system.
- The public sector is the appropriate and responsible choice as manager of the expenditure of public funding required to plan, design, construct, operate and maintain such a system.
- The provision of commuter rail service is not viable without substantial public sector financing, which would not likely be available under the auspices of private ownership.

The commuter rail service sponsor is the public entity or combination of entities that serves as the public's principal agent for or overseer of such service. As such, a sponsor serves at a minimum as the lead administrator or contracting entity for all services to be provided. All commuter rail services operated throughout the nation are owned by the public sector and sponsored by one or more public agencies through a variety of intergovernmental agreements.

Several types of public agencies are serving as sponsors for commuter rail service, including the following:

- State Departments of Transportation,
- Agencies created for the specific purpose of providing commuter rail service, and
- Other transportation agencies that offer commuter rail as part of a more diverse portfolio of public transportation services.

The following table lists examples of each as sponsoring agencies for selected commuter rail systems throughout the country:

SYSTEM	SPONSOR
MARC	The Maryland Department of Transportation, Mass Transit Administration
Metra (13 lines) Chicago, Illinois	Metra, a Service Board of the Northeastern Illinois Regional Transportation Authority (RTA)
METROLINK Los Angeles, California	Southern California Commuter Rail Authority (SCCRA)
North Coaster San Diego, California	North (San Diego) County Transit District
Peninsula Commute Service (Caltrain) San Jose, California	Peninsula Corridor Joint Powers Board consisting of San Francisco, San Mateo and Santa Clara Counties
Sounder Commuter Rail Seattle/Tacoma, Washington	Central Puget Sound Regional Transit Authority (Sound Transit)
Trinity Railway Express Dallas and Fort Worth, Texas	Intergovernmental Agreement between DART and the Forth Worth Transportation Authority
Tri-Rail Miami/Fort Lauderdale/West Palm Beach, Florida	Joint Powers Authority consisting of Broward, Dade, and Palm Beach Counties and FDOT
Virginia Railway Express Washington, D.C.	The Potomac and Rappahannock Transportation Commission, a division of the Northern Virginia Transportation Commission

	(NVTC)

All of these agencies are currently providing or will soon be providing high quality commuter rail service, defying any perception that there is a superior or preferred approach to dealing with the governance issue. The rationale behind these various organizational approaches to sponsorship relate more to political will and/or expedience on the part of state legislatures or electorates than to any definitive precedent. In other words, each region has tended to evaluate their own circumstances vis-à-vis legal and/ or functional constraints on their existing governance structure and respond in a manner most appropriate to those constraints. The example of the Central Puget Sound Regional Transit Authority is instructive in this regard.

After two failed regional public transit referenda in the late1960s/early1970s, the Municipality of Metropolitan Seattle (Metro) was empowered by the State Legislature to serve as King County's sole provider of public transportation service. Together with the Puget Sound Council of Governments (today, Puget Sound Regional Council) and the Washington State Department of Transportation, Metro resurrected plans for high capacity rail transit through a series of planning projects aimed at determining a single locally preferred Light Rail Transit (LRT) alternative.

When these latter plans also foundered, the Downtown Seattle Transit Project was conceived and ultimately completed by Metro in 1990, resulting in the provision of a rail-convertible bus tunnel through downtown Seattle as the envisioned first step toward the development of a regional LRT system.

The Regional Transit Project, a cooperative effort between Metro, Pierce Transit, the Washington State Department of Transportation and Community Transit, was undertaken in 1991 as a means of advancing the development of what had become a more fully developed regional LRT and commuter rail network. The Regional Transit Project culminated in yet another failed public referendum in 1994, nearly three years after Metro had been absorbed by King County and their regional transit planning responsibilities assumed by the newly-created Central Puget Sound Regional Transit Authority (Sound Transit). In response to the failed public referendum in 1994, plans for regional LRT, commuter rail and HOV improvements were scaled-back, re-

packaged and ultimately approved by the public in 1996, providing the local monies needed to secure federal funding.

The Puget Sound experience is similar to that of the Twin Cities Metropolitan Area in many ways. Both regions are new start candidates, having studied plans for the implementation of LRT for decades with commuter rail being given serious consideration only relatively recently. The heavily consensus-based or populist approach to decision-making characteristic of both regions, in part, led to the evolution of highly-developed, geographically distinct and occasionally parochial governance structures. In addition, both the Washington and Minnesota State legislatures have empowered singular state agencies with the authority to implement rail transit service in order to consolidate and streamline the complex decision-making processes characteristic of both regions. These many similarities and the success of Central Puget Sound Region in eventually securing broad-based consensus on the implementation of LRT and commuter rail service may provide a template of sorts which can be applied within the context of the Twin Cities Metropolitan Area.

SECTION 3 – FUNDING AND FINANCING GUIDELINES

3.1 Cost Sharing

As indicated in the Twin Cities Commuter Rail Feasibility Study, commuter rail development and operating costs should be equitably distributed among State and local governments:

- Capital cost sharing. In all likelihood, the proposed First Tier of the proposed commuter rail system will initially be paid for through one or more financing techniques described in this report. Accordingly, there will be debt service to repay the borrowed principal plus interest over a 20-year period. The major share for debt service could be most appropriately assigned to the State of Minnesota with any railroad cost sharing or federal funding reducing the portion of the capital costs funded by the State. There are two reasons for this approach:

  - *Borrowing capacity***.** The State more than meets all the requirements and expectations for selling long-term bonds in the public credit market. The creditworthiness of the State is held in high regard by investors and rating agencies alike. The State is a known and regular presence in the public credit market, and it is in a good position to pledge either its "full faith and credit" or specific revenues to cover the debt service.
  - *Transportation funding***.** The State has traditionally funded major transportation system improvements throughout Minnesota. This includes both highway and light rail projects within the Twin Cities metropolitan area, which constitutes two-thirds of the statewide economy and half the State population. State funding of the construction of commuter rail facilities would be a natural extension of such investments in a multimodal transportation system for Minnesota.

- Operating cost sharing. In contrast, public funding for commuter rail operations is best placed at the local (or regional) level of government. There are three reasons for this approach:

- *Commuter rail passengers.* Direct users of commuter rail services will overwhelmingly be residents of the Twin Cities metropolitan area. Their local and regional governments are in a good position to oversee commuter rail operations as part of their broad responsibilities for municipal service delivery in the region.
- *Coordination of bus and rail services.* The existing public bus system is operated by Metro Transit. Funding at the local or regional level would help further coordination of bus and commuter rail services.
- *Fiscal capacity.* Local and regional governments have more than sufficient fiscal capacity to fund the portion of commuter rail operating costs not covered by operating revenues (i.e., fares, parking fees, advertising, etc.). The metropolitan counties have the authority to levy real property taxes directly or through their regional railroad authorities. Affected cities have a diverse mix of taxing and fee-setting authority.

  However, it is also important to point out that, historically, the State of Minnesota has appropriated monies from its General Fund to support transit operating costs.

3.2 Sources of Funding and Financing

There are three prospective types of operating revenues to help pay for the operating costs of proposed commuter rail service: fare revenues, parking fees, and advertising revenues.

Fare Revenues

The Twin Cities Metropolitan Commuter Rail Feasibility Study suggested a fare structure that was based on the express bus fares then in effect. This structure was:

Fare Zone	Effective Radius	One-Way Charge
1	0-15 miles	$2.00
2	15-20 miles	$2.75
3	20-25 miles	$3.50
4	25-30 miles	$4.25
5	30-35 miles	$5.00
6	35-40 miles	$5.75

The use of concentric circle fare zones (measured on a straight-line basis out from the central business district), as well as the five-mile radius between succeeding fare zones, is common within the commuter rail industry. Note that distance is measured as a straight-line distance, as opposed to the actual rail mileage from the CBD to that station.

Suburb-to-suburb travel would be possible by purchasing a ticket good from the originating zone to the first CBD. If both the origin and destination were in the same fare zone, no additional charge would be collected. If the destination were in a fare zone further out than the origin, a zone charge would be collected on the train to the destination. This practice is consistent with that in use at other carriers having multiple lines radiating out of a CBD.

No commentary on possible discounts for multiple-ride tickets or other fare media was made in the Twin Cities Metropolitan Commuter Rail Feasibility Study. The sale of "SuperSaver" and stored-value tickets on the bus system allows a rider to save money compared to paying for the trips in single-ride fares.

Parking Fees

Based on a review of the parking practices at other North American commuter rail operations, the Twin Cities Metropolitan Commuter Rail Final Summary Report concluded that:

- No parking fee is warranted until additional demand estimation work is done, the station locations are finalized, and further engineering investigations on the constructability of each facility have been completed.

- The provision of free parking will serve as a further inducement for potential riders.

The following table summarizes sample facilities and parking fees identified during our survey of other commuter rail agencies.

Property	Sample Station(s)	Parking Lot Information	Parking Charges, Comments
DART	South Irving	Yes – no capacity given	None
MBTA	Route 128	803 spaces	MBTA lots - $1.00/day
Metra	North Central (11 stations)	10 lots total; 80 to 488 spaces	All spaces $1.50/day
Metrolink	Chatsworth	375 spaces	None listed for this station; Some lots are $20/month
Metro North	Brewster North	Yes – no capacity given	Municipality / private contractor provide
Metro North	Dover Plains	Yes – no capacity given	Private contractor provides
SEPTA	Bryn Mawr	Yes – no capacity given	No information provided
VRE	Quantico	100 spaces	None
West Coast Express	Port Coquitlam	254 spaces	$0.68 US/day; $10.20 US/month

Advertising Revenues

The Twin Cities Metropolitan Commuter Rail Feasibility Study assumed that the project sponsor could generate advertising revenues equal to 5% of fare revenues.

There are at least six prospective types of local, regional and State funding to help pay for the operating costs of proposed commuter rail service.

Property Tax Funding

The seven metropolitan counties – through their regional railroad authorities – are authorized by State statute to impose levies on real estate of up to a maximum of 0.04835% of market valuation to pay for capital and/or operating costs of passenger rail service. Below is a summary of the market value of real estate, potential property tax revenue, and the current property tax revenue generated in each of the seven metropolitan counties.

County	Market Valuation	Potential Levy	1998 Levy
Anoka	$10.64 Billion	$5.15 Million	$700,000
Carver	3.30 Billion	1.60 Million	0
Dakota	15.79 Billion	7.62 Million	75,000
Hennepin	56.57 Billion	27.35 Million	0
Ramsey	18.25 Billion	8.82 Million	0
Scott	3.58 Billion	1.73 Million	0
Washington	9.10 Billion	4.40 Million	200,000
Total	$117.22 Billion	$56.67 Million	$975,000

Other Local Taxes and Fees

The most common type of local taxation for transportation improvements – particularly in California – is the sales tax. State legislation enacted in 1988 authorized California's 58 counties to establish up to a 1-cent sales tax in their respective jurisdictions. Since then, 19 counties have done so. A number of the counties are using part of their sales tax revenues to fund part of capital and/or operating costs of commuter rail service, as indicated below:

- San Mateo County voters committed 44% of their Measure A ½cent sales tax revenues ($357 million in 1988 dollars) over a 20-year period to Caltrain improvements and grade separations.

- San Diego County voters approved a ½cent local sales tax in 1987. About 1/3 of the sales tax revenue is earmarked for capital improvements to public transit. While most of such funds have gone to San Diego's light rail system, a portion of them are being used to leverage state and federal funding for the San Diego Mid Coast Corridor commuter rail project.

State Taxes or Fees

Currently, the State motor vehicle excise tax (MVET) is allocated to the State's general fund. At current rates, it generates about $400 million per year statewide. At one time, it was distributed in part to transportation but this was repealed. Any shift to transportation would result in a loss to the general fund, or it would require a small increase – a "surcharge" – in the existing MVET rate. In 1999, there was a joint Metropolitan Council – Mn/DOT initiative before the State legislature to create a Transit Mobility Fund using the MVET. The initiative proposed dedicating 5% of the MVET (about $20 million per year) to fund major transit capital improvements, including commuter rail. The proposal did not pass, but it is expected that similar initiatives will be introduced in the future, as the need for a new dedicated source of transit funding is recognized. At the rate proposed, this source would provide a small, but possibly significant, increase in availability of capital funding capability for any one project.

Joint Development

Until 1997, federal (UMTA/FTA) policy with regard to joint development was restrictive. To prevent transit systems from "double dipping" on their federal subsidies, federal transit dollars could be used to defray only the "net" costs of a joint development project at prevailing matching rates. The term "net" referred to costs remaining after any economic or other return from the project's private partner. In effect, transit systems were expected to pay back any federal grant funds that resulted in private income to the agency through joint development. This obviously created great

reluctance on the part of transit operators to engage in joint development, as it created a direct substitution effect between federal dollars and private income.

In 1997, FTA revisited its joint development policy. The new policy allows revenues from federally assisted joint development to be retained as "program" income by the agency for capital or operating needs, provided the transit agency retains "effective continuing control of the project." The property could be sold to the developer, but contract provisions or physical easements or connections must be included that assure that the development would remain accessible to the transit system. Transit-oriented joint development can be accomplished through a sale or lease of federally funded property, or through direct participation of the transit agency in the development as a partner.

There have been a substantial number of joint development projects within the past several years. The following are recent illustrations:

- Miami, 1990s, Metrorail. MDTA has undertaken major joint developments at both its Dadeland South and Dadeland North Metrorail stations. At Dadeland South, MDTA needed to purchase a large parcel during construction. A developer owned the land and proposed a land swap with MDTA. The developer donated the land to the transit agency in exchange for the right to develop a hotel, office complex, and retail stores. The developer also financed and built a 1,650-space parking garage, of which 1,000 are owned by MDTA. At Dadeland South, the developer leases the site for 99 years, pays the complete costs for the development's construction and maintenance. MDTA receives the greater of a minimum escalating guaranteed rent or a percentage of the gross profits. The leases are not subordinated to bondholders.

- Los Angeles, 1999, Blue Line. LA County MTA has opened a 700-space parking structure located adjacent to the Metro Blue Line Willow Station in Long Beach. The structure is a major part of a joint development project between MTA, the Long Beach Redevelopment Agency, and private enterprise. Eventually, in addition to the parking structure, the project will include two major retail stores and about a dozen smaller stores. The

smaller stores will be located on property formerly used as a 200-space park-and-ride lot.

MTA contributed 5 acres toward the 12-acre joint development project. In exchange, the developer agreed to build the parking structure and will pay rent for the land. The costs of the parking structure will be amortized against MTA's share of the proceeds of the commercial center site. MTA's net proceeds for the 35-year lease will total nearly $8 million.

Joint development opportunities are likely to arise in connection with the following:

- Development or redevelopment of the principal downtown central terminal. Because of its central location, and also as the destination for most trips, the CBD station provides the best joint development opportunity, and is best suitable for leveraging other downtown development or redevelopment activities. In Minneapolis, a central station connecting with the proposed Hiawatha LRT presents a special joint development opportunity due to the linkage. The St. Paul Union Depot represents a redevelopment opportunity that could also attract STP enhancement funding.

- Development at a major park-and-ride facility, typically the end-of-line station. During the start-up phase of a new commuter rail line, the terminal station may require no more than a 100-200 space surface lot. As ridership on the line increases, the need for more parking within a structured facility arises. As illustrated above in the LA Blue Line example, existing surface parking and other adjacent land can be converted into structured parking and commercial development, with the private developer leasing the land from the agency and building the parking structure. In this case, the developer retains most of the proceeds from the commercial development, minus the lease costs of the land and the cost of constructing the parking structure. Alternatively, the transit agency could have assumed the role of developer, but it would then bear the risk of the commercial project and all or at least some of the cost of the parking structure, depending on the level of federal support.

- Sale of development rights above or adjacent to storage tracks and/or the main repair facility. Where market and physical conditions are right, redevelopment above yards and shops can occur. Plans for such development are currently evolving in New York City, including the LIRR west side storage yards on 34th Street west of 10th Avenue, and the Sunnyside Yards in Queens. These would be very large development sites, where real estate values are extremely high compared with most cities. Something on a less grand scale in Minneapolis could be considered. The area surrounding the CP Shoreham Shops, one of the better potential CMF sites, may not be in a suitable market for intensive commercial development, although there may be potential housing demand there. Other sites besides the CP Shoreham Shops may also be considered, and these may or may not have commercial development potential.

Joint development at intermediate stations along commuter rail lines may be less likely candidates for joint development. As the benefits of the station are often fairly limited to the immediate municipality, it is common among commuter rail systems to transfer the development and/or operating responsibility of the station, including planning and parking, to the host municipality. Development at the station becomes a local municipal affair. Southern California's Metrolink, for example, requires cities that want stations to locate the land, fund construction, and provide station parking. The cities own and maintain the stations. Similar approaches are used by NJ Transit and MTA Metro North and LIRR commuter rail systems. In all cases, the success of joint development will hinge on the real estate market environment, the specific development location, local government support, and the patronage of the rail system.

There are a number of federal grant programs available to support the implementation of new rail lines. U.S. DOT grant programs that may be used for rail in Minnesota include:

- Section 5309 New Starts Program: part of FTA's Capital Program that funds new fixed guideway systems (heavy rail, light rail, commuter rail, busways, etc.) and extensions in metropolitan areas. In FY 1999, $896 million was appropriated nationwide.

- Section 5307 Program**:** FTA's Urbanized Area Formula Program through which funds for capital replacement and expansion are distributed to transit operators and States. In FY 1999, $25.6 million was apportioned to Minnesota.

- Job Access and Reverse Commute Grants: competitive grants for transportation services that connect welfare recipients and low-income persons to employment and support services. In FY 1999, $75 million was available nationwide. Not more than $10 million per year may be used for reverse commute activities.

- Congestion Mitigation and Air Quality (CMAQ) Program: a formula program administered by FHWA and FTA whose primary purpose is to fund projects that reduce emissions in air quality non-attainment areas. In FY 1999, $19.4 million was apportioned to Minnesota.

- Surface Transportation Program (STP): a formula program through which funds are allocated to states and metropolitan areas for highways, transit capital, and bus terminals and facilities. Minnesota received $114.8 million in FY 1999.

- National Highway System (NHS): a FHWA formula program that provides funding for improvements to rural and urban roads that are part of the National Highway System (NHS). Under certain circumstances, funds can be used for transit. Minnesota's apportionment in FY 1999 was $89.2 million.

- Interstate Maintenance: a FHWA formula program for resurfacing, restoring, rehabilitating, and reconstructing most routes on the Interstate System. Up to 50% of a State's apportionment may be transferred to NHS, STP, CMAQ, and/or Bridge. Minnesota's 1999 apportionment was $74.7 million.

- Section 130 Grade Crossing Program: a formula program provides funds for highway/railroad grade crossing safety improvements. As of September 30, 1998, Minnesota had $4.6 million in unobligated funds.

Key Eligibility Requirements

Certain cross-cutting requirements generally apply across all programs. To be eligible for funding, projects must be included in metropolitan and statewide plans and programs. Requirements of the National Environmental Policy Act must be met. Other cross-cutting requirements relate to right-of-way acquisition, wage rates, access by people with disabilities, and competitive procurement. Programs administered by FTA require Project Management Plans, Section 13(c) certification (labor protection), and certain other certifications and assurances.
There are also program-specific eligibility requirements, including:

- Section 5309 New Starts - Project sponsors must address the FTA's New Starts Criteria which require that a project be based on the results of alternatives analysis and preliminary engineering, must be justified, and must be supported by an acceptable degree of local financial commitment. Projects must also successfully compete for congressional earmarks. See New Starts Program Summary.

- Job Access and Reverse Commute Grants - Requires regional job access and reverse commute transportation plans developed by a coordinated transportation/human services planning process. Grant award criteria include the percentage of the population that are welfare recipients, the need for additional services, coordination with State welfare agencies, and use of innovative approaches.

- CMAQ Program - Project sponsors must demonstrate that the project will lead to a reduction in air pollutant emissions. Priority is to be given to projects in a State Implementation Plan for air quality. Funds must generally be used for projects within the boundaries of a non-attainment or maintenance area. CMAQ may be used for operating assistance during the first three years of a new service.

- National Highway System - To be eligible for NHS funding, a transit project must serve the same corridor as a fully controlled access NHS highway, must improve the highway level of service, and must be more cost effective than a highway improvement.

When and How Successfully Applied

Many of these programs has been successfully applied to commuter rail and other fixed guideway transit programs. Frequently, they are applied in combination. Examples of recent commuter rail projects funded with Federal grants are shown below.

- Tri-Rail System in South Florida: Initial development of this system was funded as a traffic mitigation measure using Interstate Maintenance (4-R) funding. Subsequent service enhancements (double tracking, extension, added stations, equipment) have been funded with Section 5309 New Starts, Section 5309 Bus, and CMAQ/STP monies.
- MARC System in Maryland: Section 5309 New Starts for extensions and upgrades.
- RAILTRAN in Dallas/Fort Worth: Section 5309 New Starts (for phase II extension), Section 5307 Formula, CMAQ/STP.
- North Central (Wisconsin Central) Line in Chicago: Section 5309 New Starts.

Schedule and Other Considerations

- Section 5309 New Starts Program. This program is very competitive, with a long list of projects in the pipeline. An alternatives analysis study must be completed. Proposed projects are rated by FTA on an annual basis during the fall, based on project information submitted by project sponsors in the late summer (for FY 2001 the submittals were due September 3, 1999). FTA's funding recommendations are submitted to Congress in February. Funding allocations are determined by congressional earmarks. On average, those projects receiving Section 5309 New Starts funds are obtaining 50% of the project's capital cost from this source.

- Job Access and Reverse Commute Grants. Applications must be submitted to FTA near the end of the calendar year. In FY 1998 the deadline was December 31.

References

- FTA Notice of Proposed Rulemaking on the New Starts Criteria (April 7, 1999 Federal Register).
- FTA Circular C 9300.1, Capital Program: Grant Application Instructions.
- FTA Circular C 9030.1C, Urbanized Area Formula Program: Grant Application Instructions.
- FTA Notice of Availability of Funds and Solicitation for Job Access and Reverse Commute Grant Applications (November 6, 1998 Federal Register).
- FHWA/FTA CMAQ Program Guidance (April 1999).

Section 5309 New Starts Program

The New Starts Program is that part of FTA's Capital Program that funds new fixed guideway systems (heavy rail, light rail, commuter rail, busways, etc.) and extensions in metropolitan areas. In FY 1999, $896 million was appropriated nationwide.

Key Eligibility Requirements

Projects must meet FTA/FHWA planning, programming, and environmental documentation requirements. In addition, FTA approval must be obtained at key project milestones (start of preliminary engineering and start of final design), and the project must be rated by FTA and authorized by Congress.

To receive FTA approval to enter PE and final design, and to obtain an FTA project rating, project sponsors must address the FTA's New Starts Criteria:

- A project must be based on the results of alternatives analysis and preliminary engineering. In alternatives analysis, a range of alternatives is considered in terms of costs, benefits, and impacts leading to the selection of a "locally preferred alternative". Alternatives analysis is part of the metropolitan planning process and may include preparation of a draft environmental document pursuant to the National Environmental Policy Act (NEPA).
- A project must be justified. Five criteria are applied – mobility improvements, operating efficiencies, environmental benefits, cost effectiveness, and supportive land use.
- A project must be supported by an acceptable degree of local financial commitment. Criteria include the size of the non-Federal share, the soundness of the capital finance plan, and the stability and reliability of operating and maintenance funds.

