



Minnesota Regional Transit  
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**REGIONAL TRANSIT BOARD**

Mears Park Centre  
230 East 5th Street  
St. Paul, Minnesota 55101  
612/292-8789

**MEETING OF THE COMMITTEE OF THE WHOLE**

Monday, December 10, 1990  
Mears Park Centre, Room A  
3:00 p.m.

**AGENDA**

1. Call to Order and Roll Call
2. Approval of Agenda
3. Draft Light Rail Transit Coordination Plan  
(material will be distributed at the meeting)
4. Other Business

Jeff Spartz  
Chair

REGIONAL TRANSIT BOARD  
ROLL CALL AND ATTENDANCE SHEET

DATE: 12/10/90

BOARD OR COMMITTEE: ~~ANNE~~ CW

Member Name	Present	Vote	Vote	Vote	Vote	Vote	Vote	Vote	Vote
		<i>absent</i>							
Mike Ehrlichmann	✓	<i>Y</i>							
Doris Caranicas (P)	✓	<i>no</i>							
John Finley (A&F)	✓	<i>no</i>							
Ruth Franklin (A&F)	✓	<i>no</i>							
Ed Kranz (A&F)	✓	<i>no</i>							
Sandra Hilary (P)									
Terry O'Toole (P)	✓	<i>Y</i>							
Jeff Spartz (Chair-P)	✓	<i>no</i>							
Norbert Theis (P)	✓	<i>Y</i>							
El Tinklenberg (Chair-A)	✓	<i>no</i>							
Richard Wedell (A&F)	✓	<i>Y</i>							

Visitors

*Zimmer*  
*Walsfeld*  
*Randy Halverson*  
*Brandt*  
*Jim Newark, CTS*  
*Jarbo*  
*de Spiegler*

*426*

Staff

*ga se*  
*jh*  
*mf*  
*ch*



**Ramsey County Regional Railroad Authority**

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**Duane W. McCarty, Vice Chairman**

District 1

**Warren W. Schaber, Secretary**

District 6

**Ruby Hunt, Treasurer**

District 5

**Diane Ahrens**

District 4

**Hal Norgard**

District 7

**Donald Salverda**

District 2

**MEMORANDUM**

**TO:** Michael Ehrlichmann, Chairman, Regional Transit Board  
Members of the Regional Transit Board

**FROM:** Commissioner John T. Finley, Chairman,  
Ramsey County Regional Railroad Authority

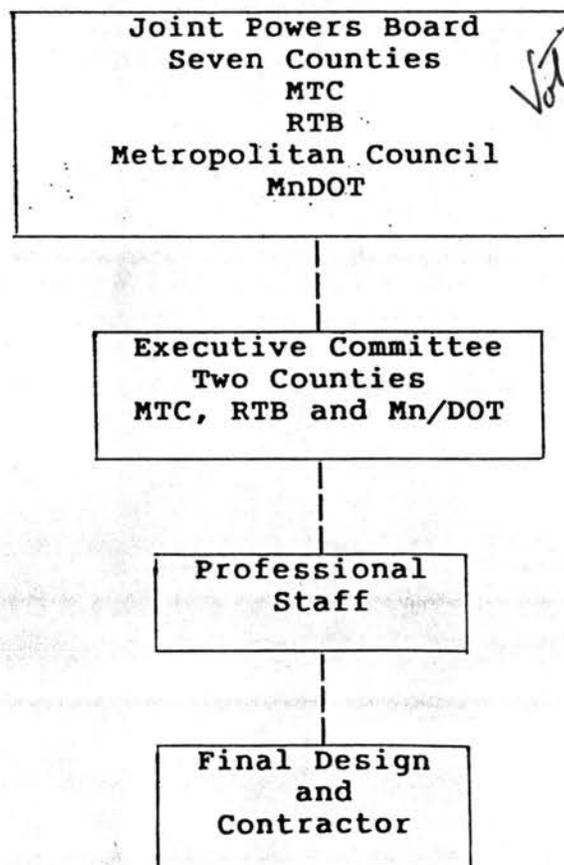
**SUBJECT:** Draft Light Rail Transit Regional Coordination Plan

**DATE:** December 6, 1990

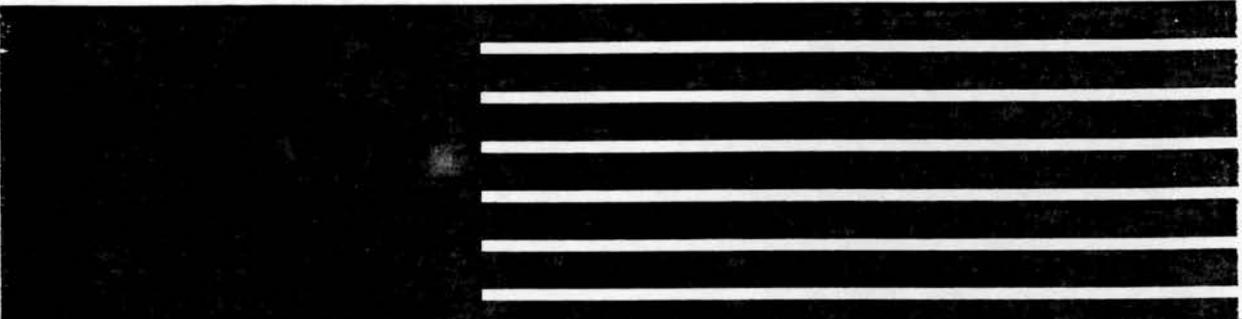
I would like to make the following amendments to the Light Rail Transit Coordination Plan and they are as follows:

- H. Finley*
1. At page 5, under Organization Plan, we would add a sentence after the fourth sentence after the word "oversight." We would add "That such program management oversight could include final design and construction in alignments that lie within the highway right of way so that highway construction and LRT construction can be provided by the same State agency. (Mn/DOT).
  2. At page 6, after the second sentence of the second full paragraph, we should insert, "If the alignment lies within the State highway corridor, Mn/DOT shall be the designer and builder for the final design and construction.
  3. At page 6, under Schedule and Budget, that we delete the part of the first sentence starting, "Which would include 1/2 cent dedicated to LRT construction and 1/2 cent returned to counties and municipalities within the seven county metropolitan area for transportation purposes."
  4. A new paragraph should be inserted in the Executive Summary and the full report which would call for the Joint Powers Board to consist of members from each of the seven counties in the metropolitan area, the Regional Transit Board, Mn/DOT, the Metropolitan

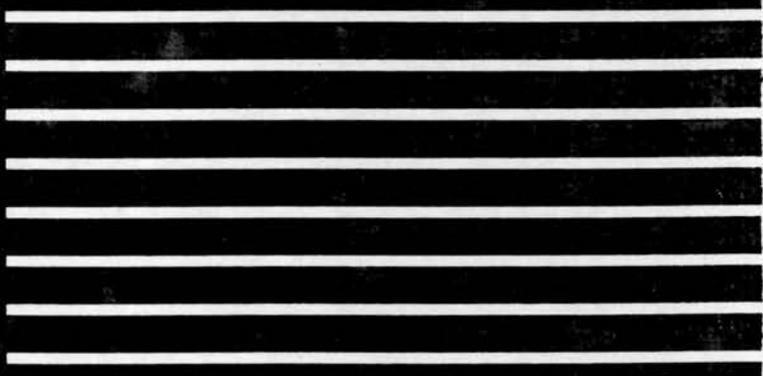
Transit Commission, and Metropolitan Council. The Joint Powers Board should have executive committees overseeing the day-to-day planning, design, and construction of the specific corridors. The Executive Committee should consist of members of the two counties through which a line passes, an MTC representative and an RTB representative. If the line is on a highway corridor, then Mn/DOT shall have a representative on this Executive Committee. Professional staff people from each of the agencies represented on the Executive Committee shall perform the staff function for the Executive Committee with the professional management reporting to the Executive Committee. The Joint Powers Board would have responsibility for overseeing the entire development in the seven county metropolitan area but only those areas which are most directly affected would have the representation at the staff and Executive Committee level. If Mn/DOT had the final design and construction because the alignment is within a highway corridor, the project director would be similar to a general contractor and report to the Executive Committee's professional staff.



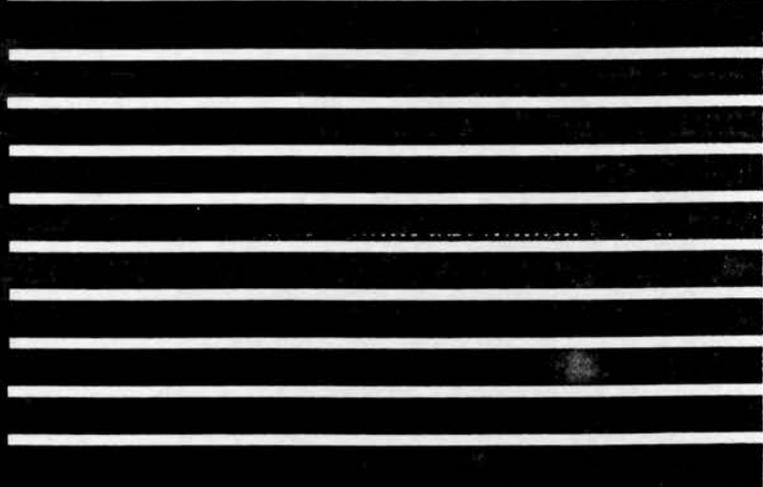
APPROVED DRAFT 10/17/90



LIGHT RAIL TRANSIT  
COORDINATION PLAN



*REGIONAL TRANSIT BOARD*



**DRAFT**

**LRT COORDINATION PLAN**

**APPROVED BY THE  
JOINT LRT ADVISORY COMMITTEE  
OF THE  
REGIONAL TRANSIT BOARD  
ON  
OCTOBER 17, 1990**

## ACKNOWLEDGEMENTS

The Regional Transit Board would like to acknowledge the contributions of the following organizations in the preparation of the LRT Coordination Plan.

- o The Joint LRT Advisory Committee for its role in developing policies and providing overall direction in the preparation of the LRT Coordination Plan.
- o The LRT Staff Committee for its role in reviewing technical data and preparing staff recommendations to the Joint LRT Advisory Committee.
- o Richard P. Braun (Director, Center for Transportation Studies, University of Minnesota), Representative Ruth Fisher (State of Washington), Kenneth G. Knight (Toronto Transit Commission), Larry F. Miller (Gannett-Fleming), James F. O'Leary (Alternative Concepts, Inc.), and Edward F. Ries (Urban Transportation Development Corporation) for their participation in the Peer Review on LRT Implementation Strategies and Organizational Alternatives.
- o The Hennepin County Regional Railroad Authority for its assistance in the preparation of Design Guidelines.
- o The Metropolitan Transit Commission for preparation of the Operations and Maintenance Plan.
- o The Metropolitan Council and members of the LRT/Land Use Task Force for preparation of the LRT/Land Use Coordination element of the plan.
- o The firms of Strgar-Roscoe-Fausch, Inc.; BRW, Inc.; and O'Brien-Krietzberg & Associates for technical consulting services.
- o The elected and appointed officials and staffs of the Regional Railroad Authorities, the Minnesota Department of Transportation, the Metropolitan Council, the Metropolitan Transit Commission, and the Regional Transit Board for their participation in this project.

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**CHAPTER 1**  
**EXECUTIVE SUMMARY**

## CHAPTER 1 EXECUTIVE SUMMARY

The "LRT Coordination Plan" was prepared in response to legislation passed by the 1989 Minnesota Legislature. It is a companion document to the "LRT Development and Financial Plan" published by the Regional Transit Board in February, 1990. The Coordination Plan is intended to provide guidelines for the implementation (design, construction and operation) of Light Rail Transit (LRT) in the Twin Cities. The Plan includes the following elements:

- o Organization plan
- o Implementation strategies
- o Schedule and budget for ten-year plan and two-year plan
- o Design guidelines
- o Operations and maintenance plan
- o Coordination of LRT with land use planning
- o Process for updating the Regional LRT Plan
- o Next steps in implementing LRT

The LRT Coordination Plan was prepared by the Joint LRT Advisory Committee for approval by the Regional Transit Board with review and comment by the Metropolitan Council and the Commissioner of Transportation. The Joint LRT Advisory Committee is made up of representatives of the seven county Regional Railroad Authorities, the Metropolitan Transit Commission and the Department of Transportation.