Projects must also successfully compete for congressional earmarks.

When and How Successfully Applied

The Section 5309 program has been used to fund the several commuter rail projects or extensions:

- MARC extension to Frederick, Maryland
- Phase II of the RAILTRAN project in Dallas/Fort Worth.
- North Central (Wisconsin Central) line in Chicago.

Section 5309 funds have also been used to upgrade commuter rail lines once they are in operation:

- Tri-Rail in South Florida
- MARC rolling stock procurement (Maryland)

Schedule and Other Considerations

According to FTA, approximately 50 projects in preliminary engineering and final design represent a potential funding demand of $12 to $14 billion, compared with about $1 billion in annual appropriations. This demand estimate includes funds for the Hiawatha LRT.

TEA-21 authorized 190 projects for the FY 1998 to FY 2003 period. The list of authorized projects includes the Northstar Corridor, the Washington County [Red Rock] Corridor (Hastings-St. Paul), and other Twin Cities transitways (e.g., Hiawatha LRT and a Riverview project).

Once a proposed project enters preliminary engineering, it is rated by FTA on an annual basis during the fall, based on project information submitted by the project sponsor (for FY 2001 the submittals were due September 3, 1999). FTA's funding recommendations are submitted to Congress in February. Funding allocations are determined by congressional earmarks.

References

- FTA Notice of Proposed Rulemaking on the New Starts Criteria (April 7, 1999 Federal Register).
- FTA Circular C 9300.1, Capital Program: Grant Application Instructions.

There are at least five different types of financing techniques available to help pay for the capital costs of commuter rail development.

Transportation Infrastructure Financing and Innovation Act (TIFIA)

USDOT provides loans, letters and lines of credit, and loan guarantees for surface transportation projects of National significance. Such loans and guarantees can be provided to public and private sponsors of highway, rail, transit, and intermodal projects. Project applications are evaluated and selected by DOT on a competitive basis. Total credit assistance available nationwide is authorized at $1.8 billion in FY 2000 ($90 million in subsidy).

Key Eligibility Requirements

Highway, rail, transit, and intermodal projects may receive credit assistance under TIFIA.
The following threshold criteria must be met:

- Projects must generally cost at least $100 million, and the amount of credit assistance to a project may not exceed 33% of eligible project costs, including capitalized interest.
- Project sponsor must submit a formal application
- Projects must be included in the State transportation plan and State TIP
- Financing must be repayable, in whole or in part, from tolls, user fees, and other dedicated sources (which may include general obligation pledges or corporate promissory pledges, but not a pledge of Federal funds).

Transit projects receiving TIFIA assistance must also comply with the rules and requirements governing the FTA grant programs, as well as cross-cutting laws and regulations (such as NEPA, Title VI, 13c, etc.).

Selection criteria include the extent to which a project would generate economic benefits, leverage private capital, promote innovative technologies, and meet other transportation objectives.

When and How Successfully Applied

In the first year of the TIFIA program (FY 1999), five projects were selected for $1.6 billion in assistance:

- State Route 125, San Diego ($400 million toll road, TIFIA loan guarantee of $90 million and $37 million line of credit)
- Miami Intermodal Center ($1.4 billion project, two TIFIA loans totaling $436 million)
- Tren Urbano Project, San Juan ($1.7 billion rail project, $300 million TIFIA loan)
- Farley-Penn Station Redevelopment, New York ($750 million project, $140 million TIFIA loan and $20 million line of credit)
- Metro Capital Program, Washington ($2.3 billion capital improvement program, $600 million TIFIA loan guarantee)

Schedule and Other Considerations

Applicants must submit a letter of intent. If approved for further review, applicants are invited to submit a formal application and make an oral presentation. For the FY 1999 funding cycle, letters of interest were required by June 23, 1999 and formal applications had a deadline of August 2.

Formal applications require a non-refundable application charge ($5000 in FY 1999). Starting in FY 2000, a credit processing charge may also be assessed.

Applicants must also provide a preliminary rating opinion letter from at least one nationally recognized bond rating agency.

References

- Final Rule implementing the Transportation Infrastructure Financing and Innovation Act (49 CFR Part 80).
- U.S. DOT, FY 1999 TIFIA Program Guide

Railroad Rehabilitation and Improvement Loan Fund (RRIF)

Administered by the Federal Railroad Administration, RRIF is a direct loan and loan guarantee program which may be used to acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track; to refinance existing debt; or to develop or establish new intermodal or railroad facilities.

Key Eligibility Requirements

A Credit Risk Premium must be provided to FRA by any non-Federal entity. Other requirements include:

- Loans and loan guarantees are subject to NEPA and other environmental laws, Executive Orders, and regulations;
- Application requirements must be met, including payment of an investigation charge;
- FRA establishes the Credit Risk Premium by estimating risk and potential recovery in the event of a default;
- Borrower is required to maintain facilities. FRA representatives must be allowed to inspect and examine any facilities acquired with RRIF assistance.

When and How Successfully Applied

Implementation of the RRIF program awaits the issuance of final rules. A Notice of Proposed Rulemaking was published in the Federal Register on May 20, 1999, and the final rules are under review at OMB.

Schedule and Other Considerations

The aggregate unpaid principal amounts cannot exceed $3.5 billion, of which $1 billion is reserved for projects benefiting non-Class I freight railroads. Within these constraints, FRA gives priority to projects that enhance safety, enhance the environment, promote economic development, are included in state transportation plans, promote U.S. competitiveness, and preserve/enhance service to small communities and rural areas.

References

- Proposed rules were published in the Federal Register on May 20, 1999.

Transportation Revolving Loan Fund

The federal government established a State Infrastructure Bank (SIB) program in 1995 through the National Highway System Designation Act. A SIB is a state or multi-state fund that can be used by eligible borrowers to finance transportation projects. The purpose of a SIB is to attract new funding into transportation, to encourage innovative approaches to financing transportation projects, and to help build needed transportation infrastructure. A SIB operates much like a commercial bank. It provides loans or credit enhancements (lines of credit, letters of credit, debt service guarantees) which can be used to finance projects. When the loans are repaid or the obligation for the credit enhancements expire, the funds are returned to the SIB, recycled, and then used to finance another set of projects. Because funds are repaid and returned to the SIB, a permanent, flexible use fund for transit and highways is created in order to help states meet their transportation funding needs.

During the 1997 Legislative session, Mn/DOT proposed legislation that would create a SIB for Minnesota. The legislation, known as the Transportation Revolving Loan Fund (TRLF) Act, was enacted in May 1997. In June 1997, Minnesota was designated a "SIB State" by the federal government and was approved to receive federal incentive funds in order to capitalize the TRLF.

Key Eligibility Requirements

Borrowers eligible for TRLF financing include the State, counties, cities, and other governmental entities with projects eligible for federal-aid funding. TRLF funds are available for financing transportation projects such as the construction and preservation of highways, bridges, roads, streets, bikeways, rights-of-way, design, pedestrian access; and for purchasing transit capital.

All projects receiving TRLF funding must be Title 23 (highway) or Title 49 (transit capital) eligible. TRLF loans must be secured by a dedicated revenue stream from such sources as property taxes, sales taxes, special assessments, future federal aid, or future state aid revenues.

Each project must be certified by the Commissioner of Transportation before it will be considered by the transportation committee of the Public Facilities Authority.

When and How Successfully Applied

- Metropolitan Council will use approximately $4.1 million from TRLF to leverage a $17.1 million bond issue and provide a total of $21.0 million for approximately 53 transit capital projects ranging from bus purchases to park and ride lot construction. The interest rate on the loan is 2.71%; the repayment term is variable (depending on useful life of assets) over 20 years; and the repayment source is property tax revenue. The Metropolitan Council will save approximately $4.1 million over issuing bonds itself.
- The City of Mazeppa will receive a PFA loan of approximately $500,000 to pay for bridge approach construction. The interest rate on loan will be approximately 3%; the repayment term is 20 years; and the repayment source is property tax revenue. The City of Mazeppa will save approximately $185,000 over market rate loan or issuing bonds itself.

Schedule and Other Considerations

An eligible borrower's possible sources of TRLF loan repayment include, but are not limited to, special assessments, property tax levies, tax increment financing, local government option sales taxes, future federal funds, future state funds, and customer fees from revenue-generating projects such as parking ramps and intermodal terminals.

All proposed projects are required to go through the District/Area Transportation Partnership (ATP) process (a/k/a the State Transportation Improvement Program (STIP) development process). Although the District/ATP process primarily addresses transportation projects to be advanced in the next three years with federal funding, it will also address proposed TRLF projects to be advanced solely with state and/or local funding, as well as TRLF projects which may be advanced or financed beyond the next three fiscal years. TRLF applications are submitted in accordance with the normal STIP development schedule.

The term of the TRLF financing will be based upon the "useful life" of the assets being financed. The "useful life" of the project or the term of 30 years, whichever is less, will be the maximum term for the loan; there are no minimum terms. On a TRLF loan, principal payments must commence no later than 3 years and interest payments no later than one year after the execution of the loan agreement. Capitalized interest is an eligible loan cost

References

- National Highway System Designation Act of 1995, Public Law Number 104-59, as amended.
- Minnesota Statutes, section 446A.085
- Minnesota Rules, chapters 8805 and 7380.0705-.0775

Grant Anticipation Revenue Vehicle (GARVEE) Bonds

A GARVEE bond refers to any financing instrument for which principal and/or interest is repayable with future Federal-aid highway funds. The debt is issued in anticipation of the receipt of Federal-aid grant reimbursements in subsequent years.

Key Eligibility Requirements

A project must be eligible for Federal-aid funds under Title 23, U.S.C. Planning, programming, environmental, and other pre-construction requirements must be met.

A project must be approved by FHWA as an advance construction project and as a Federal-aid bond issue project. At the time of project authorization, the State must elect to seek reimbursements for bond issue costs in lieu of construction invoice costs.

When and How Successfully Applied

GARVEE bonds are being well received in the credit markets. In the two cases listed below, States have used GARVEE bonds in different ways and created highly rated and very marketable debt instruments:

- Central Artery/Tunnel in Boston, Massachusetts. The Commonwealth issued $600 million of Grant Anticipation Notes in June 1998. The $600 million issue matures in 8 to 17 years and has received ratings of Aa3, AA, and AAA by Moody's, Fitch IBCA, and Duff & Phelps, respectively. The Commonwealth intends to pay interest from state highway funds but retire principal with Federal-aid reimbursements.
- Spring-Sandusky Interchange in Columbus, Ohio. The State of Ohio issued $70 million worth of bonds in May 1998. The bonds will mature in 10 year. The bonds received ratings of Aa3 from Moody's and AA- from both Standard & Poors and Fitch IBCA.

Schedule and Other Considerations

The GARVEE bond concept can be applied in two ways:

- A "direct" GARVEE bond in which federal assistance directly reimburses debt service paid to investors in a debt-financed Federal-aid project.
- An "indirect" reimbursement whereby federal funds reimburse expenditures on other Federal-aid projects and the State DOT subsequently uses a portion of those funds to pay debt service on the debt-financed project. In this case, the debt-financed project need not be a Federal-aid project.

A high volume of Federal-aid projects built under advance construction authority creates a favorable environment for an indirect reimbursement strategy. These projects can be readily converted to Federal-aid, creating "quick cash" that can be applied to debt service.

References

- 23 U.S.C. Section 122.
- FHWA, Innovative Finance Quarterly, Volume 3 Number 2 (Fall 1997)
- FHWA, Innovative Finance Quarterly, Volume 4 Number 3 (Summer 1998).

SECTION 4 – ADVANCED CORRIDOR PLANNING GUIDELINES

Implementation of a commuter rail service requires careful consideration of how overall transit service is affected, as well as how the services can be coordinated and integrated to provide the best overall transit service possible.

Coordination with Existing Transit Service

Commuter rail lines will often serve areas currently served by transit. This will be particularly true in the central business districts of Minneapolis and St. Paul, but will also true in many other areas. Wherever possible, the new commuter rail service and the existing transit services should be coordinated so that users are able to maximize their mobility. In practice, this means that transfer points should be located to be convenient for users, schedules should be coordinated, and transfers should be seamless.

An outstanding opportunity is likely to present itself wherever commuter rail services and light rail services operate in proximity to one another. Connections between regional systems will benefit the entire transit system.

New Community Circulator Vans

1. Elk River on the Northstar Corridor
2. Savage on the Dan Patch Corridor
3. Hastings on the Red Rock Corridor
4. Forest Lake and Little Canada on the Rush Line

These lines were characterized by being on the order of 5 miles in length (round trip) with an overall travel time of 25 minutes. The service concept was that the van on each route would meet all trips of the commuter trains in both the morning and evening peak periods, based on the opening day service plans for each of the corridors.

The feasibility study envisioned a single van per route operating in the period 2005-2010, transitioning to two vans per route in 2011, and expanding the hours of operation per day per route from 2016.

Reallocated Transit Service

It was recognized that the onset of commuter rail service would result in a reduction of some bus services, and the complete replacement of other routes. Conversely, there were also possible diversions of existing bus routes in order to serve new intermodal travel patterns.

Bus service reallocations were estimated for years 2005 (initial year) and 2020. The guidelines applied to the reallocations were:

1. One bus removed for every 40 riders transferred to commuter rail
2. An average of one hour of operational time was saved for each revenue bus trip eliminated, and
3. No reduction of system-wide bus capital purchases resulted from the planned service reallocation.

Buses Removed by Corridor		
	Buses Reallocated	
Corridor	**2005**	**2020**
Bethel	5	6
Dan Patch	24	28
Northstar	24	28
Norwood/Young America	10	9
Red Rock	18	22
Rush Line	16	15
TOTAL	97	108

Bus/Rail Competition

In most markets, the proposed commuter rail service (recall that the opening day service pattern would have all trains making all stops) could offer travel time savings, compared to existing express bus services. Depending on freeway and arterial traffic levels, the time savings by taking the train could be as much as 27-28 minutes (from Chaska and Chanhassen on the Norwood/Young America Corridor), or as little as 6 minutes (Anoka on the Bethel/Northstar Corridors, Burnsville on the Dan Patch and Newport on the Red Rock).

The Feasibility Study review of transit services indicated that there were three markets in which the express bus service would continue to offer travel times competitive with the commuter rail service. These were:

1. Foley Park and Ride Express Buses (competing with the train service on the Bethel and Northstar Corridors) – projected travel time equal to that of the commuter trains
2. Hopkins Park and Ride Express Buses (competing with the Norwood/Young America train service) – buses are scheduled to make this trip in 4 minutes less than that proposed for the commuter rail service
3. Express buses between the Minneapolis and St. Paul CBDs (competing with the trains operating across the Central Corridor) – scheduled bus service would be 5 minutes faster than what is preliminarily envisioned for the commuter rail trains.

Choice of mode in these markets would be determined largely by scheduling decisions, and the proximity of the service to the rider's origin and destination.

Where existing bus services compete with the commuter rail service, those bus services should be selectively eliminated as replacement commuter rail service is implemented. That is, when peak period commuter rail service is implemented, peak period bus service serving the same market should be eliminated. At the time when commuter rail service is added in off-peak periods, competing off-peak bus services should also be eliminated.

Station Development and Site Planning

Standards for design of the commuter rail station and supporting facilities fall into six categories:

- Platform
- Parking
- Drop-off/pick-up areas
- Pedestrian circulation
- Vehicular circulation
- Access

Overall, station design should make a positive contribution to the communities in which stations are located. These contributions can be made in the form of enhancements of the physical, cultural and natural environment of the station areas.

Platform

The characteristics of the platform should be very consistent for all stations in order to give patrons a sense of familiarity and of knowing how to use the facility. The basic components of a commuter rail station are listed below, along with applicable standards for each component.

- Platform length. The platform will be of sufficient length to accommodate the longest train expected to be in service on that line plus 20 feet to provide a margin for error in spotting the trains at the platform. Minimum length will be to accommodate a locomotive and five-six passenger cars.
- Platform width. The platform width will be that required allow a minimum of 7 to 10 square feet of open area per person expected to be on the platform at a the peak load time in the forecast year. Regardless of the area requirement, the minimum width for a side platform will be 9 to 12 feet, and the minimum width of a center platform will be 16 feet.

- Accessibility. The station and platform must, at a minimum, meet the requirements of the Americans With Disabilities Act (ADA). The owners and designers of stations and platforms should work with representatives of the disabled community to explore means of making the use of the facilities even more convenient.

- Shelter. The station will include an area which is sheltered from precipitation and prevailing winds which is at least one-half the length of the platform.

- Platform furnishings. Items provided for the information and comfort of the patrons will include:

  - Benches – seating for, say, 10 percent of maximum number of people expected to be on the platform at the peak load time in the forecast year).
  - Lighting – the platform will be illuminated to a safe level.
  - Information displays – information regarding train schedules and bus schedules and other appropriate transportation information will be displayed at several points along the platform. Take-along schedules will be provided. Maps displayed and provided at the station may also include information regarding business and entertainment opportunities located with a reasonable distance of the station. The platform display may also include emergency and non-emergency telephone numbers which patrons may find useful.
  - Fare-vending equipment – where tickets can be purchased on the platform, vending machines, change machines and/or ticket office will be provided.
  - Telephone – one or more pay telephones may be provided.
  - Closed-circuit television (CCTV) – may be included at stations at which security of patrons may be an issue. Installation of CCTV requires that the video information be monitored and that timely response to incidents at the stations be made by appropriate authorities.
  - Trash receptacles – located at about 50-foot intervals along the platform and near any vending locations.

- Drinking fountains – may be considered depending on the availability of potable water and the proximity of alternate sources.
- Rest rooms - may be considered depending on station use characteristics and the proximity of alternate resources.
- Retail and service outlets – at stations which generate or attract significant traffic, space may be made available to a newsstand operator, a dry cleaning operator, a video rental store, a shoe repair shop, or a convenience food store.

- Platform layout. With all the possible combinations of platform size and features, it is critical that the platform be designed with capacity, accessibility and safety as high priorities.

  - The platform and accesses to the platform must have sufficient capacity to serve the peak expected passenger load at a reasonable level of service in the forecast year for the system. Waiting areas must have sufficient area to allow patrons to wait comfortably for their train and to allow circulation to and use of the fare vending machines (if provided), information areas and the various amenities provided on the platform. Where points of access to the platform constrict flow, there must be sufficient width in the opening to allow efficient flow of passengers to and from the trains at a reasonable level of service in the forecast year for the system.
  - From all areas around the platform, the paths to and from parking facilities, bus stops and drop-off areas must be clearly defined and designated. These paths must have sufficient width at the opening to allow efficient flow of passengers to and from the trains at a reasonable level of service in the forecast year for the system.
  - All areas accessible by the public must be designed to minimize the potential for accident and injury due to the use or even improper use of the facilities.

Parking

Planning for a commuter rail line or system should include development of a parking strategy and a parking implementation plan. The parking strategy considers:

- Potential access modes.
- The likelihood that various access modes will be used.
- How patrons are most likely to access the commuter rail service.
- The availability of space for parking facilities at the various station sites.
- The communities' development plans for the station areas.
- Potential competing uses for the available land at the station sites.

The parking strategy should describe the amount of parking needed and the best locations for those parking facilities.

The parking implementation plan describes in detail how the strategy will be implemented. The exact location and size of the parking facility at each station will be given. Preliminary layouts will be prepared which identify access points, and walking paths between discreet sections of the facilities and the platform. The plans should demonstrate a reasonable view of the platform and approaching trains for people approaching the platform. The walking paths should not pass through bus loading areas or kiss-and-ride areas. The parking facilities should be designed such that maintenance activities can be accomplished without unnecessary effort. Signalization plans at the connections to streets/arteries should be developed.

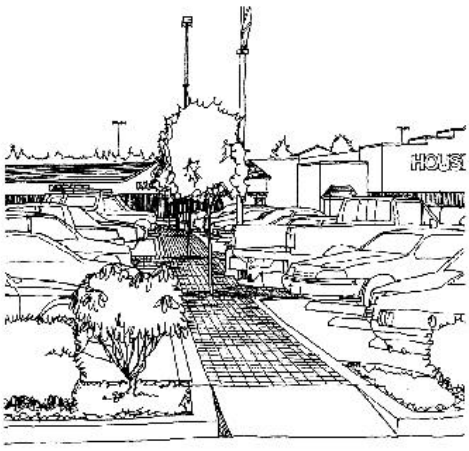
General guidelines for layout and use of station parking areas include:

- Provide sufficient parking at stations to minimize conflict with nearby residents
- Capacity of park-and-ride lots should be about 15% more actual spaces than the expected forecast year peak period demand to minimize the time required to find an open space and to allow for loss of spaces due to misparked vehicles and incomplete snow removal.

- Desirable maximum walk distance from parked vehicle to the station platform is 400 – 500 feet; maximum is 1,000 feet.
- Explore opportunities to share parking with adjacent development.
- Park-and-ride facilities should not be provided within the heavily urbanized area.
- Provide secure parking facilities for bicycles.
- Parking for the disabled should be placed to minimize the time and effort required to reach the platform.
- Consideration may be given to providing preferential parking to car pools and van pools.

Drop-Off/Pick-Up Areas

The areas designated for bus drop-off/pick-up should be kept separate from those designated for passenger car drop-off/pick-up (kiss-and-ride). These areas should be as close to the platform as possible without blocking the paths of other patrons to the platform. The passenger car drop-off/pick-up (kiss-and-ride) should also be separated from long-term parking for the station to effectively monitor the use of all facilities.



Large parking lots should have landscaped pedestrian pathways to improve pedestrian connections and safety. Graphic from "Creating Transit Station Communities" by the Puget Sound Regional Council, June 1999.

Pedestrian Circulation

Pedestrian movements between various points in the station area should be along landscape-defined paths which, as much as practical, are raised above the level of the parking lots or roadways. Direct paths should be provided as much as possible to encourage use of the designated paths.

Vehicular Circulation

The proper design of vehicular paths within the station site can make a significant contribution to site usability. The guiding principle is the minimization of conflict between traffic flows. This suggests that:

- Vehicles entering the station site should be able to reach their destination (parking space, drop-off/pick-up area) without crossing major pedestrian paths.
- Vehicles searching for a parking space should be separated from vehicles entering and leaving the site.
- Busses and any other vehicles making scheduled runs to and from the stations should be provided with preferential access to their loading areas at stations where the possibility of delays caused by congestion is present.

Access

The proper design of access to commuter rail stations can make transit more easily accessible and can make the transit system a better neighbor to the area through which it passes. Attention to detail and an awareness of the potential secondary impacts of the traffic flow will result in a better-performing design. Some of the key considerations are:

- The station should have access directly from a public street.
- Access points should be located on collector streets and minor arterials, not on major arterial streets.
- Access roads must accommodate forecast year traffic loading safely and efficiently.

- Station access must serve pedestrian and bicycle traffic as well as automobile traffic.
- Locate access points to encourage use of arterials and collector streets and discourage use of local streets, especially residential streets.
- Provide adequate on-site queuing space to avoid extension of queues to adjacent public streets.

The design of station access and egress routes should eliminate the possibility that queuing of station-generated trips will block the railroad tracks serving the station.