### WHY LIGHT RAIL TRANSIT?

The Twin Cities, like many other growing metropolitan areas, will face severe transportation problems in the future. Population and employment are growing. Travel patterns are changing. Congestion is increasing while highways are deteriorating. Transportation problems in the metropolitan area can no longer be easily solved. Resources are limited; right-of-way for new highways is often unavailable; and people are demanding better alternatives. It is clear that transit will be relied upon more heavily in the future to meet peak hour transportation needs in congested corridors, in the downtowns, and in suburban employment centers.

Light Rail Transit is an important tool for responding to the transportation challenges being faced by the Twin Cities. It is certain that significant improvements in the level and quality of transit service will be needed in the future. The planning and implementation of an LRT system in the 1990s may avoid a transit crisis in the 21st century.

While LRT is not a panacea for all transportation needs, it offers distinct qualities which could bring significant benefits to the Twin Cities. Most importantly, LRT offers an opportunity to revitalize regular route transit service in the Twin Cities and to restructure transit services to better meet changing travel needs throughout the metropolitan area. Key potential benefits of LRT are:

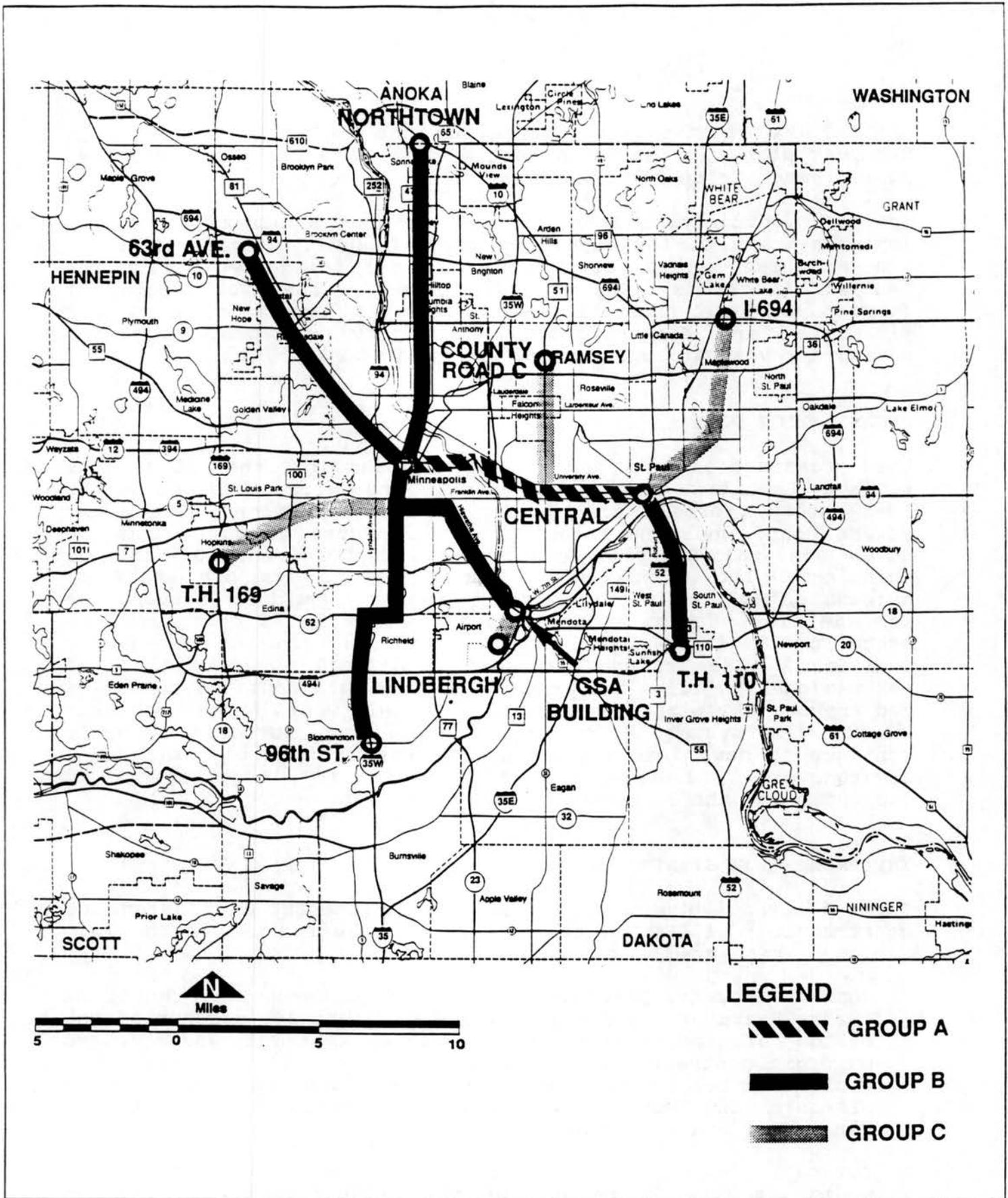
- o LRT can significantly increase transit ridership by providing better service coverage, better frequency, and shorter travel times for transit trips. The modern design, quality image, and high predictability of rail attracts many new riders who would not typically consider bus transportation. Once introduced to LRT service, new riders have a higher tendency to use the bus for connecting service to LRT.
- o LRT will enhance the existing bus system. Buses will continue to serve most transit needs, including the important function of a "feeder system" to LRT lines. Restructuring of existing bus routes will provide better suburb-to-suburb connections, improved neighborhood circulation, and better transit opportunities for the reverse-commuter. This restructuring around fixed LRT schedules will provide an opportunity to improve the timeliness of the entire bus system and coordinate a wide variety of transit service options and providers.
- o An LRT and bus system is more cost-effective than an all-bus system in moving large numbers of people. The primary reason for this operating cost advantage is that LRT is less labor intensive--one operator/driver can serve up to 450-500 passengers. Often the cost of constructing an LRT system can be recovered over several years through operating cost savings.
- o LRT can play an important part in relieving peak hour congestion in key commuter corridors. LRT has been successful in attracting people away from the automobile in highly congested corridors because it decreases transit travel times. The improved service coverage, trip frequency and reliability of LRT also adds to the perception that LRT is a high-speed mode of transportation which is competitive with the automobile.
- o LRT can also play an important role in relieving downtown congestion and improving air quality by reducing the number of buses and automobiles using downtown streets and reducing the need for additional parking.
- o LRT's physical characteristics provide a wide range of operating advantages over other modes of transit including improved ride quality, increased operating speed, variable capacity, increased cost efficiency and all-weather reliability.

- **LRT offers people with special transit needs a new versatility**, increased freedom of movement, and much broader access to the metropolitan area. LRT can provide better accessibility for transit dependent people, as well as better mobility for all riders.
- **LRT can provide environmental benefits** by reducing auto and bus emissions as riders choose the clean powered electric rail service over gasoline powered modes. LRT also runs quietly because of its electrical power source.
- **LRT can help focus retail, office and residential development.** It can be used to complement existing or planned developments or to restructure new development activity.
- **A strong transit system will enhance the economic vitality of the metropolitan region**, making it more attractive to new businesses, visitors and special events. By enhancing the quality of life and economic attractiveness of the Twin Cities metropolitan area, LRT indirectly benefits the economy of the entire State.

#### TEN-YEAR LRT PLAN

The recommended staging for the ten-year LRT plan is shown in Figure 1-1. The plan includes 83 miles of LRT service and is estimated to cost \$1.6 billion (1991 dollars). The three stages of the ten-year plan are:

<u>Group</u>	<u>Corridors, Facilities, Extensions</u>
A	Central Corridor (downtown Minneapolis to downtown St. Paul) St. Paul downtown loop Minneapolis downtown tunnel Central operations and maintenance facility
B	Minneapolis tunnel extension to 29th Street Hiawatha Corridor to GSA Building Minneapolis Northeast to Northtown Minneapolis Northwest to 63rd Avenue Minneapolis South to 96th Street St. Paul South to T.H. 110
C	Minneapolis Southwest to T.H. 169 St. Paul Northeast to I-694 St. Paul Northwest to County Road C Extension of Hiawatha to Lindbergh Terminal Extension of Minneapolis South to T.H. 13



LIGHT RAIL TRANSIT COORDINATION PLAN

**STAGING FOR MAXIMUM  
10-YEAR LRT PLAN**



FIGURE 1-1

The LRT Coordination Plan focuses on the implementation of this ten-year plan with emphasis on the tasks and decisions required to implement Group A of the plan.

The LRT Coordination Plan also sets forth a strategy for the implementation of the remaining Group B and C corridors in the ten-year plan. These corridors would be implemented during the ten-year timeframe (1992 to 2001) based on the availability of funding and the priorities set forth in the Development and Financial Plan. The Coordination Plan provides a process for the periodic review and updating of the regional LRT Plan.

#### **ORGANIZATION PLAN**

The organizational structure recommended by the Joint LRT Advisory Committee is a Joint Powers Board which would act as the lead agency, for LRT final design and construction. The Joint Powers Board would be established with representation from the seven Regional Railroad Authorities, Mn/DOT and the regional agencies. The Joint Powers Board, through its own staff or through delegation to an existing agency, would be responsible for the final design and construction of all LRT corridors. A state or regional agency would provide program management oversight. The RTB and Metropolitan Council would continue to set regional policies and priorities and would continue to review and approve LRT plans and designs. The MTC would be the operator of the LRT system. The Regional Railroad Authorities would continue to have lead responsibility for LRT corridor planning, environmental assessments, and preliminary engineering to completion of the 30 percent level of design.

#### **IMPLEMENTATION STRATEGIES**

Three alternative strategies for the implementation (design and construction) of LRT are considered suitable for use in the Twin Cities. These are:

- o **Current Industry Practice.** Under this alternative, the Joint Powers Board or its designee would complete 100 percent of the design of the facilities (civil works) and would award multiple contracts for construction. The Joint Powers Board would complete performance specifications for the systems elements and would award multiple contracts for design, furnishing and installation.
- o **Turnkey.** Under this alternative the County Rail Authorities would complete 30 percent of the design of the facilities (civil works) and complete performance specifications for the systems elements. A single contract would be awarded to a turnkey contractor by the Joint Powers Board who would be responsible for design, construction, furnishing and

installation of all facilities and equipment associated with the LRT project. The turnkey contractor would also be responsible for a test period of operation. A turnkey project may also involve private financing by the contractor to reduce the net cost of the system to the public.

- o **Hybrid Approach.** Under this alternative, the Joint Powers Board would complete 100 percent of the design of the facilities (civil works) and would award multiple contracts for construction. The Joint Powers Board would complete performance specifications for the systems elements and would award a single contract to a systems turnkey contractor for design, furnishing and installation of all vehicles and equipment needed for the LRT project. The systems turnkey contractor may also be required to operate the system for a test period. Private financing could also be a part of the systems turnkey contract.

The selection of the most appropriate implementation strategy will be dependent on conditions within existing corridors. Therefore, the Joint LRT Advisory Committee has recommended that the selection of a preferred implementation strategy be made by the Joint Powers Board on a corridor-by-corridor basis. The implementation strategy selected for a specific corridor should be the alternative which best addresses the following recommended selection criteria:

- o Impact on project cost
- o Impact on project schedule
- o Owner risks
- o Owner control
- o Quality of end product
- o Requirements for funding commitment

#### **SCHEDULE AND BUDGET**

The Joint LRT Advisory Committee has recommended a budget and schedule based on a funding assumption of a one cent regional sales tax for broad-based transportation purposes with 1/2 cent dedicated to LRT construction and 1/2 cent returned to counties and municipalities within the seven county metropolitan area for transportation purposes. Under this scenario, construction could begin on an LRT corridor every 12 months. The Central Corridor would be completed in 1997/1998. Construction could begin on all Group B corridors and two Group C corridors within the ten-year (1992 to 2001) timeframe. Four Group B corridors would be completed by 2001. It is assumed, as proposed in the Development

and Financial Plan, that \$200 million (1991 dollars) of federal funding will be obtained for the ten-year plan and a 10 percent local share will be provided by the counties for Group B and C corridors not receiving federal funds.

#### DESIGN GUIDELINES

Light Rail Transit (LRT) is a mass transportation system which utilizes a steel-wheeled vehicle running on a steel track, powered by overhead electrical wires. Vehicles may operate singly or may be trained together. Consists of up to three vehicles are recommended for the Twin Cities based on block lengths in the two downtowns. LRT will serve as the backbone of the regional transit system, supported by a bus system which will be reconfigured to feed the LRT lines.

The LRT system proposed for the Twin Cities is conceptually a high speed, high capacity, moderate cost, commuter service radiating out from the two metro centers. Travel to and through the metro centers as well as within corridors is expected. To accomplish these objectives, the system will utilize high-platform level boarding, predominantly exclusive (but not necessarily grade-separated) rights-of-way, and stations spaced approximately one mile apart. The system will be fully accessible to mobility-impaired people.

One of the most important potential advantages of light rail is that it can improve the cost-effectiveness of the regional transit system. However, the implementation of light rail does require a major capital investment. The LRT system to be built in the Twin Cities should be reliable and moderate in cost. To accomplish this objective, the LRT system will utilize conventional "off-the-shelf" LRT technology. Designs and materials will be selected which are attractive but are moderate in cost, easy to install and inexpensive to maintain. Grade separations and tunnels will be provided only where it can be shown that they are needed to address topographic or operational concerns.

The LRT Coordination Plan provides design guidelines for:

- o Light rail vehicles
- o Stations
- o Park-and-ride lots and bus transfer facilities
- o Accessibility features for seniors and the disabled
- o Track system
- o Electrification system
- o Train signal system
- o Communication system
- o Fare collection system
- o Landscaping and architectural treatments
- o Operations and maintenance facilities

## OPERATIONS AND MAINTENANCE PLAN

The Metropolitan Transit Commission will be the agency responsible for LRT operations and maintenance, and has prepared an organization and staffing plan for the provision of these services. The MTC operations and maintenance plan addresses overall operating policies as well as specific operational issues related to security, communications, signalization, dispatching and training. Key operating policies are:

- o The LRT hours of service will be comparable to those of the present day bus system (approximately 5:30 a.m. to 1:30 a.m.).
- o Scheduled train frequency will be adjusted to meet passenger demand. The maximum time between trains will be 10 minutes during peak hours and 30 minutes during off-peak hours.
- o Operating policies will be adopted to assure reliable service. This will include contingency plans for emergencies, training programs for personnel, and maintenance schedules which do not conflict with peak times of operation.
- o Fare collection will be barrier free and self-service. Passengers will purchase tickets from vending machines on station platforms. Fares will be in conformance with adopted RTB/MTC policies and will be consistent with other transit fares in the region.
- o Feeder bus service will take the form of timed transfers and will be designed to enhance overall transit service in the region. The feeder bus system will be planned using guidelines that include travel time, route spacing, rail/bus integration, and transfer standards.
- o A thorough and ongoing training program will be provided for all train operators. Operators will be subject to an annual review of their operating and safety records.
- o A system security plan will be prepared with assistance from municipal, county and state public safety agencies.

To assure reliability, minimize expense and promote a high level of passenger satisfaction, the MTC maintenance program will be based on a proactive, preventive approach. All inspections and component replacements will be completed in conformance with the guidelines and intervals recommended by suppliers. Emphasis will be given to those measures which increase vehicle availability and reduce system downtime and resulting service interruptions.

## LRT AND LAND USE COORDINATION

The Metropolitan Council has prepared a planning framework for coordination between the development of an LRT system and land use-related activities. These guidelines are not mandatory but will serve as information and guidance to cities affected by the implementation of LRT. Cities will continue to be responsible for land use-related decisions. The recommended planning process includes five phases:

- o **Phase I--Land Use Evaluation.** This phase, which would be accomplished during preliminary design (10%) and environmental reviews, involves a review of local comprehensive land use and transportation policies, an assessment of the potential impacts of the LRT line, and an assessment of station locations.
- o **Phase II--Station Area Land Use Planning.** This phase, accomplished during preliminary engineering (30%), includes development of conceptual land use planning around LRT stations, amendments to comprehensive plans, and further refinement of the location and sizing of park-and-ride facilities.
- o **Phase III--Detailed Station Area Land Use Planning.** This phase of planning would be undertaken during final design of LRT and involves development of a final station area land use plan, preparation of an economic market analysis, and preparation of an implementation plan.
- o **Phase IV--Station Area Preparation.** Once LRT construction is initiated, cities would take the necessary steps to implement station area plans including land acquisition, negotiations with developers, and implementation of financial plans.
- o **Phase V--Station Area Development** would occur after the LRT system begins operation and would continue 10-20 years after the system is open.

## PROCESS FOR UPDATING THE REGIONAL LRT PLAN

The regional LRT plan will be reviewed annually and formally updated every two years as part of RTB's update of the Five Year Transit Plan. Changes in corridor priorities will be based on the following conditions:

- o Selection of final corridor alignment and station locations
- o Completion of environmental reviews
- o Significant changes in implementation costs
- o Significant changes in patronage forecasts

- o Local and agency plan approvals
- o Readiness for construction
- o Any other significant changes in projected performance of the corridor

As part of this process, it is expected that the benefits and costs of LRT in each corridor can be better assessed as more detailed information becomes available. As a result, corridor priorities can be further refined based on cost-effectiveness, availability of funds, regional goals and other technical criteria.

**CHAPTER 2**  
**INTRODUCTION AND BACKGROUND**

## CHAPTER 2 INTRODUCTION AND BACKGROUND

The "LRT Coordination Plan" was prepared in response to the following legislation passed by the 1989 Minnesota Legislature:

"The RTB shall adopt a regional LRT plan...to ensure that LRT facilities in the metropolitan area will be acquired, developed, owned, and capable of operation in an efficient, cost-effective and coordinated manner as an integrated and unified system on a multi-county basis in coordination with buses and other transportation modes and facilities. To the extent practicable, the RTB shall incorporate into its plan appropriate elements of the plans of regional railroad authorities in order to avoid duplication (Minnesota Statutes 473.399, Subd. 1)."

In order to ensure a coordinated approach to Light Rail Transit (LRT) planning and development, the 1989 Minnesota Legislature required the RTB to prepare a regional LRT plan. The legislation requires: (1) a Development and Financial Plan element, and (2) a Coordination Plan element.

This report, the LRT Coordination Plan, is to be prepared by the Joint LRT Advisory Committee and submitted to the RTB for approval. Legislatively-mandated elements of the Coordination Plan include:

- o Plan for the coordination of construction, ownership, and operations, including:
  - Coordination of vehicle specifications
  - Provisions for a single operator
  - Coordination method if turnkey implementation is used
- o Development of system standards and specifications
- o Operating and performance standards and specifications
- o Feeder bus and park-and-ride policies, standards and plans
- o Method for ensuring ongoing coordination
- o Provision for operation by MTC

Other matters may also be included in the Plan if the RTB deems them necessary to ensure that LRT facilities are acquired, developed, owned and operated in an efficient, cost-effective and coordinated manner.

The Development and Financial Plan was submitted to the Legislature in February, 1990 and was prepared by the RTB in consultation with the Joint LRT Advisory Committee. Legislatively mandated elements of the Development and Financial Plan included:

- o Staging Plan
- o Ten-Year Development Plan, including
  - Statement of needs, objectives and priorities
  - Ridership projections
  - Long-term capital funding policies
- o Five-Year Development Plan, including:
  - Policies regarding facility ownership
  - Policies regarding funding capital and operating costs (use of property tax for operating funds capped at 35 percent)
  - Additional cost for tunnel construction

The Development and Financial Plan includes a plan for the staged construction of LRT and for the funding of an LRT system for the Twin Cities metropolitan area. The plan was developed in close coordination with the Joint LRT Advisory Committee and the seven county Regional Railroad Authorities. Copies of the Plan may be obtained from the Regional Transit Board.

#### **NEED FOR LIGHT RAIL TRANSIT**

The Twin Cities, like many other growing metropolitan areas, will face severe transportation problems in the future. Population and employment are growing. Travel patterns are changing. Congestion is increasing while highways are deteriorating. Transportation problems in the metropolitan area can no longer be easily solved. Resources are limited; right-of-way for new highways is often unavailable; and people are demanding better alternatives. It is clear that transit will be relied upon more heavily in the future to meet peak hour transportation needs in congested corridors, in the downtowns, and in suburban employment centers.

Light Rail Transit is an important tool for responding to the transportation challenges being faced by the Twin Cities. It is certain that significant improvements in the level and quality of transit service will be needed in the future. The planning and implementation of an LRT system in the 1990s may avoid a transit crisis in the 21st century.

While LRT is not a panacea for all transportation needs, it offers distinct qualities which could bring significant benefits to the Twin Cities. Most importantly, LRT offers an opportunity to revitalize regular route transit service in the Twin Cities and to restructure transit services to better meet changing travel needs throughout the metropolitan area. Key potential benefits of LRT are:

- **LRT can significantly increase transit ridership** by providing better service coverage, better frequency, and shorter travel times for transit trips. The modern design, quality image, and high predictability of rail attracts many new riders who would not typically consider bus transportation. Once introduced to LRT service, new riders have a higher tendency to use the bus for connecting service to LRT.
- **LRT will enhance the existing bus system.** Buses will continue to serve most transit needs, including the important function of a "feeder system" to LRT lines. Restructuring of existing bus routes will provide better suburb-to-suburb connections, improved neighborhood circulation, and better transit opportunities for the reverse-commuter. This restructuring around fixed LRT schedules will provide an opportunity to improve the timeliness of the entire bus system and coordinate a wide variety of transit service options and providers.
- **An LRT and bus system is more cost-effective** than an all-bus system in moving large numbers of people. The primary reason for this operating cost advantage is that LRT is less labor intensive--one operator/driver can serve up to 450-500 passengers. Often the cost of constructing an LRT system can be recovered over several years through operating cost savings.
- **LRT can play an important part in relieving peak hour congestion** in key commuter corridors. LRT has been successful in attracting people away from the automobile in highly congested corridors because it decreases transit travel times. The improved service coverage, trip frequency and reliability of LRT also adds to the perception that LRT is a high-speed mode of transportation which is competitive with the automobile.
- **LRT can also play an important role in relieving downtown congestion** and improving air quality by reducing the number of buses and automobiles using downtown streets and reducing the need for additional parking.
- **LRT's physical characteristics provide a wide range of operating advantages** over other modes of transit including improved ride quality, increased operating speed, variable capacity, increased cost efficiency and all-weather reliability.

- o LRT offers people with special transit needs a new versatility, increased freedom of movement, and much broader access to the metropolitan area. LRT can provide better accessibility for transit dependent people, as well as better mobility for all riders.
- o LRT can provide environmental benefits by reducing auto and bus emissions as riders choose the clean powered electric rail service over gasoline powered modes. LRT also runs quietly because of its electrical power source.
- o LRT can help focus retail, office and residential development. It can be used to complement existing or planned developments or to restructure new development activity.
- o A strong transit system will enhance the economic vitality of the metropolitan region, making it more attractive to new businesses, visitors and special events. By enhancing the quality of life and economic attractiveness of the Twin Cities metropolitan area, LRT indirectly benefits the economy of the entire State.