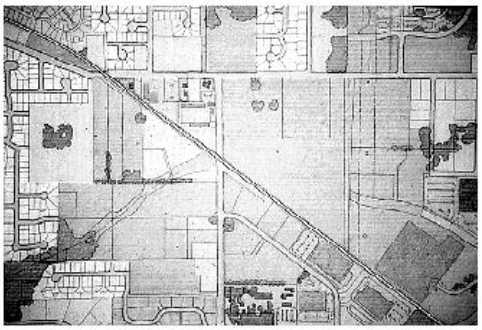
Station Area Land Use Guidelines

The success of a line-haul transit system such as commuter rail, light rail, heavy rail or busway can be significantly enhanced by patterns of development that 1) provide convenient access to the line-haul service and/or 2) allow people to satisfy a greater proportion of their needs as a transit user, pedestrian, or cyclist. Over the past ten to fifteen years, land use and development professionals as well as many private citizens have explored ways of making better use of an irreplaceable resource – land – and, simultaneously, reduce what many see as an over-dependence on

APPLYING TOD IN NEW GROWTH AREAS

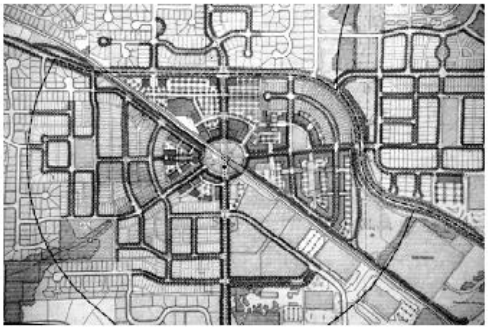
Before

The existing conditions around a planned new light rail station in the Portland Oregon region show standard sprawl patterns. Fortunately, several of the subdivisions have roads stubbing out into undeveloped parcels that can allow local street connections to the potential neighborhood center and transit stop.



After

At the center, a proposal for a TOD around the LRT station sites a village green at the core, surrounded by a retail center, cinema, daycare, apartments, and offices. Radial streets connect to new neighborhoods of varying housing densities. At the upper right of the drawing is a smaller TOD which is separated from the LRT TOD by a six-lane arterial, but which will be connected by feeder bus.



Source: Calthorpe Associates, Berkeley, CA.

private automobiles for transportation.

The result has been a new appreciation for patterns of urban development that evolved through the first half of the 20th century and faded significantly in the second half. When this rediscovered pattern of urban development described neighborhood and community planning, it was known as "neo-traditional design." As it became an increasingly important means of reinforcing the utility of transit services, it became known as "transit-oriented development" (TOD).

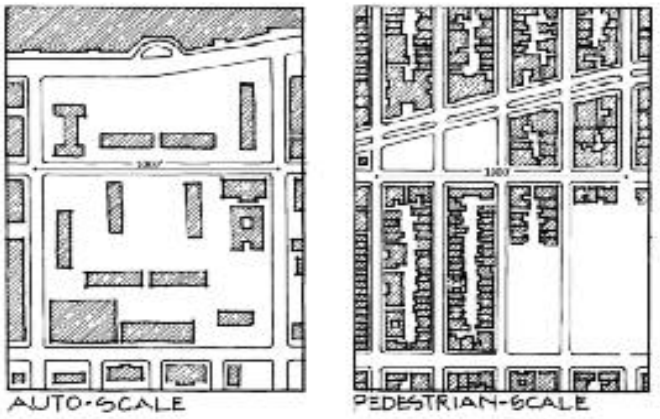
It is the intention of Mn/DOT, through the Commuter Rail System Plan, to strongly encourage the adoption of TOD as a means of maximizing the return on its investment in commuter rail transit facilities and services. The guidelines presented below regarding land use and density are not intended to be proscriptive. The intent is to encourage communities served by commuter rail to take advantage of that opportunity to strongly support the use of transit, to support more efficient development of their communities, and to enjoy the benefits which are likely to accrue to a well-designed community.

A great deal of material has been written during the last fifteen years describing neo-traditionalism and TOD. What is presented below is meant to provide a sense of the flavor and scale of the suggestions and recommendations presented in the published material. A principal source of information has been a publication of the Metropolitan Council entitled Creating Transit-Oriented Development for Livable Communities and a Sustainable Region: *A Handbook*, prepared by Calthorpe Associates and published in draft from in September 1999.

For a great deal more information on the topic of TOD, consult the bibliography included with this document and the list of references contained in the Metropolitan Council *Handbook*.

Characteristics of Transit-Oriented Development

In general, TOD is described as dense, mixed-use development, designed for pedestrians and multiple modes of transportation (Ref. 11, Bibliography). A number of characteristics are associated with TOD including:



Human-scaled environments. *Compared to large, automobile-sized blocks (left), smaller blocks (right) and a great variety of street-facing buildings create safer and more interesting environments in which people are more willing to walk for many local trips.*

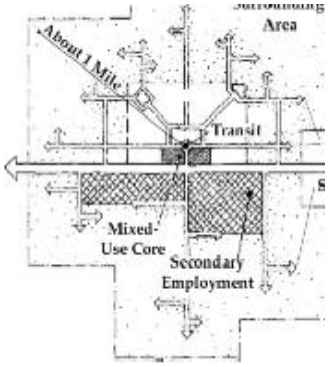
- Mixed-use development that includes residential, office, retail and service businesses.
- Small lot and multi-unit residential development
- Second-floor and above residential units in commercial areas.
- Neighborhood retail in residential areas.
- Increased security by enhancing views between areas and promotion of activity through land use.
- Convenient accessibility and pedestrian connections throughout the neighborhood.
- Walkable and pleasant neighborhoods.
- Public and quasi-public land uses in proximity to transit stations.

Land Use Guidelines

Land use planning in the vicinity of transit stations still considers most of the same factors considered by land use planners in all areas, including:

- Compatibility with adjacent land uses
- Overall community plans
- Effect on cultural resources
- Effect on natural resources

am shows the extents of a TOD around a p, defined by the walking distance (here, The mixed-use core, housing, and other the TOD have easy access to the station, condary employment uses are across an erial. The Surrounding Area, which also s ridership and retail patrons for transit, nds up to 1 mile from the transit station.



The key consideration in planning a TOD is to achieve a mix of land uses and pedestrian amenities that encourages people to live, shop, recreate and work within a smaller area centered on a transit station. The effect is to increase the density of development in areas where the greater number of people can utilize the nearby transit service while simultaneously reserving more of the community's undeveloped land in either agricultural or developed or undeveloped recreational uses.

The table below is reproduced from the Metropolitan Council's Handbook as a guide for communities that are considering development plans around commuter rail stations in their communities.

The Core should include a mix of uses, including retail, in an amount varying with the setting. At all stations, at least 40 percent of the Core should be retail, such as restaurants, personal services, or public amenities (such as plazas or town greens), day care, offices, other high-intensity employment, public facilities (such as hospitals, clinics, libraries, government services, post offices, gymnasiums and meeting halls), cinemas, hotels, offices, health clubs and high-density housing. Some stations may attract larger retail and employment uses. The Mixed-Use Core Area should be an attractive, interesting walking environment for pedestrians, with local streets lined with ground-floor retail and other active uses.

General Land Use Guidelines
for Transit Oriented Development (TOD)

	Transit Oriented Development Locations			
	Transitway, Rail & Major Bus Transfer Stations	Bus Corridors		
		CBD/Core Zones	Inner Urban/ Suburban Zone and Pockets	Outer Suburban Zone
Allowable Size of TOD (acres)	60 – 125	30 – 125	30 – 125	30 – 125
Land devoted to mixed-use Core	10% - 40% of TOD area			5% - 30% of TOD area
Land devoted to employment uses (outside the Core)	20% - 30% of TOD area		0% - 70% of TOD area	0% - 20% of TOD area
Land devoted to residential uses (outside the Core)	20% - 30% of TOD area		0% - 70% of TOD area	50% - 80% of TOD area
Land devoted to civic uses (outside the Core)	10% minimum of TOD area for small parks or plazas, recreation, government/civic, day care.			

Density Guidelines

This document does not present rigid guidelines for development densities in TOD's. Since the information provided here applies to commuter rail systems wherever in the State they are implemented, firm guidelines would not be that useful.

The photos at right illustrate residential development at the level of density typically specified in commuter rail station areas.

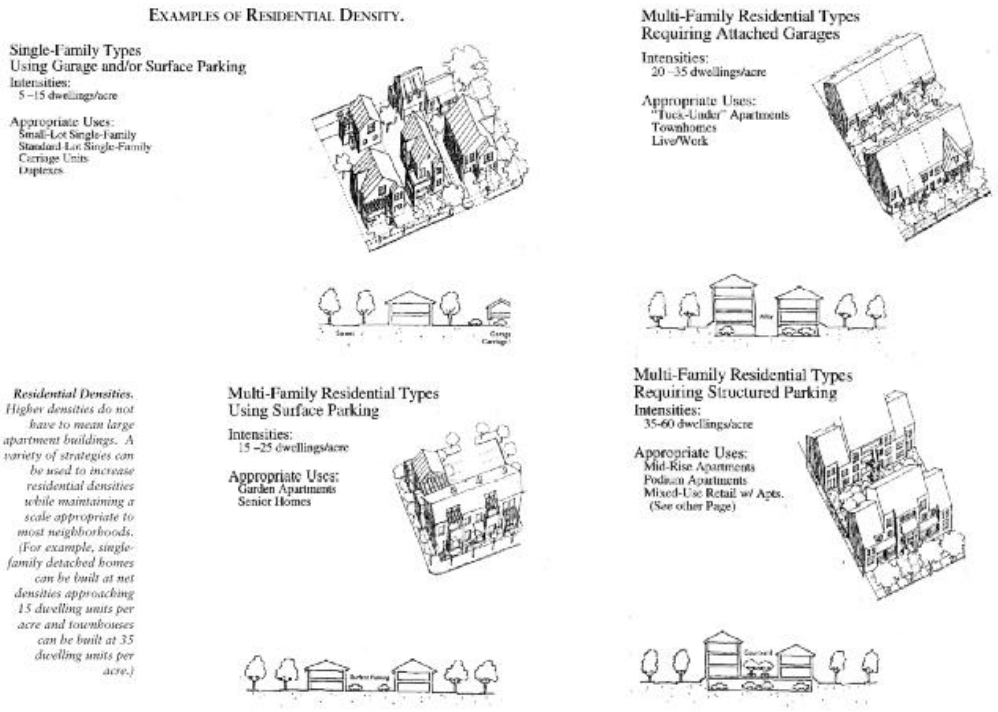
Left Top: Townhouses at about 30 units to the acre.

Left bottom: Single family homes at about 12 units to the acre.

Bottom: Modest-sized, small-lot single-family homes clustered around a neighborhood park provide "eyes on the street" and a safe and pleasant place for children to play.

What is important is that the benefits to the community of rail transit service are enhanced by increased development density in station areas. Further, the rail transit will be of greater service to the community if development in the station areas is denser.

The drawings included in this section present similar density references in a different format.



The table on the following page is reproduced from the Metropolitan Council's Handbook as a guide for communities that are considering development plans around commuter rail stations in their communities.

Density Guidelines for the Mixed-Use Core
of the Transit Oriented Development (TOD)

	Transit Oriented Development Locations			
	Transitway, Rail & Major Bus Transfer Stations	Bus Corridors		
		CBD/Core Zones	Inner Urban/ Suburban Zone and Pockets	Outer Suburban Zone
Mix of uses *	Retail, Restaurants, Personal Services, Office, Cinema, Grocery, Hotel, Apartments/Condominiums, Live-Work, Day Care and other Civic Uses, Park/Plaza * At least 40% of Mixed-Use Core must have ground-floor retail, restaurant/cafes, service commercial, or personal services except in low-intensity bus corridors where as little as 5,000 square feet of these uses meets the requirement.			
Minimum net FAR [1]	0.5	0.4	0.35	0.25
Minimum gross residential density (units/acre) [2]	30	25	15	10
Maximum block size	4 acres		7 acres	
Frontage of street along each block with street-facing buildings [3]	75% of each street		65% of each street	
Setback for street-facing buildings	0 - 10 feet			
Minimum transparent area (windows or doors) in primary façade for street-facing buildings	40%			

Station Area Planning Process and Timetable

To develop a plan for the development around commuter rail stations which truly represents the vision of its residents, a community must proceed through a classic master planning process. That process allows the community to thoughtfully consider how it wants to develop: the population, the types of land uses, the reservation of land for recreation, civic facilities, roads, quasi-public facilities, etc.

At a point during that planning process, the community may wish to begin consideration of the question of how a commuter rail transit service in their community might help them to achieve their goals more effectively. The alternative question for consideration is whether commuter rail would allow them to achieve goals they would otherwise not be able to achieve.

If commuter rail is a desirable element of their plan, than the process of adapting their overall community goals to a commuter rail environment should begin.

In its *Handbook*, the Metropolitan Council describes the station area planning process used for the light rail transit stations in the Hiawatha Avenue corridor in south Minneapolis. That process is depicted in the accompanying graphic. The steps can be used as a guide in the development of commuter rail station area planning, although the schedule can probably be shortened.

Bibliography

1. Bus-Based Park & Ride – A Good Practice Guide, The English Historic Towns Forum, June 1993.

2. Buying Time: Symposium – Research and Policy Symposium on the Land Use and Equity Impacts of Congestion Pricing, State and Local Policy Program, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, August 1996.

3. Creating Transit-Oriented Development for Livable Communities and a Sustainable Region: A Handbook, Metropolitan Council, September 1999 (REVIEW DRAFT – SUBJECT TO CHANGE).

4. Edwards, John D., The Parking Handbook for Small Communities, Institute of Transportation Engineers, National Main Street Center, National Trust for Historic Preservation, 1994.
5. Engineering Standards Report – Tacoma Transit Oriented Land Use, Transportation and Development Standards, Pierce Transit and City of Tacoma Planning and Development Services, December 1994.

6. Guide for Including Public Transit in Land Use Planning, Alameda-Contra Costa Transit District, Oakland, CA, April 1983.

7. Jia, Wunyu and Martin Wachs, "Parking and Affordable Housing," Access – Research at the University of California Transportation Center, Volume 13, Berkley, CA, Fall 1998.

8. Kivett, Hanan A. and Peterson, Kenneth, Rail Stations Compendium, Parsons Brinckerhoff Quade & Douglas, Inc., 1995.

9. Memorandum: Selection of Station Locations, Northstar Corridor Development Authority (NCDA), August 27, 1999.

10. Passenger Facilities Handbook, Valley Metro, June 1995.

11. Planning and Design for Transit Handbook, Guidelines for implementing transit supportive development, Tri-County Metropolitan Transportation District of Oregon (Tri-Met), Portland, Oregon 97201, January 1996.

12. Planning for Transit-Friendly Land Use, New Jersey Transit, June 1994.

13. Planning With Transit – Land Use/Transit Coordination Handbook, Utah Transit Authority, 1988. A general guide to the principles of coordination of transit and land use planning.

14. Regional Transportation Commission of Clark County, RTC Transit Terminal/Transfer Study Design Standards, PBQ&D, Inc. , August 1994.

15. Spillar, Robert J., PE, Park-and Ride Planning and Design Guidelines, 1995 William Barclay Parsons Fellowship, Parsons Brinckerhoff, Monograph 11, October 1997.

16. Urban Design Guidelines, Metro, July 1989.

17. Wulkan, Alan C., and Snyder, Gregg S., The Role of Land Use Regulations in Successful Transit Investments: Case Studies of Success, Parsons Brinckerhoff, June 1997. Investigates the fundamentals of successful land use regulations and their impact on efficient, growth shaping transportation investments.

Station Deferrals and Service Truncations

Only one of the recommended service truncations from the Twin Cities Metropolitan Commuter Rail Feasibility Study was on one of the First Tier routes. Recommendations to station deferrals and service truncations are:

1. Terminate the Dan Patch Corridor in the vicinity of the Lakeville station, thereby deferring development of the Northfield station, and
2. Adopt a minimum threshold of 100 riders served for determining the cost effectiveness of a proposed station.

None of the recommended station deferrals would effect the First Tier system.

The potential capital cost savings due to the recommended truncation is estimated to total approximately $82 million (in 2003 $). Elimination of the Northfield station might result in a reduction of system ridership by the 64 riders per day projected to use that station. This represents a 12% reduction in the overall capital program, but would reduce ridership by less than 1%.

Railroad Negotiations

The provision of commuter rail service always requires the cooperation and support of the host railroad(s). Commuter rail service operates over existing railroad rights-of-

way, utilizes existing railroad infrastructure and usually relies to some extent on the provision of railroad operations personnel (examples include but are not limited to train crews, maintenance-of-way employees and/or dispatching personnel). Consequently, a cooperative and mutually-beneficial partnership between the host railroad(s) and the public entity serving as owner or sponsor of the commuter rail service is essential. If conducted properly, negotiations with the host railroads related to the provision of commuter rail service can form the foundation for such a cooperative and mutually-beneficial partnership.

Railroad's attitudes differ significantly with regard to the acceptability of joint commuter and freight service. Fortunately, two of the Twin Cities Metropolitan Area's primary Class I freight carriers - the Burlington Northern Santa Fe (BNSF) and Canadian Pacific Railway (CP) - are some of the nation's strongest proponents of commuter rail service, provided that such service can be implemented and operated in a manner which results in little or no impact to existing and projected freight service capacity.

In order to negotiate a mutually satisfactory agreement of any kind, the relative positions of the parties to the negotiations must be clearly understood and respected. The primary concerns of any freight carrier related to the provision of joint commuter and freight service are as follows:

- The potential for degradation in freight service capacity
- The potential for degradation in freight service reliability
- The financial impact of the unanticipated, incremental capital investment required to provide such service
- The financial impact of the unanticipated, incremental operating and maintenance costs inherent in the provision of such service
- The implications of substantially increased liability

From the perspective of the railroad(s), the incremental costs and liabilities alluded to above arise only as a consequence of the provision of commuter rail service. Consequently, the host railroad(s) position as to the disposition of these costs is that

they should be borne entirely or almost entirely by the public sector. However, if properly planned and implemented the provision of commuter rail service can result in a number of significant benefits to the host railroad(s). These include the following:

- A predictable mid-to-long term source of operating income
- The potential to leverage public funds for capital improvements to the railroad's physical plant
- Valuable and virtually free advertising to a broad spectrum of the riding public
- Enhanced cooperation with public and private employers whose decisions often significantly affect the railroad's performance and profitability

Understanding and respecting these concerns and the perspectives that give rise to them is the foundation for successful railroad negotiations.

Following are general guidelines to be followed as a means of ensuring successful railroad negotiations as they pertain to the provision of joint commuter and freight railroad service.

1. Centralize Negotiations

The provision of commuter rail service within multiple corridors owned and operated by multiple freight carriers virtually demands that the authority to negotiate terms and conditions with the respective railroads be vested in a single, multi-jurisdictional public entity. The most logical choice at the present time is Mn/DOT.

Minnesota State legislation[1] has recently been passed which establishes Mn/DOT as the state's commuter rail planning and implementation agent. It is assumed for the purposes of this System Plan that Mn/DOT will assume the role of chief negotiator with the affected railroad(s) on any and all commuter rail implementation initiatives throughout the region. It is further assumed that in it's role as chief negotiator, Mn/DOT

[1] Minnesota Session Laws 1999, Chapter 230 – S.F. No. 1762, Section 20

will solicit the active involvement of the relevant Commuter Rail Corridor Coordinating Committees as members of negotiations teams. It is envisioned that these teams will also be comprised of experienced legal counsel and any engineering and/or related individuals or firms experienced in railroad negotiations that may be deemed necessary.

Such centralization of negotiating authority is warranted in order to:

- Ensure consistent and equitable terms and conditions among the various agreements negotiated
- Ensure continuity in terms of personnel, organizational structure and approach
- Build upon the institutional memory and knowledge collectively developed through corridor-specific negotiations
- Enhance the efficiency of the negotiations process, thereby ensuring the most cost-effective expenditure of public funds

Over time the railroads themselves would doubtless benefit from dealing with a single, experienced and familiar public sector negotiator as opposed to having to re-acclimate themselves to entirely new individuals and organizations during each subsequent stage of implementation. Ideally, the first such negotiated agreement would serve, with some modification(s), as a prototype and precedent for a master or "blanket" agreement to be used as the basis for subsequent negotiations. Ongoing negotiations between the Northstar Corridor Development Authority and the BNSF related to potential commuter rail service in the Northstar Corridor will likely result in such a first-generation agreement.

2. Select and Empower a Multi-Disciplinary Negotiating Team

In its role as the region's chief negotiator for commuter rail service, Mn/DOT would lead or "chair" negotiations teams comprised of the relevant Commuter Rail Corridor Coordinating Committees, experienced legal counsel and any engineering and/or related individuals or firms similarly experienced in railroad negotiations that may be

deemed necessary. The negotiations teams would establish appropriate procurement strategy and execute that strategy through negotiations with the affected railroad(s).

With the exception of the lead Mn/DOT personnel, the negotiation team members would change as each corridor in turn moves toward staged implementation.

3. Define the Nature of the Service to be Provided

The findings of the Twin Cities Metropolitan Commuter Rail Feasibility Study should be used as the baseline for the development of a detailed service plan, schedule and capital program. By quantifying the nature and amount of commuter rail service to be provided, the railroad(s) will be better able to assess the potential impacts to their existing and projected freight operations including their risk, liability and insurance requirements. In addition, a detailed service plan, schedule and capital program will be required as input to capacity modeling activities described later in this section.

4. Determine Procurement Strategy

Regardless of the service provider, the basic elements of commuter rail service may be defined and "bundled" as follows:

- Trackage rights and dispatching services including the trackage rights themselves, train control/dispatching, maintenance of way, structures and systems, emergency response and recovery, the provision of layover yards and communications
- Operations management services (excluding the dispatching and maintenance functions described above) including the provision and training of operations, rolling stock maintenance and administrative personnel, train operations including fare collection, customer safety and assistance, the provision of maintenance shops and equipment required for the periodic light and heavy maintenance/unit repair of commuter rail rolling stock
- Furnishing of commuter rail rolling stock.

The two key issues related to these three service elements are (1) who should provide these services and (2) how should they be procured. These two issues must be resolved prior to the actual conduct of the negotiations themselves through the development and implementation of an appropriate procurement strategy.

There are two general approaches or procurement strategies to be considered:

- Deal with the railroad(s) as turnkey contractors, placing the responsibility for the provision of these three basic services elements on the railroads themselves
- Allow the marketplace to determine the most cost-effective mix of potential contractors and services

There are various intermediate or hybrid approaches as well. For example, it may be possible to "piggyback" on existing contracts to purchase rolling stock and other equipment to start up commuter rail service. The relative advantages and disadvantages of each approach are summarized in the table on the following page.

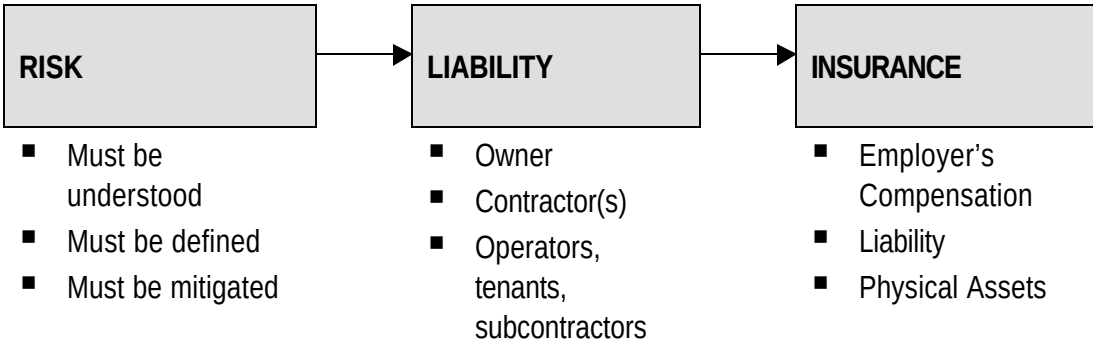
In the event that the turnkey approach is utilized, the railroad(s) will doubtless employ their own personnel and equipment. The costs inherent in such an approach should be expected to be commensurate with the lack of competition and reduced level of control over the work performed typically inherent in a sole-source procurement. If the latter, "market-driven" approach to the procurement of commuter rail services is adopted, it must be recognized that the railroad(s) will nonetheless have substantial involvement in providing these services. This is particularly true given their control over trackage rights conveyance and service management and control (dispatching) activities.