#### GOALS FOR LIGHT RAIL TRANSIT

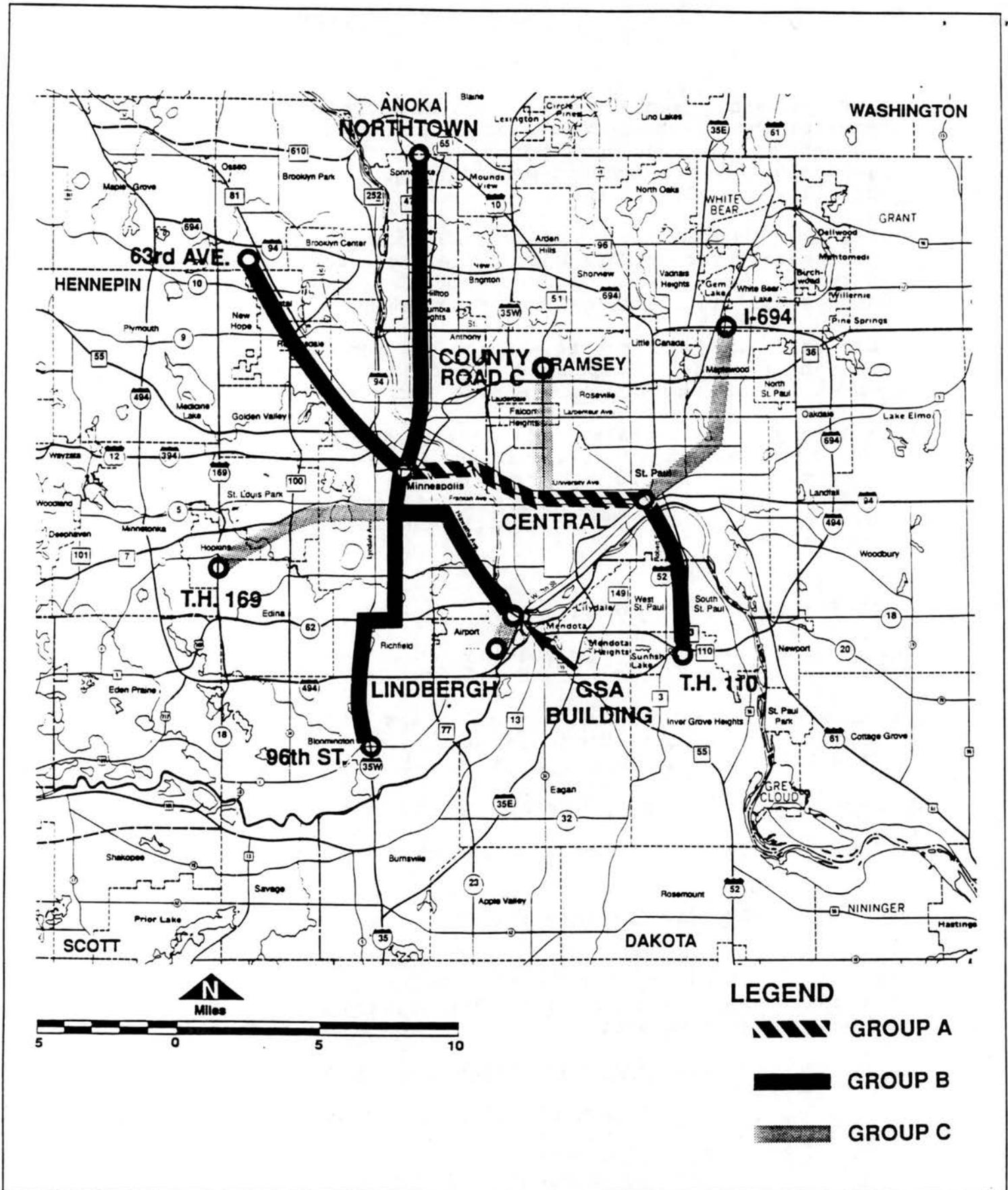
The Joint LRT Advisory Committee has endorsed the following goals for the implementation of Light Rail Transit in the Twin Cities:

- o Maximize ridership and improve transit service by reducing travel time, operating in exclusive right-of-way where feasible, and providing a high quality of service.
- o Improve cost-effectiveness of transit service.
- o Improve service to transit dependents.

#### RECOMMENDED TEN-YEAR LRT PLAN

The recommended staging for the ten-year LRT plan is shown in Figure 2-1. The plan includes 83 miles of LRT service and is estimated to cost \$1.6 billion (1991 dollars). The three stages of the ten-year plan are:

<u>Group</u>	<u>Corridors, Facilities, Extensions</u>
A	Central Corridor (downtown Minneapolis to downtown St. Paul) St. Paul downtown loop Minneapolis downtown tunnel Central operations and maintenance facility



LIGHT RAIL TRANSIT COORDINATION PLAN

**STAGING FOR MAXIMUM  
10-YEAR LRT PLAN**



FIGURE 2-1

- B Minneapolis tunnel extension to 29th Street  
Hiawatha Corridor to GSA Building  
Minneapolis Northeast to Northtown  
Minneapolis Northwest to 63rd Avenue  
Minneapolis South to 96th Street  
St. Paul South to T.H. 110
  
- C Minneapolis Southwest to T.H. 169  
St. Paul Northeast to I-694  
St. Paul Northwest to County Road C  
Extension of Hiawatha to Lindbergh Terminal  
Extension of Minneapolis South to T.H. 13

The LRT Coordination Plan focuses on the implementation of this ten-year plan with emphasis on the tasks and decisions required to implement Group A of the plan.

#### **PARTICIPANTS IN THE PREPARATION OF THE COORDINATION PLAN**

The relationship of the participants involved in the formulation, discussion and approval of the LRT Coordination Plan is shown in Figure 2-2. The roles of the participants are described below.

##### **Regional Transit Board**

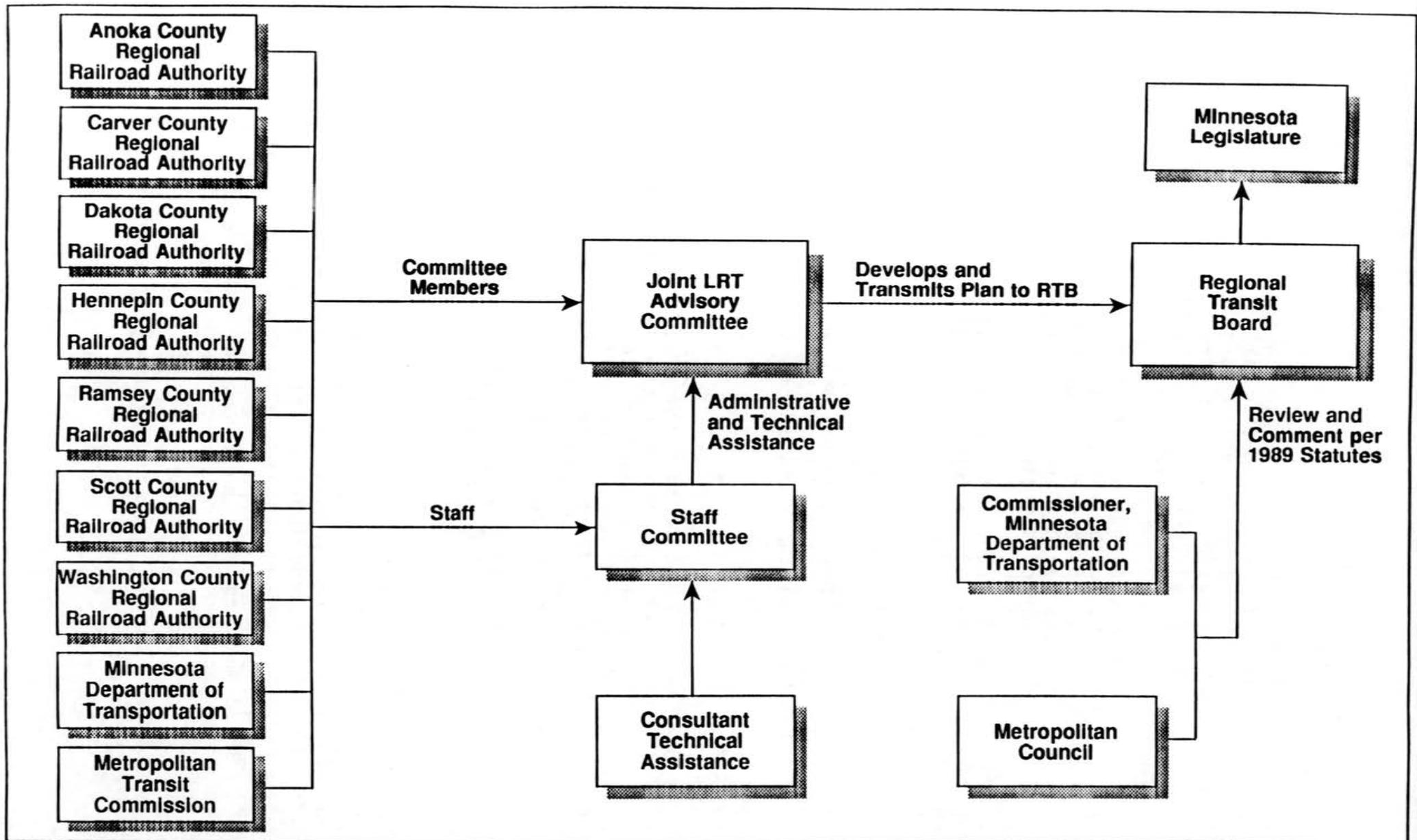
The RTB is comprised of ten board members and a full-time chair. Eight board members are appointed by the Metropolitan Council, one from each Metropolitan Council district. Two additional members and the chair are appointed by the Governor. The RTB conducts its business through its Policy Committee and Administration and Finance Committee. Each committee meets monthly and the board, as a whole, meets at least twice monthly.

The role of the RTB in this project is to review and approve the LRT Coordination Plan as recommended by the Joint LRT Advisory Committee.

##### **Joint LRT Advisory Committee**

The Joint LRT Advisory Committee was established, at the direction of the 1989 Legislature, to advise the RTB on issues related to the planning and implementation of Light Rail Transit in the Twin Cities metropolitan area. The Committee consists of:

- o Two RRA Board members from each Regional Railroad Authority that receives state MVET funds for preliminary design of an LRT line.
  
- o One additional member from the Hennepin County Regional Railroad Authority.



LIGHT RAIL TRANSIT COORDINATION PLAN

## RELATIONSHIP OF PLAN PARTICIPANTS



FIGURE 2-2

- o One Board member from each Regional Railroad Authority that receives state MVET funds for planning LRT facilities not otherwise represented.
- o Two members of the Metropolitan Transit Commission.
- o One representative from the Minnesota Department of Transportation.

The Joint LRT Advisory Committee met twice monthly during the development of the LRT Coordination Plan to review staff and consultant findings and make recommendations on various aspects of the plan.

The role of the Joint LRT Advisory Committee on the LRT Coordination Plan is to develop the plan for approval by the RTB. The role of the Joint LRT Advisory Committee in the LRT Development and Financial Plan was to advise the Regional Transit Board on the staging and financing of LRT. John Derus, Hennepin County Commissioner chaired the Joint LRT Advisory Committee and Paul McCarron, Anoka County Commissioner, served as Vice-Chair during the preparation of both the LRT Development and Financial Plan and the LRT Coordination Plan.

#### **Staff Committee**

A technical committee composed of staff from each represented agency was formed to advise the Joint LRT Advisory Committee on technical issues. The role of the Staff Committee in this project has been to review technical information and make staff recommendations to the Joint LRT Advisory Committee.

The RTB, the MTC, Mn/DOT, Metropolitan Council and each of the Regional Rail Authorities provide staff for technical and administrative assistance. Consultant services were also procured to provide technical assistance on the project.

#### **PLAN DEVELOPMENT PROCESS**

Staff recommendations and draft reports were presented to the Joint LRT Advisory Committee. The Committee developed its recommendations through a series of motions addressing specific issues. These background reports are assembled in a "Background Materials" notebook and are available for review at the Regional Transit Board.

Two Peer Reviews were conducted on the LRT Coordination Plan. The first was conducted in June, 1990, to hear a discussion of the advantages and disadvantages of organizational alternatives and implementation strategies. The second Peer Review will be held in November 1990 for review and comment on the draft LRT Coordination Plan. Summaries of these Peer Reviews are included in the "Background Materials" notebook.

A Public Hearing will be held in November 1990 to receive public comment on the draft LRT Coordination Plan.

The Joint LRT Advisory Committee will review and approve a report for submittal to the Regional Transit Board. The report will be reviewed by the RTB's Policy Committee which, in turn, will make recommendations to the RTB. The draft report will be submitted, as required by the 1989 Legislature, to the Metropolitan Council and the Commissioner of Transportation for review and comment. The RTB will modify and approve the LRT Coordination Plan, taking into account recommendations from the Joint LRT Advisory Committee and RTB's Policy Committee, the results of the Peer Reviews and the Public Hearing, and comments received from the Metropolitan Council and the Department of Transportation.

**CHAPTER 3**  
**ORGANIZATIONAL PLAN**

## CHAPTER 3 ORGANIZATIONAL PLAN

The preparation of an organizational plan for the implementation of Light Rail Transit in the Twin Cities was one of the tasks specified in the 1989 legislation requiring the preparation of the Regional LRT Coordination Plan. This chapter of the Coordination Plan addresses the issues of organization by identifying functional stages and organizational principles for the implementation of LRT, describing organizational alternatives, identifying the strengths and weaknesses of participating agencies, and recommending a joint powers board which builds on the strengths of all participating organizations.

### PROJECT PHASES

Each LRT corridor must go through several project phases before construction can be completed and the line can be opened for operation. These key steps as defined for the Twin Cities are:

- o **Corridor Planning.** This stage includes comprehensive planning, conceptual planning studies and corridor alignment studies.
- o **Preliminary Design.** The Preliminary Design (PD) phase includes approximately 10 percent of engineering and design work and completion of an Environmental Impact Statement (EIS). Legislation requires local and regional approval of preliminary design and the EIS for LRT corridors.
- o **Preliminary Engineering.** The Preliminary Engineering (PE) phase includes completion of approximately 30 percent of civil engineering and preparation of performance specifications for the systems elements (vehicles, communications, electrification, signals, fare collection, etc.) of the LRT project.
- o **Final Engineering.** 100 percent of engineering is completed during the Final Engineering (FE) of the project. Legislation requires local and regional approval of final design for LRT corridors.
- o **Construction.** All aspects of the LRT project are constructed, furnished and installed during the construction phase of the project.

- o **Testing and Start-Up Operation.** All LRT projects must go through a period of test operation before they are opened for public use to ensure that all facilities and equipment are operating properly. The system must meet design and performance specifications before it is accepted by the owner as satisfactorily completed.
- o **Revenue Operation.** The LRT line is opened for revenue operation after all performance specifications are met. Legislation identifies the Metropolitan Transit Commission (MTC) as the operator of LRT in the Twin Cities.

#### **AUTHORITY AND RESPONSIBILITIES OF EXISTING AGENCIES**

A number of agencies are actively involved in Light Rail Transit planning and engineering activities including:

- o Regional Railroad Authorities (seven counties)
- o Regional Transit Board
- o Metropolitan Transit Commission
- o Metropolitan Council
- o Minnesota Department of Transportation (Mn/DOT)

The roles and responsibilities of each of these agencies and their legislative authority related to LRT (based on most recent legislation through 1989) are described below and shown in Figure 3-1.

#### **Regional Railroad Authorities (RRAs)**

Regional Railroad Authorities (RRAs) were authorized by the State Legislature in 1980 and can be established by an individual county or by two or more counties under a joint-powers agreement. Since that time, all seven counties in the metropolitan area have set up separate RRAs. In all cases, the county commissioners serve as the Regional Railroad Authority Commissioners.

Regional Railroad Authorities have the authority to plan, design and construct Light Rail Transit. They also have the authority to acquire right-of-way and to levy property taxes for LRT (up to a maximum equivalent of 2 mills). Current activities are:

- o The Hennepin County RRA is completing Preliminary Design and an EIS on a Stage I system and has initiated Preliminary Engineering activities on some corridors including the downtown Minneapolis tunnel. The Hennepin County RRA has also purchased right-of-way for LRT where properties have been available for sale.

 = LEAD ROLE  
 = APPROVAL AUTHORITY  
 = PARTICIPANT

AGENCY	RTB	MET COUNCIL	CRRRA'S	MTC	LOCAL JURISDICTIONS	ADVISORY GROUPS
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ACTIVITY	Mn/DOT	RTB	MET COUNCIL	CRRRA'S	MTC	LOCAL JURISDICTIONS	ADVISORY GROUPS	COMMENTS
REGIONAL SYSTEM PLANNING	Participant	Lead Role	Approval Authority	Participant	Participant	Participant	Participant	Develop System Plan & Updates
CORRIDOR PLANNING	Participant	Participant	Participant	Lead Role	Participant	Participant	Participant	
PRE-DESIGN (10%)/E.I.S.	Participant	Approval Authority	Approval Authority	Lead Role	Participant	Approval Authority		10% Design/E.I.S.
PRELIMINARY ENGINEERING (30%)	Participant	Participant	Participant	Lead Role	Participant	Participant	Participant	30% Design; Performance Specifications
FINAL DESIGN	Participant	Approval Authority	Approval Authority	Lead Role	Participant	Approval Authority	Participant	100% Design
RIGHT-OF-WAY ACQUISITION	Participant			Lead Role		Participant		
CONSTRUCTION MANAGEMENT	Participant			Lead Role				
SYSTEM TESTING		Participant		Lead Role	Approval Authority			Safety, Pre-Revenue Testing
OPERATING/STAFF		Participant		Participant	Lead Role			Training & Gearing Up for Operation
MAINTENANCE		Participant		Participant	Lead Role			Vehicles, Lines, Park & Ride Lots, Sidewalks, etc.
FINANCIAL MANAGEMENT				Lead Role				Design & Construction
FUNDING ACQUISITION		Lead Role		Lead Role				Federal, State, Local Funds
MARKETING		Participant			Lead Role			Obtaining Support for the System
SYSTEM EVALUATION		Lead Role	Participant	Participant	Participant			

LIGHT RAIL TRANSIT COORDINATION PLAN



## CURRENT RESPONSIBILITIES FOR LIGHT RAIL TRANSIT

FIGURE 3-1

- o The Ramsey County RRA and Hennepin County RRA are jointly conducting Preliminary Design and an EIS on the Midway Corridor. The Ramsey County RRA is conducting a corridor alignment study for the St. Paul Northeast Corridor. The Ramsey County RRA is currently negotiating acquisition of an abandoned rail line in the St. Paul Northeast Corridor.
- o The Anoka County RRA and Hennepin County RRA are jointly conducting Preliminary Design and an EIS for the Minneapolis Northeast Corridor.
- o The Dakota County RRA and Ramsey County RRA are jointly conducting Preliminary Design and an EIS for the St. Paul South Corridor.
- o The Dakota County RRA and Hennepin County RRA are participating with the Minnesota Department of Transportation in the Preliminary Design and EIS for the Minneapolis South (I-35W) Corridor.
- o The Washington County RRA has completed a Comprehensive LRT Plan.
- o All seven counties are active participants on the Joint LRT Advisory Committee.

The Hennepin County RRA table of organization provides for a Director and 11 staff positions. As of May, 1990, the Director's position and six of the staff positions were filled. The Ramsey County RRA has four full-time staff members. Other RRA's use personnel from other county departments on an as-needed basis.

#### **Regional Transit Board**

The Regional Transit Board (RTB) has responsibility for short and mid-range transit planning for the Twin Cities metropolitan area including Light Rail Transit, funding oversight for the Metropolitan Transit Commission and all other transit operators in the metropolitan area, and administrative and oversight responsibility for numerous other transit activities.

The RTB's role in Light Rail Transit involves the following:

- o Approval of grant requests for LRT funding from Motor Vehicle Excise Taxes (MVET).
- o Preparation of the Regional LRT Development and Financial Plan (and periodic updating) which sets regional priorities for LRT construction and funding.
- o Approval of the LRT Coordination Plan prepared by the Joint LRT Advisory Committee.

- o Lead agency in seeking federal funds for LRT and in working with the Urban Mass Transportation Administration (UMTA).
- o Review and approval of preliminary design and final design of LRT corridors.

The RTB has the authority to levy property tax for bonding for capital transit projects including LRT. Bonding must be approved by the Legislature. There is no levy limit. The RTB does not have the authority to design or construct LRT nor does it have the authority to acquire right-of-way.

The Regional Transit Board's 1990 budget calls for a total staff of 39 persons. Three staff members are assigned full-time to LRT. Other staff members are used for LRT projects on an as needed basis.

#### **Metropolitan Transit Commission**

The Metropolitan Transit Commission is a five-member board appointed by the Regional Transit Board. RTB approves the MTC's budget. MTC is the major operator of transit services in the metropolitan area. MTC has been designated by the Legislature as the operator of a Light Rail Transit system. The MTC's role in LRT includes operational planning, feeder bus planning, and participation on LRT advisory committees.

The MTC has the authority to design and construct transit facilities and to acquire right-of-way. While this authority does not explicitly include LRT, it does not exclude LRT. MTC is responsible for the procurement of all capital equipment for operation and maintenance of the bus system. MTC does not have any staff dedicated full-time to LRT projects. Staff are used on an as-needed basis.

#### **Metropolitan Council**

The Metropolitan Council is a seventeen member board appointed by the Governor. It is the principal agency for coordinating long range regional development and planning regional infrastructure improvements. The current role of the Metropolitan Council in LRT is to review and comment on the Regional LRT Development and Financial Plan and the LRT Coordination Plan. In addition to its long range planning role, Metropolitan Council is responsible for LRT ridership forecasting and review and comment on preliminary design and final design plans for LRT as to consistency with regional transportation policies and plans. In addition, the Metropolitan Council is a joint lead agency with Mn/DOT for the Preliminary Design and EIS being prepared for the Minneapolis South (I-35W) corridor.

The Metropolitan Council does not have authority to design or construct LRT, purchase right-of-way or levy taxes for LRT. No staff are dedicated full-time to LRT projects. Staff are used on an as-needed basis.

#### **Minnesota Department of Transportation**

The Minnesota Department of Transportation (Mn/DOT) has statewide responsibility for planning, designing and constructing transportation facilities including the administration and distribution of state funds for highway and transit purposes. The role of Mn/DOT in Light Rail Transit is:

- o Distributes MVET funds for LRT to agencies in the Twin Cities area upon eligibility certification by the RTB.
- o Joint Lead Agency with the Metropolitan Council for the preliminary design and EIS for the Minneapolis South (I-35W) corridor.
- o Participates on LRT advisory committees.
- o Mn/DOT trunk highways are being considered as alignment alternatives for LRT in the Central Corridor and all of the Group B corridors (Minneapolis South, Minneapolis Northeast, Hiawatha, Minneapolis Northwest, and St. Paul South).

Mn/DOT has the authority to plan and design LRT within state highway rights-of-way. Mn/DOT does not have the authority to construct Light Rail Transit nor to acquire right-of-way exclusively for LRT.

The Minnesota Department of Transportation has a full range of capabilities from planning through construction, primarily for highway facilities (although Mn/DOT has managed some joint highway/transit projects). Mn/DOT does not have any staff dedicated full-time to LRT projects. Staff are used on an as needed basis.

#### **ORGANIZATIONAL ALTERNATIVES FOR THE CONSTRUCTION OF LIGHT RAIL TRANSIT**

The above section of the report describes the roles and responsibilities which various agencies have undertaken to date. However, the project management and staffing requirements are different for LRT construction than for planning. The Legislature recognized this when the legislation requiring the Coordination Plan specified that the plan address organizational

requirements for LRT construction. The purpose of this section of the report is to describe organizational alternatives which have been considered for LRT construction in the Twin Cities. The alternatives described are:

- o Joint Powers Board (Regional Railroad Authorities)
- o Minnesota Department of Transportation
- o Regional Transit Board
- o Metropolitan Transit Commission
- o A new regional agency charged with LRT design and construction

The strengths and weaknesses of each of these alternatives are summarized in Figure 3-2. It should be noted that many of the potential weaknesses could be overcome by actions such as adding experienced staff, developing interagency agreements or joint responsibilities, or changing current ways of doing business. In addition, many variations and combinations of these alternatives are possible.