The relative disadvantages of both procurement strategies can be mitigated to some extent through the utilization of appropriate contracting instruments. The provision of (1) incentive compensation for time-based performance, (2) railroad protectives related to enhanced insurance and indemnification and (3) requirements to maximize the use of represented (union) personnel to avoid the potential for "mixed shop" labor grievances are prime examples of appropriate mitigation measures. Since long-term operating costs comprise the vast majority of the total expenditures required to provide such service, public sector owners/ sponsors should do everything legally and ethically possible to reduce their financial burden due to operations.

APPROACH:	ADVANTAGES:	DISADVANTAGES:
Turnkey Contract	▪ Singular responsibility for performance of the work ▪ Reduced public sector management and administrative demands ▪ Potential reduction in mobilization time ▪ Reduces potential for labor conflicts	▪ Potentially higher costs due to lack of competition ▪ Potentially reduced control over services provided ▪ May not maximize potential market benefits ▪ Establishes precedent for provision of future service
Competitive Procurement	▪ Potential reduction in long-term operating costs ▪ Enhanced control over services provided ▪ Takes advantage of potential market benefits ▪ Perception of fair and equitable competition	▪ Increased public sector management and administrative demands ▪ Potential increase in mobilization time ▪ Potential for labor conflicts must be mitigated ▪ Potential for increased cost due to trackage rights

5. Determine the Railroad's Risk, Liability and Insurance Requirements

The basic relationship between risk, liability and insurance as it pertains to railroad operations is portrayed below:



The first questions to ask a freight railroad during serious discussions of implementing commuter rail service should relate to the levels and structure of insurance to indemnify that railroad. The railroad(s) may prefer to leave the administrative duties to an impartial third party such as a state agency or they may insist on overseeing these activities themselves. The level of reserves and amounts of insurance needed to provide indemnification will vary greatly depending on the confidence level chosen from the underlying actuarial study. Agreeing on a 90% level of confidence could save an agency as much as a million dollars annually compared to selecting a 95% level of confidence. Such actuarial studies attempt to predict future losses based on the past loss experience of comparable commuter rail operators, until the new railroad has gained a few years of its own operating experience.

As suggested by the graphic above, typical components of a broad-based insurance program include Employer's Compensation, general liability coverage and physical assets insurance.

Physical assets insurance is designed to protect against property loss, employee theft/dishonesty, earthquake, flood and other "Force Majeure" occurrences. Typically, such coverage provides for or requires full replacement value without coinsurance. Employer's Compensation typically includes provisions for Worker's Compensation/Employer's Liability (WC/EL), Maritime Employer's Liability (MEL), Jones Acts, US Longshoremen and Harborworker's (USL&H) and Federal Employer's Liability Act (FELA). Minimum per-occurrence limits of $10 million (EL/MEL/USL&H/Jones) and $100 million (FELA) are common. General liability coverage protects against personal injury claims, property damage and the like. The point is that adequate protection must be obtained for all parties – owner, contractor(s), the contractor's operator(s) -- if any -- as well as tenants and/or subcontractors. Many options are available, and all of them are costly.

State-owned and operated commuter rail systems may rely on existing state resources to provide levels of indemnification satisfactory to all. In some cases, state limits on tort liability reduce exposure to risk of claims. And generally, with such tort claim limits passenger fares can be lower since the share of fare revenues devoted to tort liability is lower. Research published in 1994 showed public transit systems with such

immunity devoted an average 4.19% of fare revenues to tort liability costs, while the average for systems without such liability limits was 7.01%.[2]

Under current Minnesota State law, which provides no provision for commuter rail operations, the state's statutory limits on tort liability are as follows:[3]

- $300,000 for wrongful death or any other single claim,
- $750,000 for multiple claims arising out of a single occurrence effective between January 1, 1998 and January 1, 2000, and
- $1 million for multiple claims arising out of a single occurrence effective after January 1, 2000.

By statute, if it is named as a defendant under the Minnesota Tort Claims Act, Minnesota will not pay punitive damages.[4]

For most locally owned systems, private railroads may demand levels and forms of protection that are beyond the scope of local resources alone. For example, the insurance program of the Virginia Railway Express is comprised of several layers: (1) a $5 million self-insured retention, (2) commercial insurance up to $25 million, (3) captive insurance with Ace up to $100 million, and (4) captive insurance with XL up to $200 million.

Insurance Type	Amount of Coverage	Annual Premium
Self-Insured	$5 million	Not Applicable
Commercial	$20 million	$1 million
Captive (Ace)	$75 million	$750,000
Captive (XL)	$100 million	$500,000

[2] "State Limitations on Tort Liability of Public Transit Operators", TCRP Legal Research Digest No. 3, December, 1994
[3] Minnesota Stat. § 3.736 Subd. 4 (a) – (c) (1999)
[4] Minnesota Stat. § 3.736 Subd. 3 (1999)

The lessons to be learned from the VRE experience related to risk, liability and insurance mirror those from around much of the rest of the nation:

- All parties must be identified and protected
- Adequate protection must be provided to the various parties
- Be prepared to pay the price for such protection
- Be aware that substantive changes to state law may be required, requiring that these issues be dealt with early in the negotiations process

With regard to the provision of adequate protection for all parties, it is wise to try to obtain - as VRE did - a retroactive premium provision that will allow lower premiums on the assumption of no significant claims. If claims do occur, the policy can be automatically reinstated upon repayment of the previous discount. In addition, once you have established an insurance program, use it to its maximum extent. For example, you may be able to absorb liabilities from your contract operator (say, for federal employees liability protection – FELA) at less cost through your program than your operator charges you. For example, Amtrak charges VRE 8 percent of employees' salaries for FELA protection.

6. Utilize Capacity Modeling to Verify Capital Program Requirements

The detailed service plan and schedule alluded to earlier in this section, together with the preliminary capital program inherent in the Twin Cities Metropolitan Commuter Rail Feasibility Study, will serve as initial or baseline input to capacity modeling. Capacity modeling has become the preferred method for determining the capital program required to support joint commuter and freight rail service.

Railroad capacity simulation software and related expertise is available through a number of private consulting firms. Some railroads have developed their own software, while some out-source this service on an as-needed basis. In general, there are two types of capacity simulation software – time-based and event-based. The latter is preferred by most railroads as such software more closely reflects the decision-making logic and priorities of railroad dispatching personnel. The application of both

types of software to identical operating constraints suggests that event-based simulations tend to arrive at less capital-intensive capital requirements which provide an equal or higher degree of joint commuter and freight operation efficiency.
The capital requirements arising out of capacity simulations should be used as the baseline for determining public and private capital costs and benefits and - eventually - the negotiation of a reasonable cost-sharing formula.

7. Determine Public and Private Benefits and Cost

The capital improvements arising out of the capacity simulation exercise should be segregated into three categories – (1) those accruing benefit(s) to commuter service only, (2) those of exclusive benefit to freight railroad operations, and (3) those improvements providing mutual benefit(s).

The railroad's position vis-à-vis cost sharing is likely to be that these costs are incremental – that is, due solely to the provision of commuter rail service. Consequently, their position as to the disposition of these costs is likely to be that they should be borne entirely (or almost entirely) by the public sector. As a result, the focus of negotiations must be on the benefits as well as the costs to each of the affected parties.

Few will argue that the cost of capital improvements which benefit only commuter rail service should be borne by the public sector. Logic would dictate that the cost of capital improvements solely benefiting the railroad(s) should be paid for by the railroads while the cost of those that result in mutual benefits should be shared. However, this logic fails to reflect or account for the experience of every domestic commuter rail property. Ultimately, the public sector will bear the financial burden of the vast majority of capital improvements required, regardless of the primary beneficiary of those improvements.

The reasons for this are many and varied. The primary reason, of course, is that the railroads own and operate their respective physical plants. Such infrastructure is private property and not subject to rights of condemnation or Eminent Domain unless the railroad(s) decide to abandon or for some other reason convey title to their assets.

With the exception of Amtrak, which is empowered by federal law with the power of Eminent Domain for the provision of intercity passenger service, trackage rights can be obtained only through and with the consent of the owning railroad(s). The railroads are in effect selling (hopefully) some available freight capacity in addition to capitalizing on the potential to leverage public funds to maintain or more likely increase such capacity. Consequently, if and when the railroads agree to convey such rights either directly or through an instrument such as a Purchase of Services Agreement, they are not provided free of charge.

The construction of capital improvements required to support joint commuter and freight rail service have the potential to interfere with freight service - at least until such improvements are constructed/installed, tested and commissioned. This potential for interference, including increased levels of railroad operations management required during construction, also brings with it a price.

The increased level of managerial and administrative effort required of the railroad(s) to coordinate (and perhaps operate) joint commuter and freight operation is significant. These are activities for which the railroad(s) also expects compensation. The cost related to such services are usually credited to the public operations and maintenance (O&M) as opposed to capital ledger, although any additional signaling, control and/or communication equipment required to provide commuter service are generally considered capital investments.

8. Negotiate a Reasonable Cost-Sharing Formula

When you deal with the freight railroads in the context of providing commuter rail service – and deal with them you must – you are essentially a captive audience. The question is not whether a significant amount of public money will be expended for the benefit of all parties, the questions are how much and on what.

The railroad's likely negotiating position can be illustrated by the equation shown below:

Public Contribution = XF + C, where X = some factor > 1.0

and F = existing freight service capacity
C = anticipated commuter service capacity

In other words, railroads will insist on the public sector providing them with increased freight service capacity in addition to the capital program required to support commuter rail service as the cost of providing trackage rights or access.

In contrast, the public negotiating position should recognize that the cost of "C" should in fact be borne by the public, while some portion of the cost of "XF" should be shared – specifically that portion which is of demonstrable and significant benefit to the railroad(s).

If possible, a cost-sharing formula should be negotiated which is based on the relative vehicle-miles of commuter and freight travel anticipated. Such an approach recognizes and accounts for the incremental cost of providing commuter service as well as the disproportionate maintenance costs of commuter and freight operation insofar as they relate to maintenance of way, structures and systems.

After such a formula has been agreed-upon, the parties should apply this formula to the capital program to determine relative public and private capital obligations. Compensation for capital expenditures, whether by the railroad(s) or another contractor, should be provided on a fixed-price basis. Compensation for trackage rights should also be provided on a fixed-price basis.

Operating costs, with the exception of trackage rights, should be reimbursed on a cost-plus fixed fee basis. Incentive-based compensation, liquidated damages, unanticipated cost increases, extra work (such as special events service) and performance audits should all figure into the operating cost compensation structure.

Public and private railroad interests differ somewhat in relation to the provision of commuter rail service. These differences need to be understood, respected and reconciled through well-organized and thoughtful negotiations. Ultimately, both parties must compromise, although the greatest financial compromises are likely to be made

by the public sector. Such is the price for the use of private property, equipment and expertise for the provision of public service.

This section has provided general guidelines for the conduct of such negotiations. Once organized, Mn/DOT and its public partners should establish an over-arching procurement strategy, retain the appropriate expertise to provide assistance, and deal immediately with the many complex risk, liability and insurance issues inherent in the provision of joint commuter and freight rail service.

Regardless of the differences that will invariably arise between the public and private sectors, the risks must be understood, identified and mitigated. In addition, all parties must be provided with adequate protection through the provision of reasonable and appropriate indemnification and the various insurance instruments available within the marketplace. Finally, the public sector must carefully weight the relative costs and benefits of providing such service, vigorously protect its long-term as well as short-term interests, and be prepared to walk away should the proposition prove too costly.

Right-of-Way

Many of the active rail lines throughout the Twin Cities Metropolitan Area support relatively high levels of freight traffic. The host railroads will not want to sell these lines, and so the commuter rail sponsor and/or its contractor(s) will be tenants of the host railroads. Other lines have moderate to low freight traffic and it is conceivable that the owners may want to sell these lines to the commuter rail sponsor.

There are also rights-of-way that are no longer active that the sponsor may decide to purchase to ensure future availability for commuter/other rail use. The sponsoring agency will have to decide on its level of involvement in the right-of-way banking process. The Regional Rail Authorities have historically been quite active in this regard. Consequently, it is suggested that they and the commuter rail sponsor work together on future railroad right-of-way preservation activities.

In some instances, the commuter rail sponsor may find itself forced to purchase a rail line in order to ensure continued operation of the line. If freight service were to

continue on this line, the freight rail carrier would then be a tenant of the commuter rail sponsor.

Ownership of Rail Corridors

Looking at the experience of the other commuter rail agencies, there is no clear traffic threshold at which a railroad decides it is willing to sell a corridor. The relative freight traffic densities within each the potential First Tier commuter rail corridors serving the Twin Cities Metropolitan Area are as follows:

CORRIDOR:	OWNERSHIP:	FREIGHT TRAFFIC LEVEL:
Dan Patch	CP/BNSF	Low
Northstar	BNSF	Significant
Red Rock	CP	Significant

The rail carriers would not be likely to even want to discuss the sale of lines with significant freight traffic flows (more than 20 daily trains). Discussions on the acquisition of moderate to low trafficked freight corridors may prove productive, however.

While there are many responsibilities that come with the ownership of an active rail corridor, such ownership offers many incentives - not the least of which is that the owning entity would be the master of its own domain. Many commuter rail agencies have acquired lines on this basis, and have willingly taken on the responsibilities that ownership entails. Chief among the positive benefits is the fact that you are now responsible for dispatching the trains. While the coordination of commuter and freight movements at interlockings would continue to be somewhat problematic, public employees (or employees under contract to the sponsoring agency) would control the critical dispatching decisions.

But the ownership of a corridor should not become a “make or break” issue for the provision of commuter rail service. Certainly, other agencies have accepted life as a tenant of a freight railroad on a moderate to low trafficked line. It is possible that the

host railroad may change its mind and decide to sell a rail line. An example of this can be found in the Metra Southwest Service. Metra had been sponsoring commuter rail service over the Norfolk Southern's line for six years before the rail carrier agreed to the sale of the line.

Ownership of abandoned corridors may also become an issue for the commuter rail sponsor. Certainly, the county regional rail authorities have had a history of aggressively pursuing similar opportunities to ensure that use of a right-of-way is not lost. Given their extensive involvement in this regard, it is suggested that the regional rail authorities and the commuter rail sponsor work together on future right-of-way preservation activities.

A final point on the purchase of rail lines and/or rights-of-way is that these should be subject a cost-benefit or rate of return analysis. Before agreeing to the purchase of a line/right-of-way the commuter rail sponsor must ensure itself that the purchase makes financial sense, compared to the trackage rights arrangement or to the loss of the rail corridor.

Sometimes purchase of a rail line may not be desired intent of the commuter rail sponsor, but events overtake this intent. An example of this may be found in New Jersey where NJT was forced to acquire a line from Conrail in order to be able to provide diesel light rail service on the corridor. This situation was also complicated by the fact that the low-floor vehicles the agency wished to use (in order to make the service economically viable) were not FRA-compliant. The FRA then required complete separation of passenger and freight service over the corridor on account of concerns over how the dissimilar vehicles would behave in the event of a collision between a passenger and a freight train. This limitation on hours of service for both modes may have economic impacts on both services.

Under these conditions Conrail was no longer willing to bear the full cost of maintaining and operating the line. Hence the public agency was required to purchase the route in order to ensure its continued operation.

Other Land Ownership Considerations

The sponsoring agency may acquire land on which stations or parking lots are built, and where it locates remote storage sites on each of the corridors. Stations and parking lots may remain in the ownership of the sponsor, but be leased to the local municipality which then takes on the day-to-day maintenance responsibilities. This approach has been pursued by several commuter rail agencies, including Metra and Metro North. Alternatively, the sponsor may require the municipality to own the land and the improvements upon it from the start. This has been the approach taken by both Metrolink in Los Angeles and the "Sounder" project in the Puget Sound area. In the case of Los Angeles, the on-line communities were given an exceptionally high degree of freedom in the design and construction of the facilities. A considerably more rigid set of facilities design guidelines was developed by the "Sounder" staff and used to guide the work undertaken by the municipalities.

Policing or providing adequate levels of public safety and security can be the responsibility of either the commuter rail sponsor or the affected communities. In the former case, the sponsoring agency must maintain its own security force – a particularly costly endeavor in light of the geographic diversity of most commuter rail operations. If public safety and security is provided the affected communities, such services are often rendered through contractual means by state or local law enforcement officials.

Should a central maintenance facility be required for the commuter rail network, this land and facility would fall under the sponsoring agency's ownership. Similarly, a central control facility (if required) and agency administrative offices could be located on land which the sponsoring agency owns. As in the case of the corridor right-of-way, land ownership or the lack thereof should not be a make or break deal on any of these facilities.

Summary

This section has discussed various right-of-way and other land ownership alternatives throughout the Twin Cities Metropolitan Area. Ultimately, the commuter rail sponsor will

have to establish appropriate policies for its involvement in these areas in cooperation with other interested and affected governmental agencies.

The commuter rail sponsor should pursue opportunities to own rail corridors to the maximum extent possible within its financial limitations. Such ownership should be pursued in cooperation with the Regional Railroad Authorities, and should extend to dormant rail lines that prove to be viable candidates for eventual commuter rail service to ensure that future availability is not lost.

While it would be preferable for the municipalities to own the land on which stations and parking lots are constructed, the sponsoring agency may own these properties, as well. Leasing of stations and parking lots to the municipalities should be pursued to the maximum extent possible.

The commuter rail sponsor should acquire the land or property which maintenance, central control and administrative operations are located.

Communication, Signaling and Train Control

The Twin Cities Metropolitan Commuter Rail Feasibility Study indicated that "radio equipment purchased new for the commuter rail system should be compatible and consistent with the equipment the rail freight carriers are purchasing".

Each of the proposed commuter rail corridors evaluated during the earlier Twin Cities Metropolitan Commuter Rail Feasibility Study currently supports freight rail service provided by the Burlington Northern Santa Fe (BNSF) and Canadian Pacific Railway (CP).

Radio Communication

As the Twin Cities commuter rail network matures and expands, commuter trains will be required to operate over more than one division/subdivision of the same carrier in the course of its one-way trip. For example, a Dan Patch Corridor train leaving from Lakeview would begin its journey on the CP Savage Spur, continue onto the CP M&NS

Spur, transition to the BNSF Wayzata Subdivision, continue onto the BNSF Midway Subdivision, transition to the BNSF St. Paul Subdivision and finally operate via the CP Merriam Park Subdivision to the St. Paul Union Depot site. This would require the locomotive and cab car to be radio-equipped with the frequencies of both the BNSF and CP. In most cases, a given rail carrier will use multiple frequencies to control operations in a densely-trafficked area such as the Twin Cities.

The radios which the rail carriers use are capable of operating on their own multiple frequencies, as well as the frequencies of the other carriers over which that equipment may operate, such as when exercising trackage rights. The locomotives and cab cars purchased for the Twin Cities commuter rail service will be equipped in a similar manner. The identical situation exists for Amtrak whose locomotives must be equipped to operate on the frequencies of all the host carriers.

Commuter rail management and maintenance personnel will be able to monitor each of the host railroads, as well as those carriers having trackage or other operating rights, to ensure adequate levels of safety and efficiency. It may be necessary to provide secure channels for management and/or security operations. In the latter instance, if the commuter rail owning entity were to have its own facilities security force, they might well have their own channel, rather than try to share one of the operating channels. Communications coordination with Metro Transit's security forces should be considered.

A separate Central Control Facility (CCF) has been presumed to be required in conjunction with the proposed commuter rail network. Both the commuter rail CCF and those of the host rail carriers will monitor both unique and all common frequencies at all times. Initially, this facility may only be responsible for the generation and updating of variable message signs in trains and on the station platforms and for the broadcast of PA announcements to stations. However, it should be designed for eventual expansion into a facility that will also handle train dispatching duties.

Burlington Northern Santa Fe (BNSF)

BNSF is standardizing on Motorola-brand radio equipment for use in locomotives, cab cars, maintenance of way vehicles, track machinery and its over-the-road vehicles. Motorola "Spectra" series mobile radios are now the standard for locomotives and cab cars. These are fixed installations that remain in the cab, as opposed to a portable radio. Engine crews now use headsets with built-in microphones that filter out extraneous background noise allowing them to focus on the radio traffic. These also provide for hands-free radio transmission, using a foot pedal. The carrier is also using "Spectra" series mobiles on maintenance equipment and over-the-road vehicles. Most every on-track piece of machinery, as well as the company's road vehicles, are now radio equipped. Certain jobs require the use of a portable radio. In these cases, BNSF has standardized on the Motorola HT1000 multi-channel radio.

A review of a recent BNSF employee timetable indicates that a total of seven radio frequencies are being used to conduct train operations in the Twin Cities. All of these frequencies are in the 160 MHz radio band. Of the seven, four are used by trains operating over the various subdivisions, and the other three are reserved for dispatcher use.

The railroad employs centralized dispatching from its Fort Worth, TX operations center for the control of train operations in the Twin Cities area (see also the section on train control, below).

Canadian Pacific Railway (CP)

This railroad also uses Motorola-brand radios. Mobiles are installed in the cabs of all locomotives. Although not currently in use, 244 of CP's locomotives are equipped to facilitate communications through plug-in headsets, as well as the conventional method of using a hand-held microphone for radio communications.

Review of a recent CP employee timetable indicates that the carrier has five active radio frequencies for train operations in the Twin Cities area. Again, these are all in the 160 MHz band. The carrier is in the process of installing fiber optics along the length of its Chicago-Winnipeg mainline. All radio base stations will then be linked to this

fiber optics system. Radio base stations are programmed for upgrade beginning from next year.

CP dispatchers for the Twin Cities are located in the Soo Line Building in downtown Minneapolis. Safetran System Corporation supplied CP's dispatch equipment.

Other Communications Equipment

All railroads also make use of telephones and pagers to facilitate field communications. The commuter rail owning/operating entity would require similar equipment to manage its operations. Equipment compatible and consistent with what the host railroads are purchasing is recommended.

Note that some employee classifications in operations and maintenance at the rail carriers presently carry all three devices. Certainly, the trend in telecommunications is towards increasing functionality within a single device. It can be expected that as the technology matures, a more capable integrated unit may supersede the rail carriers' reliance on separate devices. However, the timeframe for the development of these devices is not in the carrier's hands.

Signaling

The Twin Cities Metropolitan Commuter Rail Feasibility Study called for the use of Centralized Train Control (CTC) throughout the proposed Twin Cities commuter rail network. Those lines that were not then equipped with this signal equipment were programmed for upgrade as part of the proposed commuter rail capital program. The CTC equipment to be purchased for use on the commuter rail network "should be compatible and consistent with what the rail freight carriers are purchasing".

New interlockings, compatible with existing railroad control facilities (see the section on train control, below) would be installed at the ends of new sidings, as well as at ends of extended sidings.

In a similar vein, grade crossing warning equipment was recommended to provide a constant warning time for highway/pedestrian traffic (regardless of the approaching train's speed), and to provide two-quadrant installations at all grade crossings. To minimize the maintenance impacts, the grade crossing warning equipment to be purchased should be compatible and consistent with what the host carrier is currently purchasing.

A detailed review of the grade crossing warning equipment by crossing should be conducted during preliminary engineering to determine what crossings, if any, do not require replacement of the existing equipment. Recall that the Feasibility Study Capital Program was deliberately conservative in assuming that all crossings would require new warning equipment.

Contemporary CTC applications can have very broad application and include interfaces to many of the other signal/communications systems in use on a rail line. For example, CP uses a Safetran System Corp. base (station) control package operating in the 900 MHz frequency band for its CTC system. The railroad is planning to include grade crossing interfaces on this system in the future. It is also possible for a CTC installation to provide the interfaces between the dispatch center and ancillary field communications equipment including wayside equipment defect detectors.

Train Control

Communications and control roles for the commuter rail CCF will vary depending on the exact contractual relationship that exists between the commuter rail owning entity and the host rail carriers. For a purchase-of-service relationship (this exists between Metra and the BNSF on the Chicago-Aurora commuter rail service), the commuter rail CCF would not be engaged in any direct radio contact with the field operations or maintenance forces. The host railroads would dispatch and direct operations. In this instance the commuter rail CCF would function more like a message center.

If commuter rail service were to be provided under trackage rights agreements, the commuter rail CCF would have responsibility for direct communications with operations

and maintenance crews. This CCF would be used to coordinate events among the dispatch centers of the host carriers, particularly when there are disruptions to service.

The commuter rail CCF does not necessarily have to be compatible with the equipment used by the railroads. However, there are only a few manufacturers of this sort of equipment, so it is likely that compatibility might occur "by accident."

BNSF dispatch is presently from a centralized operations center in Fort Worth. DigiCon supplied the control equipment (consoles, etc.) for this facility. The same manufacturer has supplied the control equipment used in the regional control facilities in Houston and San Bernardino. If the regional control concept were to be used in the Twin Cities, it is likely that the rail carriers might require the commuter rail owning entity to provide a workstation for this facility.

CP dispatchers are grouped in key locations over its network. Dispatchers working out of the Soo Line Building in downtown Minneapolis control Twin Cities area rail operations. Safetran System Corp.-supplied dispatch equipment is used.

A commuter rail CCF is required. Initially, this may be only for the generation of visual messages and for the broadcasting of PA announcements. This facility should be designed for eventual expansion allowing it to assume train dispatching duties.

Passenger Communications

The final aspect to be considered is that of communications with the passenger at stations and on-board the trains. In this instance the host rail carriers do not have any practices or standard equipment, as they are not responsible for these sorts of communications. The practices of the other commuter rail carriers are used as the guide for the following discussion. The general rule to be followed here is that it is good business to keep your riders informed, especially in the event of a delay or other service perturbation.

In stations, ADA requires the provision of visual and tactile fixed signage, as well as the use of variable message displays and public address equipment. The commuter rail CCF would control these systems and the generation of the messages displayed/

broadcast. Some agencies have sold space on these displays to advertisers, with this use being superseded by any transit system message (delays, diversions, etc.).

Stations should also be equipped with PA systems in order to similarly alert riders to changes in schedule or other information. The use of Closed-Circuit Television (CCTV) and/or emergency alarm equipment should also be considered, though the cost-effectiveness of such security measures is questionable in light of the widespread availability and use of personal cellular or wireless telephones. The cost of CCTV and dedicated emergency alarm equipment is not included I the current commuter rail capital program.

Although in its relative infancy, many transit systems are moving to provide interactive displays in stations, as well as the variable message signs and PA systems. The biggest challenge for a transit agency is the first-time or infrequent user. While fixed signage can be provided to guide this potential rider through ticket purchasing and boarding procedures, for example, it is very difficult to know what sort of information each user needs to make their decisions. It is also tough to ascertain, and dangerous to assume, the amount of knowledge that user brings to the transit facility. Interactive displays can be an excellent "bridge" to these new riders.
A very recent development in the Twin Cities is Metro Transit's implementation of advanced vehicle tracking and trip planning systems through Mn/DOT's Orion Program. A further use of the information these systems provide can be the provision of real-time information at transit stops. If the commuter rail system were to provide interactive/real-time information displays in stations it would be preferable to have this tied into the Orion Program, as well. Establishing this link would also make it possible for a single transit information center to provide the trip planning services for all transit providers in the Twin Cities. Once again, from a user standpoint it is preferable to have a single source for this information, rather than a fractured approach.

With the ties to the Orion Program, commuter rail rolling stock and locomotives would require global positioning system (GPS) installations. This would allow the agency to track train progress in order to be able to display "x minutes to next train" messages at stations, etc. There are further ties to maintenance programs, etc., which can benefit from the provision of the GPS equipment.

It is recommended that all trains have on-board PA systems and variable message signs, to allow the next stop to be identified, as well as to communicate other information. This system can also be used to expedite train crew communications. For consists where locomotive-hauled equipment is used, the PA should also tie into the locomotive to allow the engineman to communicate with the crew back in the coaches. Frequently, this may be to ascertain if all doors are closed, etc. For such routine communications it is preferable to use the on-train PA, rather than broadcast this over a radio channel.

Summary

Communication, signaling and train control equipment and systems form the "central nervous system" of commuter and freight rail operations. The safety and reliability of joint commuter and freight service depends on the use of state-of–the-art communication and control equipment and systems utilized in the framework of coordinated operations and emergency response and recovery plans and procedures.

The key word governing design philosophy and equipment procurement in the area of communication, signaling and train control is "consistency". This means consistency with industry standards and with the host carrier's practices and equipment.

The accommodation of other more recently developed communication and service control technologies such as GPS and interactive/real-time data collection and display should be considered as one of many means to enhance system productivity and customer satisfaction.

Locomotives and Rolling Stock

The Twin Cities Commuter Rail Feasibility Study included a comparison of attributes for locomotive-hauled and self-propelled commuter rail equipment. Although no definitive conclusion was drawn at that time, the commuter rail capital program did include purchase of new locomotives and rolling stock for each route, as well as spare engines and cars.

A positive development in this market in the past few years is that there are more options for new locomotives available, with both Electro-Motive Division (EMD) and General Electric (GE) offering passenger diesels. Previously, only EMD was manufacturing a service-proven passenger locomotive.

New Commuter Rail Locomotives

The only current domestic manufacturers of service proven commuter rail locomotives are EMD and GE. No foreign builders of commuter rail locomotives have attempted to enter the North American locomotive market, as the train sizes and working conditions are far more demanding than those found in Europe. In fact, EMD and GE locomotive designs have been successfully and extensively exported around the world.

Electro-Motive Division (EMD)

EMD's current offerings are the F59PHI and the DE30AC locomotives. Both offer 3000 traction horsepower from a 12-cylinder model 710 diesel engine. Electronic fuel injection is used on both designs to improve fuel economy and reduce emissions. The standard F59PHI is capable of 110 mph operation, while the DE30AC has a 100 mph top speed.

The "I" in the F59PHI stands for "isolated cab". In this design, the cab is isolated from the frame of the locomotive using rubber mounts. This reduces vibration and noise levels in the cab. It also reduces the wear and tear on cab located electronics and controls. The F59PHI has an aerodynamic design, and the locomotive's structure exceeds FRA crashworthiness standards. Head-end power (for car lighting and HVAC, which runs on AC, as opposed to the DC the engine generator produces) is taken from separate package in the locomotive. This eliminates the need for the diesel engine to run at a continuous speed even when standing still, which was one of the objectionable aspects of the predecessor F40PH model.

F59PHIs have been delivered to Amtrak, GO Transit, West Coast Express (Vancouver) and Metrolink (in Los Angeles). Owing to strict environmental requirements in the Los

Angeles basin, the Metrolink engines were equipped to run on Compressed Natural Gas (CNG). Seattle's "Sounder" commuter rail operation will also take delivery of this style of locomotive.

The DE30AC is a derivative of the dual-mode (diesel-electric/electric) locomotive EMD developed for the Long Island Railroad. Long Island required the dual-mode capability as some of its branch lines are not electrified, while its routes into Brooklyn and New York City are. Trains on these non-electrified lines traditionally stopped at Jamaica, and riders had to transfer to an electric train to continue their journey.

A monocoque design with integral fuel tank characterizes this locomotive. In monocoque construction, the locomotive side panels become part of the support structure for the underframe, as opposed to conventional construction where the underframe is self-supporting. It also has a lower and more aerodynamic profile than the F59PHI. While the standard DE30AC is rated at 3000 horsepower, by using EMD's 16-cylinder engine it is possible to increase horsepower on a short-term basis, such as when accelerating a train, to above 4000 horsepower. The engine would then taper back to a lower level with the train up to speed. A static inverter can also be used to provide the head-end power, eliminating the need for a separate engine.

General Electric (GE)

GE's "Genesis" style locomotive has been produced in large quantity for Amtrak and Metro North. This style of locomotive reintroduced the concept of monocoque construction with an integral fuel tank and the carbody sides as part of the locomotive structure. EMD's DE30AC was designed in response to GE's success in selling the "Genesis" engine.

Amtrak has both diesel-electric and dual-mode (diesel-electric/electric) versions while Metro North has only dual-mode "Genesis" locomotives. The dual-mode versions are used by both carriers on the third rail equipped Harlem and Hudson Lines in the New York area. As in the case of the Long Island dual-mode engines described above, this application of dual-mode technology allows the same engine to run through on the

train. Changing engines is a time-consuming move, hence the interest in providing dual-mode capability.

Amtrak's two orders of "Genesis" locomotives were delivered with 4000 and 4200 horsepower prime movers. The dual-mode version has a 3200 horsepower diesel engine, necessitated by the more extensive electrical equipment complement required in this version. All locomotives of this style have a separate head-end power module. GE, like EMD, offers a static inverter package to supply the head-end power requirements.

The diesel-electric versions are capable of 100 mph operation.

Other Manufacturers

From a worldwide perspective, Adtranz, Alstom and Siemens all offer diesel-electric locomotives, including passenger-capable versions. Siemens and EMD have partnered their technologies, with Siemens contributing the AC traction motor technology, as included in the DE30AC and other models.

Remanufactured Locomotives

Several builders have remanufactured locomotives for commuter rail operators. Motive Power Industries (formerly MK Rail) in Boise, ID and Mountain Top, PA has rebuilt and converted former freight locomotives for commuter rail operations throughout the US. Amtrak has also rebuilt surplus F40PH locomotives for commuter rail service at its Beech Grove, Indiana facility. Alstom's diesel shop in Montreal is also capable of performing these sorts of conversion projects.

A complete remanufacturing of the mechanical components is typically required, along with upgrade of the electrical gear to the latest standards. Inclusion of head-end power module is also typical of these conversion projects. Frequently, this requires lengthening the carbody to house this additional equipment.

Starting from a passenger locomotive, such as a surplus Amtrak F40PH, means that the engine for providing the head-end power is already in place. This simplifies the rebuild process, but still all mechanical and electrical equipment requires attention after 20-25 years of service.

Typical specifications for a remanufactured freight locomotive result in a commuter locomotive offering between 2300 and 3500 horsepower, with separate engine (of between 350 and 600 horsepower) supplying the head-end power.

The basic consideration in purchasing remanufactured equipment is that some significant portion of the equipment's economic service life has already been expended. The rebuilt units have typically been in service for 20-odd years prior to the rebuild/conversion, and can be expected to offer between 10 and 15 years service after rebuild.

Hauling Capacity

Any of the locomotives listed in this section can easily handle an 11-car train. Metra's EMD F40PHs, some of which are now 20-plus years old, handle this assignment on a daily basis. Some carriers' policies lead to double-heading (two locomotives under the control of one engine crew) of longer length trains, though this would not absolutely be required. Another factor which affects the decision to double-head is the stopping pattern for the train (the frequency with which the engine[s] must stop/start this train).

Summary

Due primarily to the availability of new commuter rail proven locomotives from at least two domestic sources, the use of new motive power is recommended over the purchase of used or remanufactured equipment. However, the use of rebuilt/remanufactured locomotives should also continue to be considered with the understanding that the effective service lives of these engines will be less than can be expected for new equipment. The extent of upgrade/rebuild on a locomotive in this category should be clearly specified, as should the expected capabilities of the rebuilt locomotive.

EMD and GE both offer acceptable and proven designs of commuter rail locomotives. Development of these products is continuing. A specification for new commuter rail locomotives should require that the engines be service-proven in order to be considered for this application.
Regarding consist lengths, any of the new or rebuilt locomotives could handle between 3 and 10 cars singly. This is an example of another key performance requirement that should be included in relevant specifications.

Rolling Stock

The Twin Cities Metropolitan Commuter Rail Feasibility Study recommended the following peak period service plan for the tier one routes:

The range of train/peak period capacities is affected by the configuration of the cars making up the train. For this analysis, car capacities between 100 and 150 were considered reasonable. Ultimately, the policies of the commuter rail owner may also enter into this, depending on policies with regard to standees on trains, etc.

ROUTE:	TRAINS/PEAK:	TRAIN LENGTH:	ESTIMATED ONE-WAY PEAK CAPACITY:
Dan Patch	6	3 cars	1,800-2,700 riders
Northstar	5	3 cars	1,500-2,250 riders
Red Rock	4	3 cars	1,200-1,800 riders

Car Capacities

This section considers the more-common railcar products and typical configurations for these cars. Other builders have supplied cars to commuter rail operators in North America, but these are mostly variations on the basic designs described.

Bombardier

The only line of commuter rail cars completely assembled in North America is available from Bombardier. Foreign-designed and built cars may have final assembly or other significant portions of the construction work completed in the US/Canada.

Bombardier offers both single- and double-deck coaches and cab cars. By virtue of strong sales of the single-deck cars in the northeast US, and sales of its double-deck cars to most every other commuter rail operator in the US, Bombardier has come to dominate this market.

The builder has delivered variants of its single-deck coach design to Metro North and New Jersey Transit (among others). As delivered to Metro North, these 85' long cars can seat up to 115 passengers, including two in wheelchairs. Including an accessible washroom in the coach means a reduction in seated capacity to 103 passengers. Including a control cab at one of the car reduces the total capacity to 99 passengers.

This style of car is most suitable for use with high-level platforms. While it can be used with low-level platforms, the dwell times will be lengthened, as riders must climb steps

to board the car. Wheelchair access can be arranged via a center door with lift, though again this reduces total capacity of the coach.

Bombardier designed these cars for operation in up to 10-car consists and for a maximum operating speed of 100 mph. While operation of 10-car trains may not occur for a long time, if ever, on the Twin Cities commuter rail routes, what is significant is the fact that this car (or any other product designed for operation in multiple-car trains) will be able to withstand the forces transmitted between cars in a coupled train. In developing the specifications for procuring rolling stock, the commuter rail sponsor should require that the cars have been designed for and have previously operated successfully in multiple-car trains elsewhere.

Bombardier's double-deck (or bi-level) car has been an extremely successful design with over 500 of these in service in North America. Once again, this design is based on an 85' overall length, but provides two low-level boarding areas per car side. Wheelchair and other disabled riders can be accommodated in the areas adjacent to the doorways. An ambulatory rider can sit on either the lower or upper decks.

The low-level doorways allow for faster boarding and alighting compared to a high-floor car. Deploying a vehicle or wayside mounted ramp to bridge the gap between the platform and the carfloor provides accessibility.

This configuration (in profile the car is shaped like a cigar band) allows this car to seat up to 164 riders. Including a control cab, accessible washroom, areas for wheelchairs and for bike storage reduces the overall car capacity.

In example, Florida's Tri-Rail is an operator who has ordered Bombardier bi-levels more than once. In response to changing rider and regulatory demands, the carrier's cars are outfitted in several different ways, as listed below:

CONFIGURATION:	SEATED CAPACITY:
Coach, non-accessible without restroom	155 riders
Coach, non-accessible with restroom	153 riders
Coach, accessible with restroom	150 riders
Cab car, non-accessible without restroom	150 riders
Cab car, accessible and with restroom	122 riders, including two wheelchairs
Cab car, accessible, with bike rack and restroom	126 riders, including four wheelchairs and bicycles

As can be seen from the information above, capacity is affected by amenities. Accessibility is not an option, it must be provided. Given the strong bicycle culture in the Twin Cities, bike racks would also be an attractive feature on the rail cars.

Another option that Bombardier has included in its cars includes the food service bars used on the West Coast Express bi-levels. Interestingly, the inclusion of this feature does not have an effect on the crush load (standing plus maximum standing capacity of the car), as the West Coast Express car can hold as many people under these conditions as can the "plain" coaches for the San Joaquin Regional Rail Commission.

Bombardier's interior design provides for seats on tracks, as well as totally removable seats. This allows the configuration of the car to be changed to provide additional room for bicycles or other amenities. The lower level of a typical Bombardier bi-level also includes wall-mounted flip-up seats in the area where wheelchairs can be accommodated. Should there be no wheelchair riders on that train, ambulatory riders can use these seats. This configuration is familiar to many transit riders, as it is also used on city buses.

As with the builder's single-deck car design, the bi-levels are designed for operation in up to 10 car trains, and can operate at speeds up to 100 mph.

Bombardier's single- and double-deck commuter rail cars are designed to comply with all FRA requirements, with regard to buff strength and other safety requirements.

Kawasaki

Kawasaki has assembled FRA-compliant double-deck cars for the Long Island Railroad, MARC, MBTA and VRE. The deliveries for MARC and VRE are in progress. As delivered to VRE, the double-deck cars will accommodate 145 passengers, including wheelchairs. VRE has specified a 36-inch seat spacing to make these cars more comfortable. The carrier also emphasizes that it is using a 2-2 seating arrangement. As noted in the Twin Cities Metropolitan Commuter Rail Feasibility Study, some carriers went to 3-2 seating in an effort to increase car capacities, but this is not always well-received by the riders. When deliveries are complete, VRE will retire its ex-MBTA demotorized Budd RDCs, which are almost 50 years old.

Sumitomo

This Japanese manufacturer has produced stainless steel carbodies for the gallery-type cars used on the Caltrain and Metra operations. Unlike the Bombardier bi-level car, which has two separate floor levels in its center section, the gallery car has upper decks which surround the open gallery of the first floor. This allows a single trainman to easily check tickets on both levels of the car, but it is a slow loading/unloading vehicle.

Boarding from a low-level platform, riders must first climb three steps to get to carfloor level. To go to the upper decks, they must climb a further flight of stairs internal to the passenger compartments. In order to make this style of car accessible, both Metra and Caltrain have had to install vehicle-mounted wheelchair lifts. Providing for wheelchair maneuverability within the passenger compartments has also dramatically affected the per-car capacity. Even with an accessible washroom, a gallery-type cab car can still accommodate 130 passengers.

In the case of Metra's order, the outfitting of the carshells was done in Illinois (a contractual requirement) by Amerail, a now-defunct concern.

Metra has outfitted some of its gallery cars with snack bars, located in the vestibule areas of the cars. This precludes use of the vestibule for passenger entry/exit. As

these cars are deployed in longer trains (8 cars or more), the loss of the vestibule is not an issue. This approach would not be acceptable in a short consist, say four cars or less, where the loss of the vestibule would drastically effect loading/unloading times.

Remanufactured Rolling Stock

As discussed in the Twin Cities Metropolitan Commuter Rail Feasibility Study, another option is to buy rolling stock from an existing operator. The market for commuter rail rolling stock goes through periods of high and low demand, and resale of equipment between properties does occur. In the last two years, locomotives and cars from GO Transit (Toronto, ON) have been sold to the Fort Worth Transportation Authority for use on the Dallas-Fort Worth commuter rail service, and from Virginia Rail Express (VRE) to a potential operator in Vermont. In the latter case, these were demotorized Budd Rail Diesel Cars, which VRE had bought from the Massachusetts Bay Transportation Authority (MBTA). Another proposed start-up in Nashville has purchased locomotives from an equipment broker, and had been considering the purchase of surplus Metra gallery cars.

Amtrak is also a source for locomotives and cars. Ex-Amtrak locomotives have gone into commuter service on Tri-Rail and other carriers. As Amtrak receives its "Acela" high-speed trainsets for service on the Northeast Corridor, it can be expected that the oldest of the "Amfleet" cars will be cascaded to other services or become surplus to Amtrak's needs.

The basic consideration in purchasing second-hand equipment is that some significant portion of the equipment's economic service life has already been expended. While the ex-MBTA RDCs discussed previously are about to enter their fifth decade of service, they will have done so through costly rebuilds and remanufacturing.

PROPERTY:	CAR STYLE:	CAPACITY AS DELIVERED:	CAPACITY, 3-CAR TRAIN:
Caltrain	Gallery	■ 160 riders (non-accessible) ■ 130 riders (cab; accessible)	450 riders (one car accessible)
DART	Rebuilt RDC	88 riders	264 riders (all cars accessible)
Metra	Gallery	■ 160 riders (non-accessible) ■ 130 riders (cab; accessible)	450 riders (one car accessible)
Metrolink	Bi-level	■ 150 riders (coach) ■ 130 riders (cab)	430 riders (all cars accessible)
Metro North	Single deck	■ 103 riders (coach) ■ 99 riders (cab)	305 riders (all cars accessible)
Tri-Rail	Bi-level	■ 155 riders (non-accessible) ■ 126 riders (cab; accessible)	436 riders (one car accessible)
VRE	RDC Single deck Double deck	■ 99 riders (coach) ■ 92 riders (cab) ■ 120 riders (coach) ■ 112 riders (cab) ■ 145 riders (coach) ■ 145 riders (cab)	290 riders (all non-accessible) 352 riders (all cars accessible) 435 riders (all cars accessible)

Conversely, Metra is still running stainless steel-bodied gallery type cars that were built by the Budd Company in 1950. The biggest challenge to Metra in keeping these cars in service has been the deterioration of the truck frames. The stainless steel car bodies are nearly indestructible. By comparison, steel-bodied cars that were built in 1955 have been retired due to corrosion problems.

The variety of car types and configurations operated by VRE, as well as the good data on car capacities, provides an interesting comparison for car and train capacities. In addition to the types listed above VRE also operates lounge cars in some trains. These 85-foot cars have a seating capacity of only 60 riders, as much of the car is laid out for refreshment service.

A fundamental point about car and train capacities is that there are any number of ways the same car can be configured inside. This can result in very different capacities within the same basic carshell. The VRE lounge car is a good example of this. Taking the same 85-foot, single deck car, depending on seat spacing and amenities (washrooms, food service areas, etc.) the car could seat anywhere from 60 to 90 persons.

Given that the Twin Cities cars are yet to be ordered, all cars should be accessible, in order to comply with ADA. This would reduce the theoretical train capacity slightly compared to the data in the table above.

Train Lengths

The projected passenger loads from the Twin Cities Metropolitan Commuter Rail Feasibility Study make the three-car train length a reasonable minimum. The practices of the peer properties are similar in this regard. In-service train lengths should be balanced by the demand forecasts of the advanced corridor planning process, as well as actual ridership counts by train.