#### Alternative 1 - Joint Powers Board

A Joint Powers Board is formed when two or more units of government agree to combine their individual powers and resources to achieve an objective which the individual units could not achieve alone. The individual units delegate their statutory powers and resources to a Joint Powers Board by entering into a joint powers agreement. The Board then exercises those powers on behalf of and instead of the individual governmental units.

Under this alternative, the Regional Railroad Authorities and perhaps other agencies such as Mn/DOT, RTB and MTC would form a Joint Powers Board through a joint powers agreement (see Figure 3-3). The Joint Powers Board would be charged with overseeing the design and construction of LRT. This concept has been successfully implemented by various counties and public agencies in the Twin Cities for major public works projects including resource recovery facilities, dams, bridges and roads.

The specific powers, roles and responsibilities for the Joint Powers Board and its member agencies would be negotiated as part of the development of the joint powers agreement. The agreement would specify voting, representation, committee structure, roles and responsibilities, financial obligations, approvals, budgeting, risk and liability, and termination/withdrawal rights.

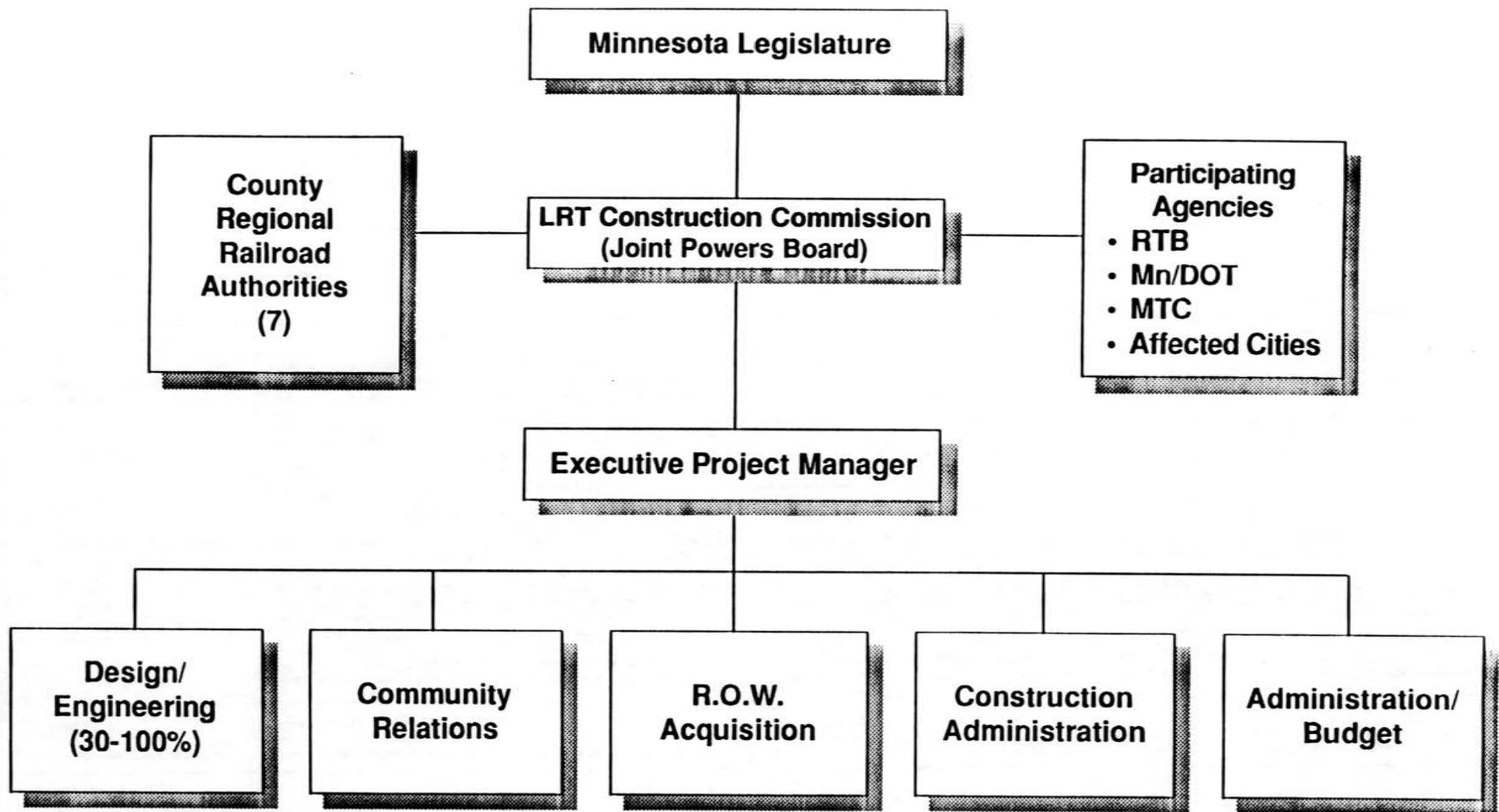
EVALUATION CRITERIA	JOINT POWERS BOARD	MINNESOTA DEPARTMENT OF TRANSPORTATION	REGIONAL TRANSIT BOARD	METROPOLITAN TRANSIT COMMISSION	NEW REGIONAL LRT AGENCY
1. Single point of authority with direct accountability to Legislature	Joint Powers Board funding from RTB or Mn/DOT	Commissioner of Transportation; funding from Legislature	Board appointed by Metropolitan Council; funding received from Legislature	Board appointed by RTB; funding from RTB	Would be appointed by RTB; funding from RTB
2. Accountability to, and demonstrated ability to work with, local units of government and neighborhoods	County Commissioners are elected; public participation programs are in place	Not elected; would need to establish public involvement process	Board appointed from local districts; some members are elected officials; would need to establish public involvement process	Board appointed; not elected officials; would need to establish public involvement process	Board appointed; could have elected officials; would need to establish public involvement process
3. Transit service and systems specification and procurement experience	Minimal transit experience; HCRRA currently developing LRT systems specifications	Minimal transit experience	Most staff have transit experience; agency is responsible for transit service specifications, fare policies, etc.	Transit operating agency; experienced in service specifications and equipment procurement	Would be staffed with people with transit service and procurement experience
4. LRT experience	Counties are currently responsible for LRT planning and design in multiple corridors	Currently responsible for LRT planning and design in the I-35W corridor	Currently responsible for regional LRT planning; review and approval of LRT designs	Currently participating in LRT operations planning	Would be staffed with people with LRT experience
5. Design & construction experience	Counties are experienced in managing major public works projects including highway design and construction	Mn/DOT is experienced in managing large, complex transit/highway design and construction projects	No agency experience in design or construction; staff experience	Minimal agency experience in design and construction; some participation in small transit facilities	Would be staffed with people with design and construction experience
6. Current ownership of right-of-way	Owens right-of-way for LRT	Can purchase right-of-way on trunk highway system	Cannot purchase right-of-way	Can purchase right-of-way	Would require the authority to purchase right-of-way
7. Staff requirements	Would need to add staff; County RRA's currently have 10 full-time LRT staff	Would need to add staff; has no full-time LRT staff	Would need to add staff; has 3 full-time LRT staff	Would need to add staff; has no full-time LRT staff	Would require all new staff
8. Ability of organization to focus efforts primarily on LRT	Joint Powers Board would be single purpose agency	Responsible for very large highway construction program; would have to set high priority for LRT	Has regional transit planning responsibility for all types of transit services	Primary responsibility is operation of regional bus system; would also operate LRT	Only purpose of the agency would be to design and construct LRT
9. Ability to make timely decisions, maintain schedules, and control budgets	Dependent on joint powers agreement and number of members	Dependent on internal priority given to LRT	Dependent on role of Board and other agencies	Dependent on role of Board and other agencies	Dependent on structure of agency and its board
10. Ease of implementation	No new legislation	Would require new authorizing legislation	Would require new authorizing legislation	May require authorizing legislation	Would require new authorizing legislature; must establish new agency
11. Ease of transition	No transition needed	Transition required	Transition required	Transition required	Longer transition period likely
12. Level of interest in LRT design and construction	Leadership role in LRT implementation in recent years	Has indicated willingness to take lead responsibility	Currently responsible for coordination of regional LRT activities	Does not desire lead role for LRT design and construction	Would be single purpose organization

LIGHT RAIL TRANSIT COORDINATION PLAN

**SUMMARY OF ORGANIZATION ALTERNATIVES  
FOR LRT DESIGN AND CONSTRUCTION**



FIGURE 3-2



## JOINT POWERS BOARD ORGANIZATION ALTERNATIVE

*Source: County Railroad Authorities*



It is expected that each RRA would continue to be responsible for developing the LRT corridors through Preliminary Engineering (30%). The Board would monitor the RRA's design activities, and coordinate systemwide performance standards and civil design criteria. The Board would be the contracting authority and would have all of the current powers of the Regional Railroad Authorities. It is assumed that a state or regional agency would collect and distribute funding, except for RRA property tax levies.

A Joint Powers Board would require administrative and project or construction management staff to accomplish its purposes. It could act as an independent employer, with a separate identity, or it could contract with one of the member organizations for one or more functional responsibilities. Whether hired by the Joint Powers Board or the Regional Railroad Authorities, new staff with LRT design and construction experience would be required.

**Strengths.** The potential strengths of the Joint Powers Board option for implementing LRT are:

- o Minimizes delay in implementation. No transition would be required since Regional Railroad Authorities have the knowledge and history of each corridor. No new legislation would be required. Public participation processes are in place.
- o Allows regional coordination by participation of all interested parties and organizations with varying responsibilities.
- o Maximizes use of the best of what each participating organization has to offer. Mn/DOT and the Counties have significant experience with planning, design and construction of major public works projects. Right-of-way acquisition and established support functions are in place. The RTB and MTC's transit experience and the MTC's experience with operation of transit systems would be used.
- o Provides for accountability to constituents. Elected County Commissioners as policy-makers would be responsive to local concerns.
- o Retains responsibilities with governmental units that have had success in advancing LRT in the region.

**Weaknesses.** Potential weaknesses of the Joint Powers Board option are:

- o Joint Powers Boards may be weak organizations if not structured properly. The structure of the Joint Powers Board underlying agreement must be strong.