While Metra's predecessors (notably, the Milwaukee Road) would operate a single-car train composed of a gallery-type cab car, the public agency uses a four-car minimum train length. One reason for this change is that the off-peak and weekend ridership is now heavier than it was when the private carrier was still providing the service. Further, to be able to operate a short train, the cab car must be marshaled at the correct position in the consist in order to uncouple the excess cars and operate the short train.

Regarding maximum train lengths, the Bombardier literature indicates that the manufacturer's single and double-deck cars can run in up to 10-car consists. Documentation for the Seattle "Sounder" service indicates that this operator plans to run trains up to 10 cars in length. While operation of 10-car trains may not occur for a long time, if ever, on the Twin Cities commuter rail routes, what is significant is the fact that this car (or any other product designed for operation in multiple-car trains) will be able to withstand the forces transmitted between cars in a coupled train. In developing the specifications for procuring rolling stock, the commuter rail sponsor should require

that the cars have been designed for and have previously operated successfully in multiple-car trains elsewhere.

Metra operates some 11-car trains on its network. One of these on the UP-Northwest Line operates on a daily basis and routinely is powered by a single locomotive.

A 10-car train of gallery cars, with an accessible cab car, would have a seated capacity of 1,570 persons. A similarly composed train of Bombardier bi-levels would have seats for 1,521. Operating a 10-car train of Kawasaki double-deck cars, the train would seat 1,450. If 10 single-deck cars were used, this consist would have a capacity of 1,026.

Summary

There are many acceptable designs of commuter rail cars. Factors affecting the selection of car type include changes to the ridership projections, ability of the carbuilder to deliver a particular style of car in a timely manner and the possibility for exercising an option on a car order placed by one of the other commuter rail operators. Regardless of the type of car selected for this application, the design must be compliant with all FRA requirements and PRESS standards (see below).

Regarding train lengths, consists between 3 and 10 cars should be considered reasonable for the Twin Cities commuter rail service, with three car trains being preferable for opening day service levels. In-service train lengths should be balanced by the demand forecasts of the advanced corridor planning process, as well as actual ridership counts by train.

Storage Facilities

Provision for storage of rolling stock when not in service (primarily overnight) can either be at a central storage location or at a series of remote storage facilities.

Although centralized storage of rolling stock reduces the initial costs for facilities, it has significant operational disadvantages since the rolling stock is unable to remain in the

suburbs/outer terminal overnight. With centralized storage, the rolling stock must leave the central storage location every morning and travel in non-revenue service (a "deadhead" move) out to the suburban stations and make the reverse movement back to the central storage location after the end of the operating day. This results in extra non-revenue trips, as well as increasing the number of timetable paths used to accommodate commuter trains on a given rail line.

A remote storage facility would be used primarily at night or over weekends and would consist of a siding close to the last passenger station on the route, but away from urbanized areas. Passenger cars would have their interiors cleaned and locomotives could be plugged into head-end power supplies to allow the engines to be shut down while in storage. Compliance with EPA regulations would be required for this facility and was reflected in the prices included in the Twin Cities Metropolitan Commuter Rail Feasibility Study Capital Program. The Capital Program included remote storage facilities at the terminal of each of the six recommended routes.

Central Maintenance Facility (CMF)

If a dedicated commuter rail CMF is built on the property of an existing railroad or is an expansion of an existing railroad facility, that host railroad's standards and practices will be followed in addition to local and national standards.

While none of the yards in the Twin Cities area currently engage in maintenance and servicing of passenger train equipment, use of diesel locomotives similar to those used in freight service would open more options for potential contract maintenance providers.

If no commuter rail CMF is constructed, maintenance could be contracted with one of the area rail carriers or with an outside supplier. If contract maintenance is selected, the amount of rolling stock might have to be increased in order to cover the additional downtime while a car or locomotive is going to or from a remote shop.

Maintenance Prior to CMF Implementation

In the absence of a dedicated commuter rail CMF, the following functions would have to be provided at the interim maintenance location:

- Fueling and sanding of locomotives (could use existing railroad installation if at an existing railroad shop)
- Running repairs and inspection for locomotives (could use existing installation)
- Periodic washing of locomotives (could use existing installation)
- Draining of passenger car retention toilets (new installation required, even if at an existing railroad shop)
- Sweeping out and other trash removal from passenger cars (new carfloor height platforms and disposal facilities required)
- Running repairs and inspection of passenger cars (could use existing installation, but may require additional track in facility, and exceptional equipment expenditures)

  Periodic washing of passenger cars (could use existing installation)

Even with these provisions, major repair/rebuild of commuter rail locomotives and cars still has to be provided. In the early days of the commuter rail operation, these functions should not be required, as the equipment will be new. An exceptional situation wherein a relatively new piece of rolling stock or a locomotive requires major repairs may be as a result of accident damage. In this instance a contractor could be hired to make the repairs off-site.

The Twin Cities Commuter Rail Feasibility Study included a cost allocation for a CMF. Acquisition of the Canadian Pacific Shoreham Shops is recommended as a potential CMF site. Note that implementation of a commuter rail CMF may not occur for several years. However, the opportunity to acquire this site should not be lost.

Distributed Maintenance Facilities

Rolling stock maintenance could be handled at multiple facilities but would not be cost-effective in the early years of the commuter rail operation due to the relatively small fleet size. Further, making the capital investment in several similarly equipped maintenance facilities distributed throughout the commuter rail network would not be a good application of capital dollars. In addition, having multiple facilities performing the same jobs would eliminate any economies of scale possible in consolidated facility.

Factors Affecting the Maintenance Policy

The answer to that question of when it becomes cost effective to acquire/build a dedicated commuter rail maintenance facility is not always so obvious. Looking at the peer properties, many of the recent starts contract for maintenance with a host railroad, or with a maintenance contractor.

One exception to this approach is the Tri-Rail system that began operations owning its own maintenance facility. Although having a small fleet at start-up (5 locomotives, 12 coaches and 6 cab cars in 1989), Tri-Rail acquired the Hialeah Shops from CSX. Initially, CSX employees maintained the rolling stock, working out of this facility. In 1994 (by which time Tri-Rail had 9 locomotives, 15 coaches and 6 cab cars), Tri-Rail initiated a facility capital improvement program for the shops that coincided with the phasing out of CSX maintenance, and the assumption of these responsibilities by Herzog Transit Services. Today, CSX forces remain responsible for maintenance of the signals along the Tri-Rail line.

Reviewing the maintenance arrangements at other properties, in some instances separate contracts for operations and maintenance have been executed with different vendors, while still other agencies have a single provider for both types of services.

Coordination with Other Transit Projects

The Hiawatha LRT project is planning to locate its maintenance facility in the vicinity of Franklin Avenue. Metro Transit has plans for a new central maintenance facility in the St. Paul area. Neither of these sites are on the proposed commuter rail corridors.

Nevertheless, certain functions (upholstery repair, electronics shops, etc.) offer possibilities for coordination of the maintenance responsibilities. Among the advantages of coordination are a single investment in sophisticated diagnostic equipment, centralization of spare parts storage, and reduced staffing levels through consolidation of responsibilities. These areas should be explored jointly between these projects and the commuter rail sponsor to determine the most cost-effective means for providing the required services.

There is also a benefit to procuring similar equipment in order to reduce spare parts inventories, training requirements and the like. Examples of areas where the transit providers should consider common equipment specifications may include station signage and other communications and control media (variable message signs, PA system components), lighting fixtures (both on-board cars and for stations and other fixed facilities) and station furnishings (shelters, seating, etc.).

Summary

Capital costs for the remote storage locations and the CMF were included in the Twin Cities Commuter Rail Feasibility Study Capital Program. No change to this program is recommended.

Once the implementation schedule for the rail network becomes clearer, decisions can be made on whether or not to pursue acquisition of a CMF or to contract with a rail carrier/maintenance provider on an interim basis. One factor that may accelerate the need to acquire a site is the existence of competing interests for the site. Note that this latter approach may not require the construction of the facility at the time of site acquisition – that may be deferred until the commuter rail fleet has grown large enough to render the central maintenance facility cost effective.

The dormant Canadian Pacific (ex-Soo Line) Shoreham Shops off of Central Avenue in Minneapolis offer a possible commuter rail central maintenance site. It is true that there are other interests for this site, but the opportunity to acquire a former rail maintenance site of this size, in reasonable proximity to the commuter rail network should be examined. Locating the CMF at this site would increase the number of commuter train

movements over portions of BNSF's Midway, St. Paul and Wayzata Subdivisions, necessitating a revised capital program for these line sections. However, the capital program of the Twin Cities Metropolitan Commuter Rail Feasibility Study was recognized to have limitations in the number of commuter rail routes/train movements it could support, particularly for the common links of the network.
Area transit projects (bus, LRT and commuter rail) should work together to determine where maintenance responsibilities can be shared, and where there are possibilities for procurement of common equipment.

Safety and Security

The following information relates to these topics in the area of safety and security:

- Industry and Regulatory Agency Efforts
- Regulatory/Funding Agency Requirements
- Actions for the Commuter Rail Sponsor

Industry and Regulatory Agency Efforts

The success of any commuter rail system is judged by its ability to reliably deliver safe and reliable service in a cost-effective and responsive manner. Public transit remains one of the safest ways to travel, and the trend in recent years has been to improve its already exceptional performance.

Transit operators and the American Public Transit Association (APTA) have been working in cooperation with the Federal Transit Administration (FTA) and the Federal Railroad Administration (FRA) to develop several programs that enhance rail safety.

APTA has had a Rail Safety Audit Program in place since 1991. This program established system safety program guidelines, as well as providing a triennial auditing program.

In the interest of establishing standardized system safety management guidelines for the commuter rail industry, APTA developed the Commuter Rail System Safety Program in 1997. APTA and the FRA jointly audit the 18 member commuter rail properties. The program is based on a systemwide approach in which every employee and supervisor is responsible for the safety of operations. Every aspect of the operation is analyzed to identify potential safety risks. Corrective actions are then implemented. The FRA's Safety Assurance and Compliance Program is closely related to the APTA effort.

On request from a member property, APTA will form a peer review panel to address safety or operational issues. APTA has also been involved in the development and refinement of formal safety standards, including the Passenger Rail Equipment Safety Standards (PRESS).

These efforts were necessitated by regulatory agency concerns stemming from two fatal accidents which occurred in one week's time in early 1996. The specific concerns were associated with the carrying of passengers in the lead car of a train on track sections where there was no in-cab signaling or automatic train stop or automatic train control. For a while it appeared that the FRA might ban the carrying of passengers in a cab car leading a train. This did not happen, however, as APTA was able to address the agency's concerns by focusing the commuter rail carriers on the issuance of a "Manual of Standards and Recommended Practices" for the manufacture and maintenance of commuter rail vehicles. All commuter rail systems in the US have voluntarily agreed to incorporate these standards and practices in new car purchases. Rolling stock ordered or built prior to the adoption of these standards are not required to conform.

The FRA did impose Emergency Order 20 in the wake of the two fatal commuter rail accidents, requiring that the engineer of a train is fully aware of signal indications after leaving a station and that passenger car emergency exits are properly marked, tested and functioning.

In 1996 the FRA established the Railroad Safety Advisory Committee (RSAC), recognizing that it need to change its rules-making procedure. Representatives of the freight carriers and the commuter rail agencies have sat on this committee along with

union representation, State DOTs and suppliers. The objective of the RSAC is to ensure that agreement on new regulations is reached in a fair and equitable manner.

The FRA and the Association of American Railroads (AAR) are also engaged in several railroad safety research efforts. Many of these make use of the Transportation Technology Center (TTC) test track and other facilities in Pueblo, CO. The TTC is FRA-owned, but is operated by the AAR.
In the first three years of the FRA's efforts to enhance rail safety (1993-1995), the industry has seen the number of rail passenger fatalities/injuries decline by nearly 8%. Rail employee fatality/injury rates decreased by more than 30% over the same period. The programs have also been effective at reducing grade crossing accidents by nearly 25% in these three years.

APTA and the FTA have also cooperated in the development and distribution of emergency preparedness guidelines. These are intended to assist rail transit systems in responding to emergency situations, as well as to facilitate interagency coordination.

Regulatory/Funding Agency Requirements

As part of ISTEA, the FTA was required to implement State Safety Oversight of Rail Fixed Guideway Systems. This program has the objective of improving rail transit safety and security.

The agencies that are subject to this state oversight are those that receive FTA funding, and are not regulated by the FRA. Several states have given their state DOT the rail safety oversight responsibility. Among these are Georgia, Florida, Ohio and Tennessee. In most instances, the agency or entity having the oversight responsibility contracts with a third party to develop and implement the required programs. FTA then audits the oversight agency to ensure that the program is in compliance with the federal law, as well as to identify ways in which to improve the effectiveness of the oversight program.

Any state failing to develop the required oversight program risks the withholding of FTA funds. Even after the state has developed and implemented the safety oversight

program, failure to enforce the accident/hazard investigation and remediation aspects of the program may result in up to 5% of FTA formula program funding being withheld.

With regard to the requirements on the properties, each must develop, submit and implement a rail System Safety Program Plan (SSPP) that complies with the FTA's requirements. The property must classify hazardous conditions, reporting any unacceptable conditions to the oversight agency. Also, the property must report accidents to the oversight agency.
There are also several requirements for the oversight agency. The oversight agency then monitors the implementation of the rail SSPP. Triennial on-site safety reviews are also required. The oversight agency must conduct accident/hazardous condition investigations at each property. Conversely, the property is required to submit corrective action plans (in response to unacceptable hazardous conditions) for approval by the oversight agency. Finally the oversight agency must respond to the FTA's safety oversight reporting requirements. Initially, these are required annually, thereafter, the reports are required on an as-requested basis.

The property's System Safety Program Plan (SSPP) is to address safety issues pertaining to employees and passengers. APTA publishes a manual for the development of rail SSPPs in order to assist the properties in generating this document. The minimum content of the SSPP includes eight sections providing demonstration of the property's commitment to the SSPP requirements, discussing the safety tasks and responsibilities within an office of safety, verification of the SSPP and other related subjects.

FTA also requires the grantees to submit a Security System Plan (SSP) to the state oversight agency. The FTA publishes a "Transit System Security Program Planning Guide" and a "Transit Security Procedures Guide" to assist agencies in the development of this plan. Minimum content of the SSP includes nine distinct sections covering everything from a description of the property through implementation and modification of the SSP.

The FRA specifies the standards and periodicity for inspection and maintenance of locomotives and cars, track, structures, signal and train control elements. Under a purchase of service arrangement, compliance with these requirements would be a

contractual article, with the burden of compliance resting with the service contractor(s). At such time as the commuter rail sponsor assumes responsibility for train operations/maintenance this burden would shift to the agency.

Actions for the Commuter Rail Sponsor

This section lists some of the actions the commuter rail sponsor should take in order to provide a safe and secure environment. Many of these actions are part of either the SSPP or the SSP described in the preceding section.

Rules, Instructions and Standard Operating Procedures

The rulebooks and special instructions of the host rail carriers will cover most of the situations under which commuter rail service is provided initially. There are however, exceptional requirements for the operation of commuter trains that are not covered in a rulebook or instructions developed around the existing freight operations. In addition, there are situations where the commuter rail sponsor should establish the policy for how a railroad or other contractor's employee should deal with its customers. Lastly, a more comprehensive set of operating procedures will be required to govern the sponsor's own (or contractor) employees on a rail line that is owned and dispatched by the sponsor.

At this time, prior to selection of rolling stock and other equipment that the passenger will encounter, it is not possible to develop any of the procedures in detail. What follows is a draft list of the procedures, along with commentary as to when these are required (from "Day 1" or when the commuter rail sponsor is responsible for operations, etc.). This list should not be taken as being all-inclusive, but rather as a list of typical operating procedure topics.

A procedure is more of a "how to do" than a rule. For example, in a radio operations procedure, illustrations of the types of equipment could be included, along with how to use the equipment (for example, "…depress push-to-talk switch, wait one second, then begin speaking to avoid losing the start of your message.").

The nature of some procedures will change from day one to such time as the sponsor is responsible for train operations/dispatching. In the early days of the commuter rail service, the handling of a situation may be simply to alert the CCF, with an operator in that facility then contacting the responsible organization. When the commuter rail sponsor has assumed responsibility for train operations/dispatching the procedure would then be revised to give the field employee first-line responsibility for responding to the situation and advising the CCF operator of the action taken.

This is a fundamental aspect of operating procedures – they are "living" documents, which will require revision over time.

Procedure Title/Topic	Required for
STANDARD OPERATING PROCEDURES	
CCF Operations	Day One
Communications with the Railroads	Day One
Communications with Emergency Services Agencies	Day One
Radio Operations	Day One
Radio Use and Call Codes	Day One
Safety/Security Communications	When Sponsor has Dedicated Safety/Security Force
Preparing a Train for Service	Day One
Coupling/Uncoupling Equipment	When Sponsor is Responsible for Train Operations
Train Operation in Yard/Storage Facility	When Sponsor is Responsible for Train Operations
Train Operation on Mainline Trackage	When Sponsor is Responsible for Train Operations
Station Stops	When Sponsor is Responsible for Train Operations
Passing a Train in a Station	When Sponsor is Responsible for Train Operations
Flagging Duties	When Sponsor is Responsible for Train Operations
On-Board Announcements	Day One
Car Cleaning	Day One
Washing of Locomotives and Cars	Day One
Defect Reporting	Day One

Procedure Title/Topic	Required for
On-Board Fare Collection/Verification Duties	Day One
Providing Information/Assistance	Day One
Use of Accessible Equipment	Day One
Lost and Found Articles	Day One
Incident Logs and Reporting	Day One
Estimating Passenger Loads	Day One
Uniforms/Equipment	Day One
ABNORMAL/EMERGENCY OPERATIONS PROCEDURES	
Signal/Grade Crossing Equipment Failures	Day One
Defective Fare Collection Equipment	Day One
ABNORMAL/EMERGENCY OPERATIONS PROCEDURES (Continued)	
Special Events/Crowds	Day One
Special Train Operations	When Sponsor is Responsible for Train Operations
Delay Information	Day One
Issuing “Free Ride” Certificates	Day One
Track out of Service	When Sponsor is Responsible for Train Operations
Damage to Track/Structure	When Sponsor is Responsible for Train Operations
Train Derailment/Collision	When Sponsor is Responsible for Train Operations
Emergency Notification/Call List	Day One
Hospital Locations/Notification	Day One
Accident/Incident Reports	Day One
Fire or Smoke on a Train	Day One
Fire or Smoke in a Station	Day One
Fire or Smoke in CCF	Day One
Evacuation from a Train	Day One
Accidental Uncoupling	When Sponsor is Responsible for Train Operations
Service Recovery Techniques	When Sponsor is Responsible for Train Operations
Emergency Bus Service	When Sponsor is Responsible for Train

Procedure Title/Topic	Required for
	Operations
Sick/Injured Passenger	Day One
Criminal Act on Train or in Station	Day One
Bomb Threats	Day One
Hazardous Materials	Day One

Note that there will also be a need for standard maintenance procedures, but that these are highly dependent on the specific equipment selections.

Training and Certification

The commuter rail sponsor should develop training programs for all job classifications, as well as the exams and pass/fail criteria for these exams.

Training on rules, instructions and procedures should be provided as employees are hired. As procedures are revised they may be reissued with on-the-spot reinstruction, as opposed to conducting classes. Once an employee has received the procedure and the reinstruction, they should be required to sign for receipt of and compliance with the revised procedure.

Periodic retraining and re-certification of employees is recommended to ensure that they remain qualified and current in the performance of their job duties. Employees involved in rules/procedures violations or other incidents should be considered for retraining.

Joint training exercises should be conducted with area emergency agencies on a regular basis to ensure that coordination and response is effective and that personnel remain current on practices and equipment. Typical exercises include simulated train derailment or collision of trains, or a grade crossing accident involving hazardous materials.

Security of Personnel and Property

The commuter rail sponsor should have a security liaison position that will work with the host railroad security forces, as well as those in the on-line communities, counties and the state police. This position will be responsible for maintaining good relations with each of the aforementioned security forces. By ensuring that good relations are kept up, the commuter rail sponsor should be able to have these local agencies patrol all stations, parking lots and other commuter rail facilities, thereby avoiding the need to establish its own security force.

Some commuter rail facilities (the CCF and the CMF [when the latter is established]) may require a full-time security guard or other arrangements at the entrance to the

property. If a guard is to be provided, this may be a contract employee, rather than an employee of the commuter rail sponsor. Roving patrols of a larger site (such as the CMF) may also be required, and provided by contract forces. There are numerous local and national contractors for these services. Among the latter are such well-known names as Burns International, Pinkerton's, Pitney-Bowes and Wells-Fargo.

Alternatively, a remote-control gate and CCTV monitoring of the facility's entrance may control entry/exit to a site. Card-key operation of the gate is possible and has been used at other commuter rail facilities.

Note that maintenance of good relations with the area's security forces/law enforcement agencies may also ensure that incidents involving commuter trains or property are cleared expeditiously.

On-train security can be provided by the presence of roving fare collection/verification employees. At such time as off-peak, evening or weekend service is implemented, restricting the passenger loading to one or two cars in the consist can also heighten the feeling of security, as it ensures that a rider will not be alone in a car.

Use of CCTV at Commuter Rail Facilities

With 41 stations and 35 parking lots recommended in the Twin Cities Metropolitan Commuter Rail Feasibility Study capital program, provision of CCTV at all facilities/locations will be an expensive proposition. All of these field inputs must also be brought back to a central location for observation/recording of images. The CCTV monitors must be observed in order for the equipment to act as an effective deterrent, and that it is most likely that a commuter rail sponsor CCF employee would be responsible for this monitoring. There are also limits to the number of monitors an employee can effectively observe.

The commuter rail sponsor should work with the on-line law enforcement agencies and other area transit service providers to determine where CCTV monitoring of stations, parking lots and other facilities will be warranted. Trending of incidents should also be

maintained in order to be able to implement new CCTV installations before the number of incidents at a particular location increases dramatically.

One local program, is Mn/DOT's "Guidestar", which has provided two pan-tilt-zoom cameras and a passenger panic-button system at a 250-space park-and-ride lot in Maplewood. The panic button acts as a hot-line to summon local law enforcement to the lot. Mn/DOT officials have noted that crime, which was low before this installation, has almost completely disappeared from the facility. Estimated cost for the installation is $10,000 (including the cost of monitoring the two cameras). The lot was selected for this test application as it was undergoing expansion, which facilitated the installation of the underground conduit, etc.

CCTV on Rolling Stock

There are two possible applications of CCTV on the commuter rail rolling stock:

1. Inside the coaches and cab cars to deter vandalism or other violent acts.
2. Outside the locomotive to allow a one-person engine crew to monitor boarding/alighting at stations.

Use of CCTV inside transit vehicles to deter vandalism and other violent acts is not unusual, though this is more typically found in urban transit services than it is in commuter rail. The commuter rail sponsor should work with the other area transit providers and local law enforcement agencies to determine if such applications are warranted for the proposed commuter rail network.

In the event that on-board equipment is deemed necessary, vandal-proof enclosures housing the cameras would be installed at several locations inside the passenger compartment to ensure that there are no hiding places. Note that more cars might receive the protective housings than are actually equipped with cameras.

CCTV equipment has also been found effective in allowing a one-person engine crew to monitor boarding/alighting when the station platform is not on the same side as the engineer's position in the locomotive. This practice is being used in both US and

European commuter and regional railroad applications, as well as in urban transit settings.

Public Education

Education on the commuter rail service and safety around railroads can take several forms. Prior to and after inception of the rail service sessions should be held in area schools to educate children and young adults on the service and the hazards present around active railroad tracks.
Direct mailings, inserts in local papers and announcements on radio and television should alert area residents to the testing and start-up activities. This is especially true where a corridor has undergone upgrade leading to much higher train speeds/levels of activity compared to what residents have grown used to.

The "Operation Lifesaver" program has also been an effective tool to alert motorists and pedestrians to the hazards of going around lowered gates. Commuter locomotives and rolling stock can be used to draw awareness to this program. Metra and other commuter rail agencies (as well as the freight railroads) have decorated locomotives with this program's logo. Hauled coaches and cab cars have also had the logo applied near doors, or at other locations visible to passengers, pedestrians and motorists.

Summary

The commuter rail sponsor and its contractors must commit to providing a safe operation, as well as a safe and secure environment for passengers. This sense of safety and security must be provided in the park and ride lots, in and around the stations, as well as on the trains.

The state and the commuter rail sponsor will have to comply with industry, regulatory and funding agency agreements and requirements with regard to safety and security. Among these agreements and requirements are compliance with the passenger rail equipment safety standards (PRESS), the establishment of state rail safety oversight

and the development and implementation of a System Safety Program Plan and a System Security Plan.

Cooperation with local law enforcement agencies and other area transit providers is strongly recommended. Implementation of a multi-pronged public education program on commuter rail operations and rail safety in general is also recommended.

4.4 Operational Guidelines

The success of any commuter rail system is judged by its ability to reliably deliver safe and reliable service in a cost-effective and responsive manner. To that end, the following sections provide background information related to the accommodation of standees on commuter rail trains and on-time performance. The related practices of selected domestic commuter rail agencies are also examined.

Accommodation of Standees

The goal of providing a seat for every rider is common throughout the domestic commuter rail industry. This goal/policy (some agencies commit to achieving this goal under normal traffic conditions) is set for several reasons. First, it is a matter of comfort, as many of the riders are traveling long distances on the commuter trains. Second, it is done for safety's sake, as a standing rider can be knocked down in the event of an emergency stop. Third, having the aisles clear of standees makes it easier for the on-board crew to check fares or to perform their jobs in general.

Despite these policies there are some riders who will choose to stand in the car vestibules even when seats are empty. In the Chicago area, this practice has become more prevalent as ridership has swelled on peak period trains. Metra reported in August 1999 that it had experienced its 33rd consecutive month where the ridership had increased over the preceding month. While the agency moves to add cars to trains or to add entirely new trains to relieve overcrowding on existing trips, there are limits to what it can do in this regard. It possesses a finite number of cars and locomotives, and as we have seen in the other technical memoranda, the need to integrate

schedules of several lines over common sections of track makes adding trains a difficult proposition.

Further, there are special events where an agency's policy against standees (or, at least, discouraging standees) must be waived aside. An example of this is the Fourth of July fireworks held each year in downtown Chicago. The attraction of the fireworks, coupled with the on-going "Taste of Chicago" draws thousands of city and suburban residents to the central area.

Once the fireworks are over, the bulk of the suburbanites head for the various commuter rail stations. Maximum length trains can be seen departing downtown Chicago until nearly midnight, and even those long trains are packed solid with riders. To cope with these crowds, Metra also forgoes its standard on-board fare checking, and collects a flat fare at the entrance to each station platform. A similar situation might be faced by the Twin Cities commuter rail sponsor when the State Fair is being held along the Central Corridor.
Returning to normal operating conditions, passenger loadings by train should be counted by the on-board employees on each trip as mentioned earlier. While these counts may not be 100% accurate, they are a good indicator of the need to add cars to a train or to increase the number of trips on a corridor.

Assigning agency administrative personnel to provide monthly train counts is also recommended, as is the assemblage of these counts on a corridor by corridor basis to track ridership. To get boarding counts by station, it may be necessary to augment the on-train employee counts with contracted personnel estimating the riders boarding each train at a station. These sorts of surveys should be done on an annual basis on each corridor in the commuter rail network. They provide another measure of the system's effectiveness, as well as being an indicator of when changes are required (additional trains, implementation of deferred stations, etc.).

On-Time Performance

The issue of on-time performance is important, since nothing will frustrate a rider more than the uncertainty of being able to get to work on time, or to make a connection to a

bus, etc. When the commute becomes a game of chance the rider will abandon the service.

Commuter rail agencies are justifiably proud of their on-time performance records. Purchase of Services contracts with the host railroads typically invoke stiff penalties for poor timekeeping. One carrier offers excuse slips to be turned in at work by riders who have been unintentionally delayed. Still other agencies offer free-ride certificates, a "guaranteed ride home" and even refunds if a train is late. Most commuter domestic commuter rail operators define a train as "late" when it is five or more minutes behind its scheduled arrival time in the station.

Most commuter rail agencies track the on-time train performance on a monthly basis. Those with multiple routes in their system make detailed comparisons between the routes in this regard. There is also a need to check performance on a train-by-train basis, to ensure that action is taken to correct a situation that has repeatedly caused delays. This may include rescheduling the train or altering the stopping pattern to revise the schedule.

At one agency, monthly reports to the Board of Directors go into great detail on the performance of each line in the system, comparing that month's performance to the previous month. Detailed discussions on the major causes of delays are included for each line. The individual line performances are also rolled up into a system-wide on-time performance record.

Common Causes of Delay

Commuter rail service may experience delays due to the host rail carriers' operations, or perturbations to that operation. Still other major sources of delay are found at level crossings with other railroads.

All significant delays are assigned a cause, and the cumulative total of delays by cause is reported. This allows the agency to take action on a cause that may be more problematic than it should be (i.e., repeated signal problems indicating that corrective maintenance is required, etc.).

A table of annulled runs is also kept in the board reports. A train may have to be annulled (not operated) when there is a major mechanical problem, or if no crew has been called to operate the train, etc. This is inconvenience enough to the riders when there are hourly trains throughout the day, but on a route where there are only a few peak period trains, an annulment cannot be tolerated.

Construction

Construction along the railroad right-of-way can be a major source of delays. Some agencies will substitute buses over the line section where they are performing trackwork or other renewal work. This is inconvenient as it means a rider will have to change from a train to a bus and back to a train. However, by suspending rail operations, the construction work can be completed in less time than if the workers had get out of the way to allow each train to pass. Still other situations require a revised schedule to allow extra time for the trains to traverse a work zone.

Grade Crossings

Grade crossing incidents are another persistent cause of delayed service. In some instances a commuter train may not be directly involved in such an incident but may experience delay due to the cascading effect of the accident. Pedestrian conflicts occur most commonly at stations and grade crossings, which are often located in the same general vicinity.

While employee training, public awareness campaigns and modern signaling technology tend to reduce the number and severity of such incidents, pedestrian and vehicular encroachment on railroad rights-of-way remains on of the greatest risks to on-time performance and public safety.

Inclement Weather

Inclement weather can also result in slow train operation, or can completely thwart scheduled operations. Fog, snow, ice and heavy rain (with or without flooding) can all wreak havoc on a railroad. Once again, these are things that are largely out of the management's control, but most agencies retain weather forecasting services to provide area-specific forecasts, to allow adjustments to be made to compensate for the expected weather. In some cases, this may mean providing extra field forces (or lengthening the shifts of workers) to clear switches of snow/ice, or to clear platforms, etc.

Other Causes of Delay

Heavier than normal passenger loadings can also delay a train, as each station stop will take longer. Medical emergencies (requiring response by an ambulance or other emergency services agency personnel) can also lead to extensive delays. For the agency this is one of the most frustrating situations, as it is completely outside the agency's direct control.

There is much to learn from the experience of the other operators. Preparation is the key, including the development of contingency plans to deal with the major disruptions to service. Simple steps, such as the inclusion of extra running time in the timetable, can help to preserve the agency's on-time performance.

Public Relations

Keeping the riding public informed is a key element in ensuring on-going, positive relations. In the Internet era commuter rail agency web sites frequently serve as repositories for performance results as well as ridership trend statistics and information of general interest to the riding public. However, contingency plans need to be developed and implemented in order to protect the public interest in the event substandard service is unintentionally provided.

Of the nearly 20 commuter rail agencies in North America, only two guarantee their on-time performance. Their guarantee is in the form of a free ride certificate if a train enters a station 30 minutes or more behind schedule. This guarantee applies to the

first station at which the train is that late and to all succeeding stations on that trip. The on-board crew is to distribute the free ride certificates on the affected train. If for any reason a rider on the delayed train does not receive the free ride certificate, they may fax a copy of their validated ticket, along with train information to the sponsoring agency. The agency will then mail a free ride certificate to the rider.

Response to delays on the part of the other 18 agencies varies. One agency will provide "tardy" slips to the riders on the delayed train. The rider may then turn this slip in at their school or place of business.

Public awareness campaigns aimed at the adult and school-age populations are important and proven methods of keeping the public informed about the potential dangers inherent in freight and commuter rail operations. Examples of such programs include “Operation Lifesaver” and “Operation Red Light”, both of which are in use throughout the nation.

Summary

The Twin Cities commuter rail sponsor will have to establish its reputation from the first day. On-time performance is important, and the sponsoring agency must recognize that its riders do have other choices on how they commute. It is recommended that the sponsor commit to on-time performance, and that it also provides a guarantee on this performance. The free ride certificate when a train is 30 minutes or more behind schedule is recommended in this regard. However, it must be recognized that this is a decision that has financial implications for the sponsor.

The Twin Cities commuter rail sponsor should adopt and enforce the commuter rail performance standards outlined earlier in this section in order to help ensure that the interests of the riding public are protected.

Service Levels

During the course of the Twin Cities Commuter Rail Feasibility Study it was assumed that all trains would be the same length (three cars, composed of two coaches and a cab car). This would result in all trains having the same performance characteristics,

and it would also mean that all trains could serve all stations, without having to increase platform lengths. The service levels for the Dan Patch and Northstar Corridors were eventually increased to reflect detailed estimates of travel demand in those corridors.

The source for the initial service pattern (four trains in the peak direction per weekday rush period) was the experience of other commuter rail carriers. For example, service on Metra's North Central Service was initiated in August of 1996 based on demographics and resultant estimates of travel demand similar to many of the corridors above.

Opening-day platform lengths are recommended to accommodate a five or six-car train. Provisions for future extension of the platforms should be made.
In a similar vein, the opening day service levels listed above may be revised at such time as capacity modeling and further demand estimation work suggest otherwise.

Practices of Other Peer Properties

This section provides an overview of the service levels characteristic of other recent commuter rail start-ups. Changes to these initial service levels are noted. Rather than discuss the services on all lines for some of the commuter rail networks, a specific line is chosen and presented. Long-established services are not considered, as these typically have more extensive service hours.

MARC – Washington/Baltimore Area

MARC assumed responsibility for commuter rail operations from the Chessie System and Penn Central in the 1970s. In the case of MARC's Brunswick (MD) Line, the public agency began operation of this line in 1974. Chessie System (previously, the Baltimore & Ohio Railroad) used multiple-car trains of Rail Diesel Cars (RDCs) on this line. Initially, MARC used the same equipment, although this was gradually phased out in favor of locomotive hauled trains.

Current day service on the Brunswick line consists of 7 trains to Washington in the AM peak period. The headways are not regularly spaced, and the stopping patterns for

the trains include a mix of express and local services. Two trains have parlor cars, which require advance reservation for a seat. PM period service consists of two trains outbound in the base, with 7 PM peak period departures. Once again, the peak period service is a mix of express and local trains.

Metra – Chicago Area

As noted above, Metra began service on its North Central Service with four trains inbound/four trains outbound each weekday. However, of these four trips one in each direction was a midday trip, meaning that three trainsets could cover the four trips, as one train made an AM peak trip to Chicago, then made the midday roundtrip and then returned to Antioch, IL as the last train of the PM peak. The peak period service was provided on an approximate 30-minute frequency.

The North Central Service pattern was revised to include a fourth rush hour trip in February 1997, less than six months after the line opened. This schedule change saw a later AM period inbound trip added, as well as a later PM period departure from Chicago. The North Central Service has seen a 27% increase in service over the past year. While much of this growth is due to new suburban development along that corridor, there has also been a considerable amount of traffic diverted from established nearby commuter rail corridors. This was one of Metra's stated goals in implementing the North Central Service, as it would relieve parking lot and train overcrowding on those other lines.

Another feature of the North Central Service was the provision of a paralleling bus service. On account of the length of the line, the bus service was split into two routes. Service was provided in the base period and on weekends, times when the train service was considered uneconomic. The southern of the two bus routes did not provide a single-seat ride to downtown Chicago, but did make connections to two other Metra routes serving the CBD.

As the road network around the North Central corridor does not exactly parallel the rail line, the routings were somewhat indirect. This was also necessitated by the fact that the buses served each rail station on the North Central Service. Consequently, the

running times for the buses were long. Both routes were ultimately discontinued on account of low ridership.

Note that Congestion Mitigation and Air Quality (CMAQ) funding was made available to Metra for the implementation of the North Central Service. These funds were used as part of the capital program funding package.

Metrolink – Los Angeles Area

Service on the Ventura County line began in October 1992. Other lines were implemented simultaneously. Weekday peak period service on this line consists of nine inbound Metrolink trains and nine outbounds over the course of the day. AM peak service on the line includes six southbounds (to Los Angeles) and three northbound Metrolink trains. A single southbound operates in the AM base period. PM base period service consists of one southbound and two northbound Metrolink trains. In the PM peak, Metrolink operates one southbound train and four northbounds. All Metrolink trains make all stops on this line.

Amtrak trains also operate over this line to/from Oxnard. They provide service to limited, intermediate stations. Amtrak service includes four southbound (inbound) trains over the course of a day and five northbound services. The southbounds operate one train each in the AM peak, AM base, PM base and PM peak time periods. Northbound Amtrak trains include two in the AM base, one in the PM base, one during the PM peak and one in the evening.

Tri-Rail – Fort Lauderdale/Miami Area

Tri-Rail began operations in January 1989. On opening day, the service pattern was eight trains in each direction. In a little over one year, two additional trains were added in each direction. In October 1991, weekday service was increased to provide two more trains in each direction (a total of 24 one-way trips). Saturday service was introduced from December 1990, on a slightly reduced schedule. Sunday service was added following devastation from Hurricane Andrew in 1992 (when mobility and the road network was sharply affected).

In the intervening time there have been some schedule adjustments. For example, late evening trains were dropped in late 1997, on account of low ridership.

Present service consists of four trains in the AM peak period, three trains in the AM after the peak, three trains in the PM peak and four trains during the PM base period or in the evening. The train count is for one direction only, meaning that the total service is 28 one-way trips each weekday. All trains make all stops, although one round trip short turns in the Miami CBD, as opposed to continuing south to the Miami airport.

Virginia Railway Express – Washington/Richmond, VA Area

VRE has two lines radiating out of Washington, DC, on which operations began in 1992. In this section, we will consider its service on the Fredricksburg Line. AM peak service on this line consists of six trains into DC. There are also two Amtrak trains on this corridor in the AM peak which provide service to a limited number of stops also served by VRE. All VRE trains make all stops. Amtrak also provides limited-stop service on this corridor by one train in the base period and two trains during the PM peak period.

Outbound VRE service from Washington consists of one train before the PM peak (from 5 PM) and five trains during the PM peak. Outbound Amtrak service on this line (again serving only limited stops) includes an AM peak period train, two trains in the base period, one train in the PM peak and one train in the evening.

A unique aspect of VRE services is the provision of a Fridays-only "Jump Start" bus on each of its routes. The concept behind this service is to allow the rider to "jump start" the weekend. These buses leave Washington around 1 PM.

West Coast Express – Vancouver, BC

Commuter rail service on the Canadian Pacific line east from Vancouver began in November 1995. Five peak period one-way trips are provided on this line, with the trains on a 30-minute headway. Ridership on the line has increased by about 52%, to over 7,600 riders per day.

Summary of Service Levels by Peer Property

The table on the following page presents a summary of current commuter rail service levels offered by relevant peer properties on selected lines. Some properties such as Tri-Rail and West Coast Express have only one line currently in operation.

As can been seen from the information contained in the table below, the opening day service levels recommended for potential commuter rail service throughout the Twin

Cities Metropolitan Area is not vastly different from the current levels of service being provided by these various peer properties.

PROPERTY/LINE:	SERVICE LEVELS:	PEAK HEADWAY:	TRAINS PER BASE PERIOD:
MARC/Brunswick	■ Seven (7) northbound AM; ■ Seven (7) southbound PM	Irregular	Two (2) northbound PM
Metra/North Central	■ Four (4) southbound AM; ■ Four (4) northbound PM	30 minutes	One (1) each direction
METROLINK/Ventura County	■ Six (6) southbound and three (3) northbound AM; ■ One (1) southbound and four (4) northbound PM	Irregular	One (1) southbound AM and PM; two (2) northbound PM
Tri-Rail	■ Eight (8) southbound AM; ■ Eight (8) northbound PM	Irregular	Six (6) southbound AM; six (6) northbound PM
VRE/Fredricksburg	■ Six (6) northbound AM; ■ Five (5) southbound PM	Irregular	One (1) southbound PM
West Coast Express	■ Five (5) westbound AM; ■ Five (5) eastbound PM	30 minutes	None

Service Level Adjustments

The need for increases or decreases in service levels are typically driven by such factors as customer and/or employer demand as well as policy considerations such as the need for providing equitable levels of service within or between corridors virtually regardless of actual demand. The rationale for such adjustments may vary greatly between the lines or routes within the same system as well as from system to system.

Metra's Heritage Corridor, the ex-Gulf Mobile & Ohio (now Illinois Central) line between Chicago and Joliet operated with one daily round trip for over a decade. In the late 1970's, with the receipt of new locomotives and cars the Regional Transportation Authority (RTA) added a second daily round trip. This service pattern remained unchanged until April 1999 when a third daily round trip was added to the schedules.

The impetus for this most recent change was a major reconstruction project of a paralleling expressway.

A similar situation - in this case the reconstruction of I-95 in the Fort Lauderdale/Miami area - led to the creation of the Tri-Rail service. A five-year reconstruction project for this highway was developed, to occur simultaneous with construction on the paralleling Florida Turnpike. The need for rail service to relieve the congestion was acute, and cars and locomotives were leased to open the service. No fares were charged for the first six months of Tri-Rail service.

Tri-Rail is generally like most commuter rail operators where ridership has driven the changes in schedule. However, extreme weather conditions (in this case, a devastating hurricane) led to expansion of service in 1992.

Returning to the subject of highway construction on a paralleling corridor, note that the planned reconstruction of Highways 494 and 61 in the Red Rock Corridor provides a similar situation/opportunity.

Development of a corridor can lead to service implementation (Metra's North Central Service is an example of this), as well as to service enhancements. In the latter category consider Metra's Southwest Service. This service dates back more than 100 years, having been provided by the Wabash and the Norfolk & Western in previous years. For several decades, this service consisted of a single round trip between Chicago and Orland Park. In the late 1970's the RTA added a second daily round trip, and contracted for supplemental bus service, to cover intermediate locations, as well as to provide midday coverage in the corridor.

In 1987 a fourth PM peak train trip was added, and a fourth AM peak trip was added the following year. In 1996 four trains were added to the daily service. This makes for a total of twelve rail trips each day on the corridor. In addition, there are 14 inbound bus trips during the AM peak and base periods, and 14 outbound bus trips each day. These are distributed from the AM base through the evening. No Saturday, Sunday or Holiday service is provided by either the trains or the buses.

These changes coincided with a dramatic expansion of the population along the corridor. That population has continued to increase, and the housing developments have moved further and further out the corridor. Metra's response was to extend the line further south from its traditional end-of-line, and it is presently studying a further extension of this service.

Finally, there are policy decisions by the board or other governing of the commuter rail entity that could lead to service changes. In this instance, the decision may be that all lines should have the same level of service, regardless of the ridership on that line. Similar decisions could be made regarding the provision of midday, evening and weekend train operations.

Another consideration is the timing of the provision of express service. Looking at the Metra examples, neither the Heritage, North Central or Southwest Services has any express service. Upon completion of a second, significant capital program on the North Central, Metra has indicated that it would increase the daily train service to more than 20 trips per day, and would include express services at this point.

In some cases, the driver for express services may be the level of traffic and distance/travel time to the outermost stations on a line. For example, Metra's Union Pacific Northwest Line extends some 62 miles out of Chicago to Harvard, Illinois. A base period local train making all stops to Harvard requires 1 hour and 45 minutes. The fastest express train to Harvard skips a total of 12 intermediate stations, and covers the 62 miles in 1 hour and 21 minutes, saving 24 minutes in the process.

Summary

In reviewing the peer properties, there is no clear pattern as to the number of trains per peak period or the headway between trains. Similarly, there is no pattern regarding provision of base period service. The approach Metra has taken with its North Central Service (operating for just over three years) was the model upon which the initial service plans for the Twin Cities routes were based.

Metra's very logical progression in the build-up of services, as well as the introduction of express services and other enhancements, is recommended for the development of the service patterns on the Twin Cities routes. As was noted in the discussion of the service changes relative to Metra's long-established Heritage and Southwest Services, the points at which the service pattern was increased were in response to differing situations. In the case of the Heritage Corridor the multi-year reconstruction of a paralleling highway was the impetus for increasing the number of trains per peak period. Conversely, the Southwest Service Corridor has seen tremendous and farther-reaching suburban development over the last decade or so. The agency's response to this situation has been:

1. Initially, contract for a "shadow" bus service to provide additional peak period coverage, as well as providing the base period service.
2. Increase the number of trains in the peak, and begin the operation of base period train service.
3. Extend the line in increments to keep pace with the suburban spread.

Further changes to the service patterns for the Twin Cities corridors should be made on the basis of refined market analysis, capacity simulations and in response to timetable path availability as a result of negotiations with the host railroads.

Lastly, policy decisions regarding services and stopping patterns may supersede a service plan that is geared to the estimated demand along the route.

Station Spacing and Operating Speeds

Station spacings of 2.5 to 3 miles are relatively standard throughout the domestic commuter rail industry. Such spacing allows the stations to have distinct catchment areas from which they draw riders. It also allows trains to attain fairly high speeds and offer low travel times between stations. Locating the stations any closer together would cause stations to compete for passenger traffic, and would hinder the ability of the train to attain competitive travel times. For the purposes of the Twin Cities commuter rail network, this has been revised to a 5-mile desirable station spacing, reflecting the results of the advanced corridor planning on the Northstar Corridor.

Those stations in the vicinity of the Twin Cities Central Business Districts (CBDs) may be closer than 5 miles.

There is no set answer as to maximum speeds or the average speeds a commuter rail line should offer or aspire to. For longer station-to-station distances operation at a 79 mph maximum speed should be the goal. However, there are some line sections where civil constraints (grades, curves, tight clearances, etc.) preclude this high a speed. Every effort should be made to operate as quickly as possible over a line section, but the operation must always be in a safe manner. In some instances the effects of civil restrictions may be mitigated by super-elevating a curve or by other easement methods. In super-elevating a curve a passenger train may comfortably operate through the curve at a higher speed. There are limits to how far this mitigation may be taken, and the commuter rail sponsor should conform to American Railway Engineering and Maintenance of Way Association (AREMA) practices and standards, regulatory guidelines and standards (chiefly from the Federal Railroad Administration, but sometimes also as imposed by local government units), as well as those of the host railroad in this regard.