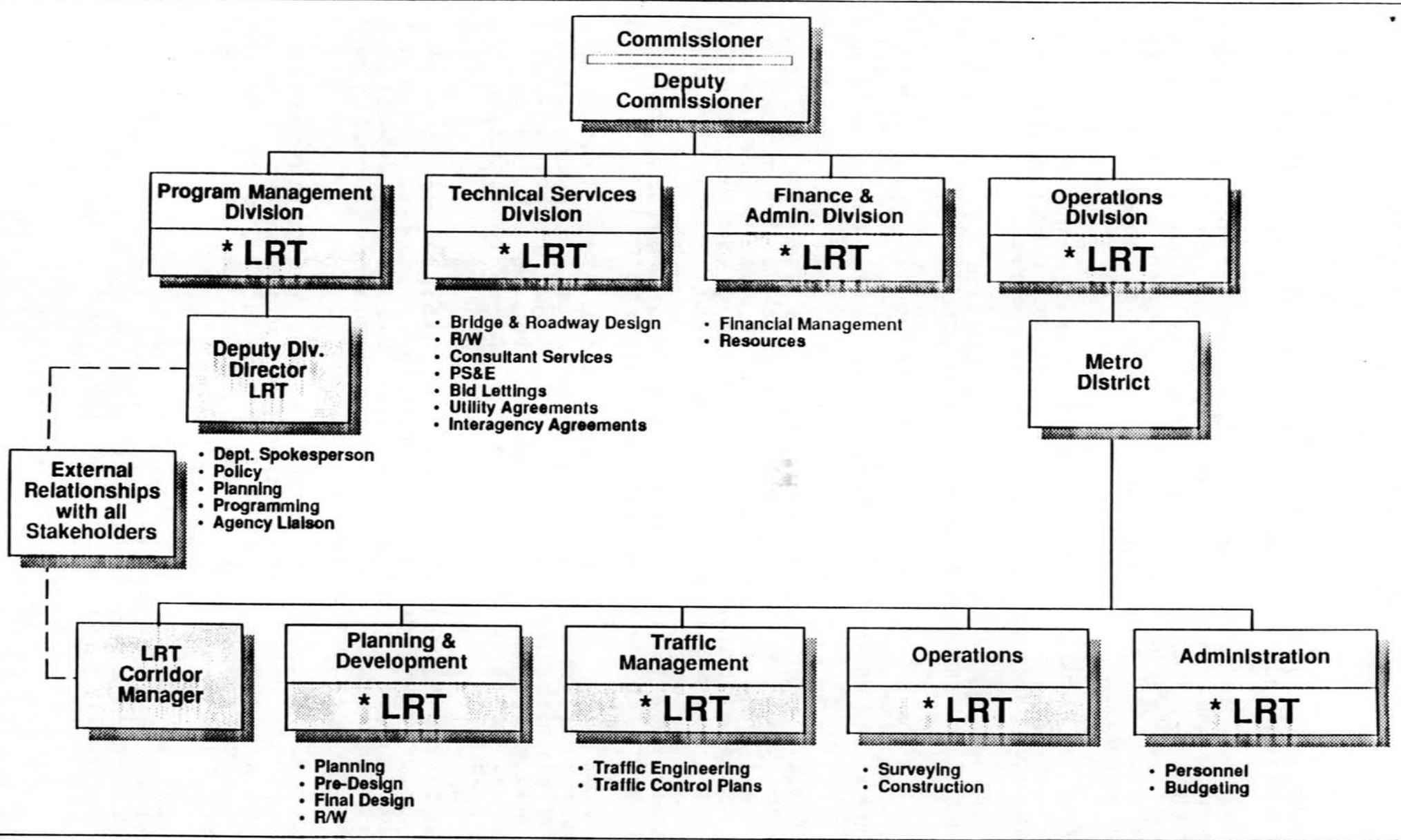
- o A Joint Powers Board is a complex decision-making structure with potential for delays because of approvals/disagreements. The joint powers agreement must have a strong dispute resolution mechanism. There must be sufficient delegation of authority to the Board to make decisions without approval of member organizations.
- o There is a potential for duplication of staff. Although each Regional Railroad Authority may have a small number of staff working on corridors through the planning and to the 30 percent design level, this ensures that a high level of attention will be paid to local issues. There need not be duplication of staff as LRT corridors are implemented beyond the 30 percent design level. The placement of new staff should reflect the responsibilities assigned to various agencies by the joint powers agreement.
- o Members may withdraw. The agreement must clearly address the rights of parties to withdraw and the effects of termination of the agreement to minimize impacts on the regional system.

#### **Alternative 2 - Minnesota Department of Transportation**

Under this alternative, the Minnesota Department of Transportation would act as the lead agency for the final design and construction of Light Rail Transit (see Figure 3-4). While Mn/DOT participates in the planning and design for transit facilities including LRT, additional legislation would be required to give Mn/DOT the authority to acquire right-of-way and construct Light Rail Transit. Mn/DOT has acted as the lead agency for construction of other highway/transit projects, none of which included LRT. Mn/DOT also has a long history of joint participation with other public agencies in the construction of highways, bridges and other transportation facilities.

It is expected that each RRA would continue to be responsible for developing the LRT corridors through at least Preliminary Design (10%). Mn/DOT would be responsible for final design and construction with participation from the Regional Railroad Authorities and other regional agencies. Mn/DOT would be the contracting authority and would coordinate all activities. It is assumed that Mn/DOT would also administer state and regional funds for LRT construction. RTB would continue to have review and approval of LRT plans and funding priorities.

Mn/DOT could accommodate all functional requirements within its existing structure except LRT systems design and procurement. However, Mn/DOT would need to add staff, particularly staff with LRT design and construction experience, to carry out the additional responsibilities associated with a LRT construction program.



## MN/DOT ORGANIZATIONAL ALTERNATIVE



**Strengths.** The potential strengths of Mn/DOT as a lead agency for LRT design and construction are:

- o Mn/DOT has project management experience and skills in pre-design, final design, right-of-way acquisition and contract management. Mn/DOT has full capability to go from project inception through construction for large, complex public works projects, and has competent oversight of consultants and contractors.
- o Mn/DOT has financing experience and direct accountability to the Legislature. Mn/DOT has a strong presence in the Legislature and has had support for its programs.
- o Mn/DOT has good working relationships with other regional agencies and is responsive to regional policies.
- o Two of the three alignment alternatives in the Central Corridor are on a Mn/DOT facility (I-94 and University Avenue). Alignment alternatives in most other corridors also include Mn/DOT facilities.
- o Mn/DOT has made a policy commitment in its 1989 Strategic Plan to "be the leader in managing the State's transportation system. This will require increased coordination and use of all modes of transportation, thus assuring that Mn/DOT will remain a true multi-modal Department of Transportation."

**Weaknesses.** The following are potential weaknesses of Mn/DOT as a lead agency for the design and construction of LRT:

- o Momentum could be lost if responsibilities for design and construction are changed. Mn/DOT would need to be aggressive in maintaining current momentum, in building on previous work, in making project decisions and in involving all interested agencies in the completion of design and the construction of the system.
- o Mn/DOT does not currently have the technical expertise to design and construct Light Rail Transit. Mn/DOT would need to retain people or consultants with the needed expertise. Mn/DOT would also need additional legislative authority to undertake the construction of LRT.
- o Mn/DOT is perceived as having a poor public involvement process with an inability to represent local interests. Thus, it would be important for Mn/DOT to develop a strong public involvement program and to supplement that process as needed during final design and construction.
- o Mn/DOT is viewed as a large bureaucracy whose priority interest is the construction of highways. Mn/DOT would need to dedicate resources to the LRT project and work internally and externally to maintain a high priority for LRT.

### Alternative 3 - Regional Transit Board

A number of other cities with Light Rail Transit systems have either utilized an existing regional transit agency or established a new regional agency for the design and construction of Light Rail Transit. The Regional Transit Board option would be similar to the organizational structure utilized by the San Diego Metropolitan Transit Development Board (see Figure 3-5).

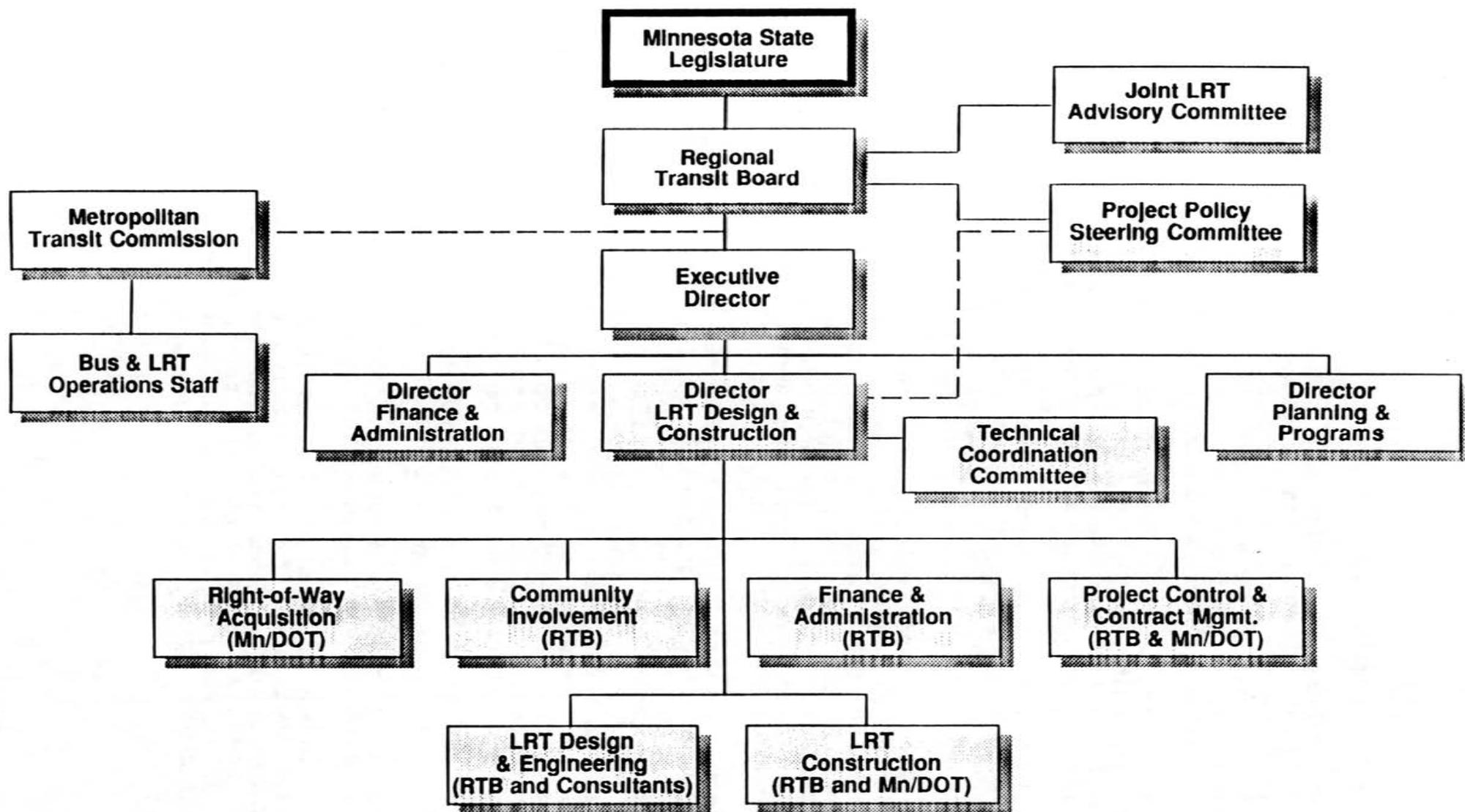
The Regional Transit Board is the regional agency that has been given the responsibility by the state legislature to set policy, plan for and finance a metropolitan-wide transit system. This is the sole mission and function of the RTB. The planning, design, funding and implementation of a regional LRT system all need to be fully integrated and coordinated with the regional transit system for the maximum chance of success and are logical functions that could fit well within the agency responsible for regional transit policy, planning and programming.

The RTB does not have legislative authority to construct Light Rail Transit or to acquire right-of-way. Like the San Diego MTDB when it implemented its first LRT line, the RTB has no experience as an organization in design, construction or management of a major construction program. The RTB would need to assemble an LRT implementation team of staff with experience in public works construction and LRT systems implementation.

It is expected that each RRA would continue to be responsible for developing the LRT corridors through at least Preliminary Design (10%) under this alternative. RTB would be responsible for final design and construction with participation from the Regional Railroad Authorities and other agencies. Mn/DOT would act as an agent of RTB and would act as the construction manager for the civil works. RTB would be the contracting authority for the systems elements of the project and would coordinate all design and construction activities. It is assumed that RTB would also administer state and regional funds for LRT.

**Strengths.** The following are potential strengths of the Regional Transit Board as the lead agency for LRT design and construction:

- o The RTB has a regional perspective with local representation from all parts of the region on the Board.
- o The RTB already has been given significant responsibilities by the state legislature for coordinating the implementation of LRT in the region. Coordinating the design and construction of LRT would be consistent with the RTB's mission to set policy, plan and provide for an efficient and cost-effective regional public transit system.



LIGHT RAIL TRANSIT COORDINATION PLAN

## RTB ORGANIZATIONAL ALTERNATIVE

Source: Regional Transit Board

FIGURE 3-5



- o The RTB has a staff composed principally of transit professionals. The organization embodies a "transit first" philosophy. The RTB board and staff are experienced in dealing with UMTA, the federal mass transportation funding agency. The RTB has staff people who have successfully managed UMTA Alternatives Analysis efforts for light rail transit projects that have resulted in full-funding agreements.
- o The RTB has financing experience and direct accountability to the legislature. The RTB is leading the effort to gain legislative approval of a regional funding source for LRT construction.