Average Station Spacing

Other commuter rail carriers have found that station spacing of less than 2.5 to 3 miles results in stations which are competing with each other for traffic. Locating the stations closer together also restricts the speed that a train can maintain on the run between stations, which will adversely affect overall travel times and reduce the attractiveness of the service.

Maximum Operating Speeds

Certain station-to-station runs may preclude attaining the recommended 79 mph maximum speed due to grades, curves and other civil restrictions. Areas in and around junctions and/or crossings with other rail lines are also locations where operations at reduced speeds are warranted. In these instances, the commuter rail operating speed should be the maximum safe speed that complies with all regulatory

agency guidelines and standards, as well as being in accordance with industry practices and guidelines, and the standards and practices of the host railroad.

Current running time estimates include one to two minute allocations per station-to-station link to account for the impacts of grades and curves. Further investigation into the engineering of the proposed commuter rail routes is required in order to ascertain the practical operating speed for each station-to-station run. In addition, computer-based capacity modeling and negotiations with the railroad may be required before station-to-station maximum speeds can be absolutely determined.

Average Operating Speeds

As outlined earlier in this section, the system should be designed to permit the following average operating speeds as a means of maximizing operating efficiency:

CORRIDOR:	AVERAGE SPEED:	
	To 1st CBD:	To 2nd CBD:
Central	26 mph	
Dan Patch	39 mph	36 mph
Northstar	36 mph	33 mph
Red Rock	38 mph	33 mph

There are a variety of factors, which account for the higher average operating speeds characteristic of the other corridors. In the case of the Dan Patch Corridor south of Savage, the station to station distances are fairly long, meaning that the trains can attain 79 mph and run at this speed for several miles.

Similarly, the Red Rock Corridor is on what is already a fairly fast rail line, and when coupled with long station-to-station distances, this makes for a fairly quick trip. Northstar, especially on the outer portions is a fast line with long distances between stations. But the area around Northtown Yard and on into the Minneapolis CBD is densely-trafficked and has some significant civil restrictions, causing the end-to-end average speed to decline.

Practices of Other Commuter Rail Agencies

Following is a discussion of the practices of selected commuter rail agencies related to maximum and average operating speeds. These performance statistics are compared to their Twin Cities equivalents.

Maximum Operating Speeds

Most of the peer properties operate at a maximum speed of 79 mph. The exceptions to this are New Jersey Transit and MARC trains that operate on the Northeast Corridor at speeds of up to 100 mph in an exclusive right-of-way.
Metra has been upgrading its physical plant and contributing to the upgrade programs for those lines on which it has purchase of service contracts. This carrier requires track layouts and structures suitable for 80 mph operation in all its upgrade projects. Metra's engineering standards may be summarized by the phrase "60 miles in 45 minutes". Doing the math implied in this phrase, one gets an average speed of 80 mph.

The actual top speed of Metra's trains is 79 mph, as above this speed FRA track safety standards require the track to be maintained to a higher standard. Other FRA requirements affect the signal equipment that must be provided to operate at 80 mph or above.

Tri-Rail in the Fort Lauderdale/Miami area operates at a maximum speed of 79 mph. Again, to operate at 80 mph or above would require additional investment in train control equipment, and would impose higher track maintenance standards.

Average Operating Speeds

The average speeds on the peer properties are affected by the number of intermediate stops, density of train traffic, complexity of junctions/crossings and the presence of civil restrictions along the line. For those peer properties offering express and local services, the average speeds for both types of trains are shown. In the table below, the average speed for the Mn/DOT Corridors includes the effects of operating across the Central Corridor to the second CBD.

From this comparison one sees that the average speeds for the Twin Cities commuter rail corridors are within the range of the average speeds of the local trains operated by the peer properties.

PROPERTY:	AVERAGE SPEED	
	Local Service:	Express Service:
Caltrain	30 mph	34 mph
DART	33 mph	(NA)
Long Island	26 mph	28 mph
MARC	33 mph	41 mph
MBTA	29 mph	38 mph
Metra	27 mph	36 mph
Metrolink	37 mph	(NA)
Metro North	37 mph	45 mph
Twin Cities: Central Corridor Dan Patch Corridor Northstar Corridor Red Rock Corridor	 26 mph 36 mph 33 mph 33 mph	 (NA) . . .
New Jersey Transit	28 mph	36 mph
SEPTA	21 mph	24 mph
VRE	32 mph	(NA)
West Coast Express	30 mph	(NA)

Summary

The Twin Cities commuter rail sponsor should continue to pursue a course where the conditions on the rail corridors and the objectives of its capital program are to maximize the speed at which the commuter trains can safely travel. Based on the practices at other commuter rail carriers, this maximum speed should approximate 79 mph. Rolling stock should be specified to be capable of operating at this maximum speed.

As the engineering investigations and capacity modeling work move forward it is possible that the maximum speeds estimated for certain station-to-station runs would change from those currently recommended. This is to be expected, as review of additional engineering details will better define the capital program needs. All engineering improvements to the track, signal and structures should be done in

conformance with Federal regulations, AREMA standards and practices and those of the host railroad.

The average speeds recommended for commuter rail operation within each of the relevant corridors serving the Twin Cities Metropolitan are within the range of average speeds typical of the other commuter rail agencies.

A desirable station spacing of 5 miles is recommended at this time. In the outlying areas the stations may be further apart, with the actual station spacing driven by location of developments, proximity to employment centers and major highway intersections. Closer station-to-station separation distances are possible on approach to the CBDs

Twin Cities Commuter Rail Feasibility Study Report Fare Structure

This practice is consistent with that in use at other carriers having multiple lines radiating out of a CBD.

No commentary on possible discounts for multiple-ride tickets or other fare media was made in the Twin Cities Metropolitan Commuter Rail Feasibility Study. Fare zones beyond the limits of those identified in the Twin Cities Metropolitan Commuter Rail Feasibility Study are also possible, as the advanced corridor planning process may lead to route lengths extending beyond the Metropolitan Area.

In the time since the Twin Cities Metropolitan Commuter Rail Feasibility Study was completed, the express bus fare has not changed. The sale of "SuperSaver" and stored-value tickets on the bus system allows a rider to save money compared to paying for the trips in single-ride fares.

Cost-per-Mile for Representative Mn/DOT Stations

One station per line is used for these sample calculations.

Rail Route	Sample Station	Fare Zone	One-Way Fare	Rail Mileage	Cost per mile
Northstar	Elk River	4	$4.25	30.8	$0.14
Dan Patch	Burnsville	2	$2.75	23.4	$0.12
Red Rock	Hastings	2	$2.75	18.4	$0.15

Factors which affect the fare per mile is where the station occurs in the fare zone and how close it is to either the inner or outer limits of that fare zone. For example, the Burnsville station is in Fare Zone 2 and is located near the midpoint of Fare Zone 2. Another station may also be in Fare Zone 2, but near the outer limits of that zone, resulting in lower cost per mile.

One-Way Fare Practices of Peer Carriers

This section considers the one-way fare structures of other commuter rail operators, for both established operations and more recent start-ups. A limited sampling of stations on the other carriers is considered. This section concludes with a comparison of the one-way fares and fares per mile to the Mn/DOT examples, calculated above.

Many of the established operations provide both express and local trains however it should be noted that there is no fare differential for use of an express train. Some carriers offer peak and off-peak fares, as noted in the following discussion. At least one operator offers parlor car service, which requires the payment of an extra fare.

At the conclusion of the individual property discussions, a table summarizes the sample fares and cost per mile in comparison to the Mn/DOT sample station fares.

Caltrain – San Francisco/San Jose

San Jose station is 46.9 miles from the San Francisco terminal of the CalTrain operation. This long-established service (originally provided by the Southern Pacific) provides 34 weekday trains to San Francisco, 14 trains on Saturdays and 10 trips on Sundays/Holidays.

The fare from San Jose to San Francisco is $5.25 one-way (in CalTrain's Fare Zone 7). On a cost-per-mile basis this equates to $0.11 per mile.

DART – Dallas Area

DART's commuter rail operation runs over a distance of 10 miles from Dallas Union Station to South Irving. This is a starter line for what will eventually be a service linking Dallas and Fort Worth. The fare from South Irving to Dallas is $1.00, which works out to $0.10 per mile.

Long Island Railroad – New York Area

The Long Island (once a subsidiary of the Pennsylvania Railroad) operates an extensive network of commuter rail routes east from New York City. Hempstead is 21.7 miles from the carrier's Penn Station terminal. Weekday service from Hempstead consists of 30 trains, including four trains in the owl period (nominally 1-5 AM). Not all trains from Hempstead operate through to New York. For example, in the owl period, riders must change trains to continue on to the city. Weekday service includes both locals and expresses.

Saturday, Sunday and Holiday service from Hempstead is provided by 21 departures, including owl service provided on an every-two hours basis. All weekend and holiday trains are locals.

The Long Island charges peak and off-peak fares. A peak period one-way ticket costs $6.25, equating to $0.29 per mile. Off peak, the one-way fare is $4.25, working out to $0.20 on a per-mile basis.

MARC – Baltimore/Washington Area

Point of Rocks, MD is on MARC's Brunswick Line, 42.1 miles from Washington, DC. MARC assumed responsibility for this service from the Chessie System in 1974. Service from Point of Rocks consists of seven trains to Washington, including some express operation. There are nine trains in the afternoon/PM peak from the city. A mix of local and express trains are provided. Two trains in each of the peak periods include parlor cars, which operate on a reserved-seat basis, and require an extra fare to be paid.

MARC provides limited service on certain holidays (including Columbus and Veterans' Days).

The one-way fare is $6.50, working out to $0.15 per mile. As Point of Rocks station does not have a ticket agent on duty, one-way and two-trip tickets can be purchased from the conductor without a penalty charge. Some carriers such as Metra impose a penalty if a rider buys the ticket from the conductor, rather than buying it from a ticket agent at an attended station.

MBTA – Boston Area

MBTA's Route 128 station is located 12 miles south of South Station, Boston, on that carrier's line to Providence, RI. This service is a long-established operation, having been provided by various private carriers prior to MBTA. At present, 28 trains in each direction serve this station on weekdays. Saturday service consists of nine trains in each direction, while 7 trains in each direction provide the Sunday/Holiday service.

The fare from Route 128 to Boston South Station is $2.25 (MBTA Fare Zone 2), which equates to $0.19 per mile.

Metra – Chicago Area

Mount Prospect on the UP Northwest Line, is 19.6 miles from the Ogilvie Transportation Center in downtown Chicago. Service on this line has been provided for more than

100 years. Weekdays, a total of 23 trains serve Mount Prospect en route to Chicago, while 26 stop at this station outbound. Saturdays, there are 14 inbound and 12 outbound trains. On Sundays and Holidays, the station is served by seven inbound and eight outbound trains.

This station is in Metra Fare Zone D. A one-way ticket costs $3.15, equating to $0.16 per mile. If you buy a ticket from a conductor when the agent is on duty at the station a $1.00 penalty is assessed.

Metrolink – Los Angeles Area

The sample station for this comparison is Chatsworth on the carrier's Ventura County line. This station, 28 miles from the Los Angeles Union Passenger Terminal, is served by nine inbound Metrolink trains and nine outbounds over the course of the day. Two Amtrak trains in each direction also serve Chatsworth on their way to/from Oxnard each day.

In the peak period, the one-way fare is $5.75. This equates to $0.21 per mile. Off-peak a one-way ticket costs $4.25 (a 25% discount). On a per-mile basis this works out to $0.15.

Metro North – New York Area

Brewster North, on the Harlem Line of Metro North, is 53 miles from Grand Central Station. Service on the Harlem Line has been provided for over a century, although the extension to Brewster North began operation in the late 1970s. Weekdays, 27 trains link Brewster North to the City. Saturday, Sunday and Holiday service consists of 19 inbound trains, operating on an hourly basis from 5 AM to 11 PM.

The peak period one-way fare from Brewster North is $10.25. This equals $0.19 per mile. Off-peak the one-way fare is $7.75, working out to $0.15 per mile.

New Jersey Transit – New York/New Jersey Area

Gladstone station is 44.8 miles from this operator's Hoboken Terminal. A rider wishing to continue into New York must transfer to a Port Authority Trans-Hudson (PATH) subway train.
Service on this rail line is well-established, having been provided by private carriers before the public agency was created. Weekdays, there are 19 trains to Hoboken. On Saturdays, Sundays and Holidays, 17 trains operate to the city on an hourly-basis.

The fare from Gladstone to Hoboken is $8.90. On a per-mile basis this is $0.20.

SEPTA – Philadelphia Area

The sample station for this comparison is Bryn Mawr on the "mainline" of the former Pennsylvania Railroad. This station is 10.3 miles from the Market East station in the center of Philadelphia. Commuter service on this line has been provided continuously since well before the turn of the century. Weekday service includes 39 inbound trains, some of which are expresses. On Saturdays, there are 26 inbound trains from Bryn Mawr, all serving all stations. Sunday and Holiday service to the center city consists of 17 train trips.

In the peak period, the one-way fare from Bryn Mawr to Market East is $4.00. This works out to a per-mile charge of $0.39. Off-peak the one-way fare is $3.25, equaling $0.32 per mile.

Tri-Rail – Fort Lauderdale/Miami Area

Hollywood station is 16.8 miles from Miami. This 10-year old service now provides 14 trains in each direction on a daily basis. With all trains making all stops.

Tri-Rail's Fare Zone 6 includes Hollywood. The one-way fare is $5.50, meaning that the per-mile charge is $0.33.

Virginia Railway Express – Washington/Richmond, VA Area

VRE's Quantico station is located 34.7 miles from Washington Union Station on that carrier's Fredricksburg Line. VRE provides six trains to Washington during the weekday AM peak period. Outbound service consists of one PM base period departure and five PM peak period trains. Amtrak trains also serve Quantico throughout the day.

The one-way fare from Quantico is $5.55. On a per-mile basis this is equal to $0.16.

While Amtrak accepts VRE multiple-ride tickets, riders cannot use a VRE single ride ticket on the longer-distance trains.

West Coast Express – Vancouver, BC

Port Coquitlam station on the West Coast Express (Canadian Pacific) Line is 16 miles from the Waterfront terminal in Vancouver. Service is provided only during the weekday peak periods, with five daily trains to the city.

The one-way fare is $2.72 US. This works out to a per-mile charge of $0.17. West Coast Express will allow a rider to transport a bicycle on its trains, but charges a flat $0.68 for that privilege.

Summary of Sample One-Way and Per-Mile Fares by Peer Property

Property	Sample Stations(s)	One-Way Peak Fare	Per Mile Charge	Is There an Off-Peak Fare?
Caltrain	San Jose	$5.25	$0.11	No
DART	South Irving	$1.00	$0.10	No – flat fare to all stations on starter line
Long Island	Hempstead	$6.25	$0.29	Yes
MARC	Point of Rocks	$6.50	$0.15	No
MBTA	Route 128	$2.25	$0.19	No
Metra	Mount Prospect	$3.15	$0.16	No
Metrolink	Chatsworth	$5.75	$0.21	Yes
Metro North	Brewster North	$10.25	$0.19	Yes
Mn/DOT	Burnsville Elk River	$2.75 $4.25	$0.12 $0.14	None recommended None recommended

	Hastings	$2.75	$0.15	None recommended
New Jersey	Gladstone	$8.90	$0.20	No
SEPTA	Bryn Mawr	$4.00	$0.39	Yes
Tri-Rail	Hollywood	$5.50	$0.33	No
VRE	Quantico	$5.55	$0.16	No
West Coast Express	Port Coquitlam	$2.72 US	$0.17 US	No

This comparison illustrates that the recommended fare structure for the Twin Cities commuter rail network would be consistent with the fare structures at most of the other North American commuter rail operations.

Availability/Charges for Multiple-Ride Tickets at Peer Carriers

This section of the memorandum considers the practices of peer carriers regarding the availability of multiple-ride tickets, noting the % discount where the carrier has been explicit about its fare structure.

The Twin Cities commuter rail sponsor should follow the practices of the other area transit agencies with regard to provision of discount fares for elderly/disabled riders and for children/students.

Many commuter rail agencies will sell “link-up” stickers that can be purchased with the monthly ticket to allow the rider to use that ticket on a feeder bus service. In some cases, mostly those where the commuter rail trains and buses are under the control of the same entity, the higher-priced multiple-ride tickets are valid for use on those connecting services without additional charge.

The section concludes with a table summarizing the multiple-ride ticket availability for the peer commuter rail properties. Some of these properties find that around 50% of their monthly ticket sales are for monthly commutation tickets, and that other forms of multiple ride tickets account for 25% of the sales in a month.

In the examples cited below, the same comparison stations are used as for the one-way fare comparisons.

Caltrain – San Francisco/San Jose Area

A 10-ride ticket from San Jose to San Francisco costs $45.50, as opposed to paying $52.50 for 10 one-way tickets. This represents about a 13% discount over the one-way fare.

The charge for a monthly ticket is $141.75. This represents a discount of approximately 40% over the one-way fares. A further discount is possible if the monthly ticket is bought by mail, in which case the price drops to $139.00, or a 42% discount from the one-way fares.

DART – Dallas Area

DART offers a one-day pass for $2.00. This can be purchased only from the ticket vending machines (TVMs) at the rail stations. An 11-ride ticket is available from the TVMs and sales outlets for a charge of $10.00. A DART monthly pass costs $30.00, and is available only from the agency's sales outlets.

Long Island Railroad – New York Area

The Long Island offers peak and off-peak 10-ride tickets. For Peak, tickets cost $62.50, 10 times the one-way fare. Off-peak a 10-ride ticket is priced at $38.25, representing a 10% discount from the one-way fare. A weekly ticket from Hempstead is priced at $42, but is good only for the week for which it is issued, hence the lower price compared to the 10-ride peak ticket.

A monthly ticket from Hempstead costs $135.00.

MARC – Baltimore/Washington Area

Two-ride tickets are available from MARC. In the case of Point of Rocks station, this type of ticket costs $11.75, a 10% discount on the one-way fares. A weekly ticket is

priced at $49.00, while a monthly ticket costs $164.00. Reduced-fare tickets (elderly and disabled) are discounted 50% off the full fare.

MBTA – Boston Area

A 12-ride ticket from Route 128 station costs $22.50. This compares to 12 one-way tickets at $27.00, representing an approximate saving of 20%. A monthly ticket would cost $72.00. Certain classes of tickets can also be purchased from the Internet, though no indication of any additional discount was evident.

Metra – Chicago Area

Zone D 10-ride tickets cost $26.80, a saving of 15% compared to the one-way ticket price. A monthly from Mount Prospect is priced at $85.05, representing a 30% discount. Metra also offers a $5.00 weekend pass, good for unlimited rides over the weekend.

Metrolink – Los Angeles Area

Metrolink offers peak and off-peak round trip fares. In the peak, a round trip costs $10.50, exactly twice the one-way fare. Off-peak the round trip is $8.00, representing a 5% discount from the one-way charge. Ten-ride and monthly tickets are also available. A 10-ride from this station is priced at $46.75, while a monthly costs $149.75.

Metro North – New York Area

In addition to peak and off-peak one-way tickets, Metro North also offers a similar fare structure for 10-ride tickets. A peak period 10-ride from Brewster North costs $102.50, while the off-peak equivalent is priced at $69.75. A weekly ticket from costs $65, but is good only for the week for which it is issued.

Metro North notes that a weekly ticket represents a 40% discount from the one-way fare, and that a monthly ticket is discounted 50% off the one-way price. Elderly and

disabled ticket prices are discounted 50%. Metro North offers group fares that are priced 75% below the equivalent one-way ticket prices.

New Jersey Transit – New York/New Jersey Area

NJT prices its weekly tickets at a 15% discount from the one-way fares. A monthly ticket represents a 30% discount over the individual ride price. The carrier discounts children, elderly and disabled ticket prices by 50%.

SEPTA – Philadelphia Area

A weekly ticket from Bryn Mawr costs $30.00. This is compared to 10 one-way peak period fares, which would cost $40.00, and represents a discount of approximately 25%. A 10-ride ticket, good for a longer period of time from date of issue, is $37.50, translating into a discount of 6%. A monthly ticket costs $109.50. Interestingly, SEPTA will refund unused monthly tickets on a declining percentage of the purchase price as the month progresses.

Tri-Rail – Fort Lauderdale/Miami Area

Round trip tickets are sold by Tri-Rail. In the case of Hollywood station, a round trip costs $9.25, where two one-ways would cost $11.00. This represents a discount of approximately 16%. Tri-Rail also sells 12-ride tickets, which from Hollywood cost $46.00.

Surprisingly, all monthly tickets on Tri-Rail are priced the same regardless of the number of fare zones covered. A monthly ticket costs $80.00.

Virginia Railway Express – Washington/Richmond, VA Area

VRE ten-ride tickets from Quantico cost $47.05. This represents a 15% discount on the one-way fares. A monthly ticket is priced at $162.60. VRE ten-rides and monthlies are valid on the Amtrak trains serving Quantico.

West Coast Express – Vancouver, BC

A round trip from Port Coquitlam costs $5.30 US. This fare is 2.5% below the one-way fare. Both the one-way and the round trip fares include a free transfer to BC Transit buses and the Skytrain service. Weekly tickets from this station are priced at $24.48 US, representing a 10% discount. A monthly ticket costs $81.60 US. If purchased in advance a 25% discount is offered. WCE also offers a rechargeable, stored-value fare card marketed under the "Xpress Card" name. A 5% bonus for each deposit to the card is offered.

As noted in the section on one-way fares, this carrier charges for bicycle transportation on its trains. Monthly and quarterly bike passes are available.

Summary of Multiple-Ride Ticket Availability by Peer Property

	Available Ticket Types			
Property	**Round-Trip?**	**10/12-Ride?**	**Weekly?**	**Monthly?**
Caltrain	No	Yes	No	Yes – additional discount if bought by mail
DART	No – day pass	11 – ride	No	Yes
Long Island	No	Yes	Yes	Yes
MARC	Two-ride	No	Yes	Yes
MBTA	No	Yes	No	Yes
Metra	No	Yes	No	Yes
Metrolink	Yes	Yes	No	Yes
Metro North	No	Yes	Yes	Yes
New Jersey	No	No	Yes	Yes
SEPTA	No	Yes	Yes	Yes
Tri-Rail	Yes	Yes	No	Yes
VRE	No	Yes	No	Yes
West Coast Express	Yes	No	Yes	Yes – discount for advance purchase

The provision of round-trip tickets is not so common a practice among the peer properties. Most every property offers a 10-/12-ride or a weekly ticket, in some cases both. Every one of the peer properties sells monthly tickets. Based on this information, it is recommended that the Twin Cities commuter rail owner offer multiple-ride tickets.

Consistency with the fare practices of the existing service providers in the Metro area is recommended. In the case of the monthly ticket, a single fare media good on all

carriers in the area could be a considerable inducement to ride the services of multiple carriers (commuter rail, bus, LRT). An excellent prototype for this practice exists in the San Francisco bay area, where the Metropolitan Transportation Commission's "TransLink" smart card can be used on all carriers in the area.

Summary

No change is recommended to the single-fare structure as included in the Twin Cities Commuter Rail Feasibility Study. The commuter rail sponsor should offer multiple-ride tickets and should work with the other area transit providers to maximize the acceptability of fare media between the various carriers. Ideally, this should culminate in the offering of a single fare media good on all carriers in the area.