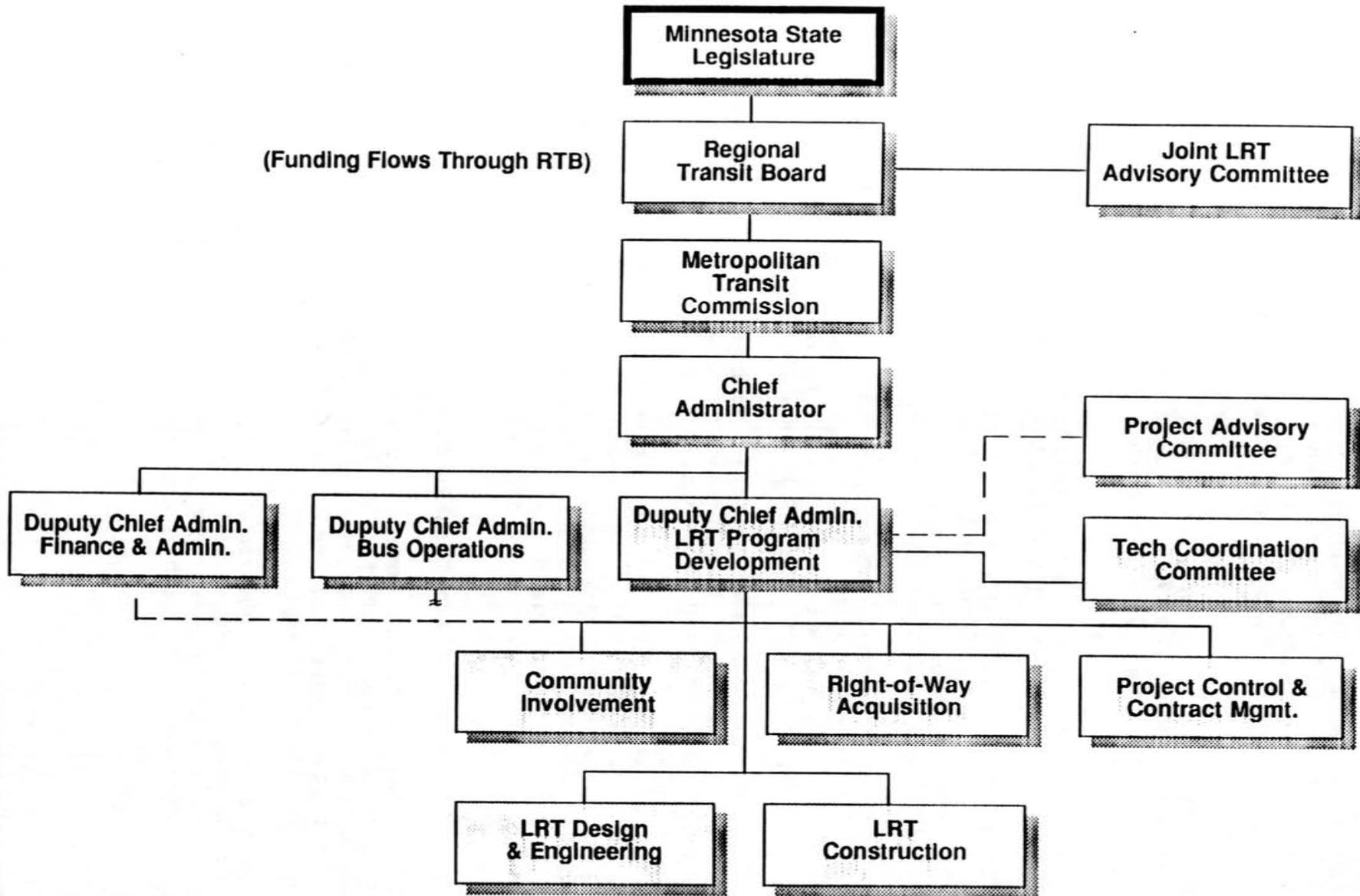
**Weaknesses.** The following are potential weaknesses of the RTB as a lead agency for LRT design and construction.

- o The RTB does not have the legislative authority to implement light rail transit. The transition of responsibility to an agency without the necessary authority could affect the overall implementation schedule for LRT.
- o The RTB does not have experience in managing public works projects or in LRT design and construction. The RTB would need to hire additional staff/consultants with the necessary experience to carry out its LRT responsibilities.
- o The RTB may not represent local interests as well as the counties. A mechanism for involving local communities would be needed to ensure responsiveness to local concerns.
- o As the lead agency for LRT design and construction, the RTB could be changed from a broad-based transit planning and policy-oriented agency to one more involved and consumed with a single transit mode. The RTB would need to ensure that adequate staffing and Board time were available to address all transit modes and regional transit planning issues.

#### **Alternative 4 - Metropolitan Transit Commission**

Under this alternative the Metropolitan Transit Commission would become the lead agency for the design and construction of LRT (see Figure 3-6). MTC has the legal authority to construct transit facilities and acquire right-of-way; and has limited design and construction experience.

It is expected that each RRA would continue to be responsible for developing the LRT corridors at least through Preliminary Design (10%) under this alternative. MTC would be responsible for final design and construction with participation from the Regional



## MTC ORGANIZATIONAL ALTERNATIVE



Railroad Authorities and other agencies. MTC would be the contracting authority and would coordinate all design and construction activities. It is assumed that the RTB would administer state and regional funds for LRT.

MTC has many of the necessary administrative and financial support services in place but would have to supplement existing staff. A new division within MTC would be established and additional staff, particularly staff with LRT design and construction experience, would be required.

**Strengths.** The potential strengths of MTC as a lead agency for LRT design and construction are:

- o MTC will be the operator of the LRT system. It will be necessary for MTC as the LRT operator to participate in design and construction even if MTC is not the lead agency. Transition from construction to operation would be facilitated with MTC as lead agency.
- o MTC currently has the authority to design and construct transit facilities. No new authorizing legislation would be required.
- o MTC has experience in systems implementation including vehicles, communication systems and fare collection systems.
- o MTC is an experienced transit agency with a regional transit perspective and experience with UMTA procedures.

**Weaknesses.** The following are perceived weaknesses of MTC as a lead agency for the design and construction of LRT.

- o Momentum could be lost if responsibilities for design and construction are changed. MTC has not played a lead role to date in the planning and design of LRT.
- o MTC has had very limited experience in engineering and construction management. MTC would have to add new staff with experience in LRT design and construction.
- o The addition of construction responsibilities may detract from MTC's responsibilities as the regional transit operator of both bus and LRT systems.
- o MTC is a legislatively created board appointed by the Regional Transit Board which, in turn, is appointed by the Metropolitan Council. As such, the MTC would not have direct accountability to the Legislature.
- o Likewise, the MTC is a small appointed board and is perceived as having limited accountability to local units of government or neighborhoods.

## **Alternative 5 - New Regional Agency**

The last alternative considered was the establishment of a new regional agency that would have the single purpose of designing and constructing Light Rail Transit (see Figure 3-7). The agency would be governed by a board appointed by the Regional Transit Board. An entirely new agency structure would be required with staff in all functional areas. Some staff requirements could be filled by staff within existing organizations currently involved in LRT planning and design. This alternative would require authorizing legislation and a significant amount of lead time for appointments and agency organization.

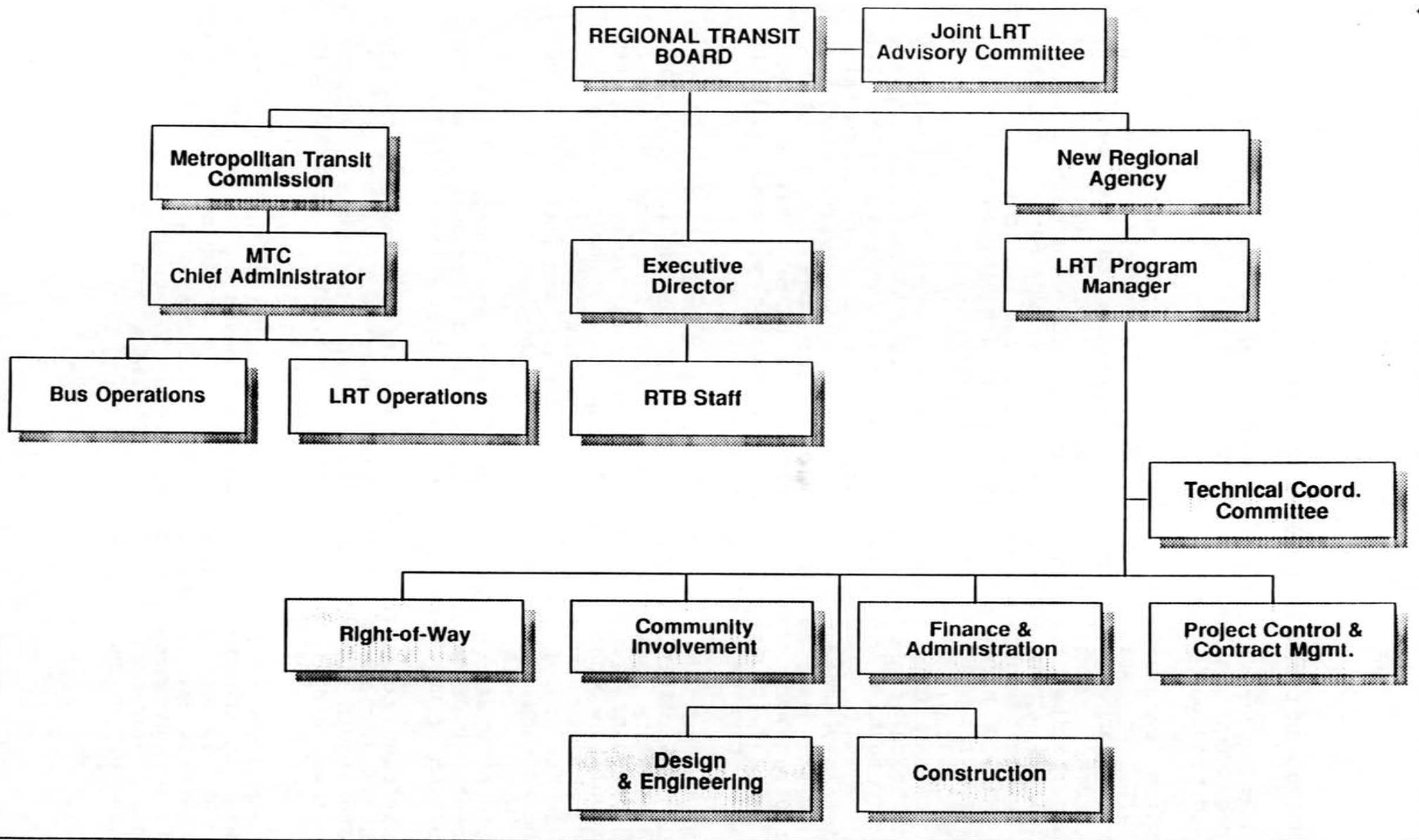
It is expected that each RRA would continue to be responsible for developing the LRT corridors at least through Preliminary Design (10%) under this alternative. The new regional agency would be responsible for final design and construction with participation from the Regional Railroad Authorities and other agencies. It would be the contracting authority and would coordinate all design and construction activities. It is assumed that RTB would administer state and regional funds for LRT.

**Strengths.** A new regional agency with the primary responsibility for the design and construction of LRT would potentially have the following strengths:

- o A new regional agency for LRT design and construction would have a single focus with no other competing responsibilities or issues.
- o The organizational structure of a new agency could be very simple and tightly organized.
- o A regional agency would have a regional perspective and could be responsive to both the legislature and to local governments if structured properly.

**Weaknesses.** The potential weaknesses of establishing a new regional agency for the design and construction of LRT are:

- o Authorizing legislation would be required to establish a new regional agency. Momentum could be lost if responsibilities for design and construction are changed. Long lead times would be required to establish a new organization with a new board, new staff, new policies and procedures.
- o A new agency would have no track record with regard to project management, financial accountability, decision-making, or responsiveness to local concerns.



## NEW REGIONAL AGENCY ALTERNATIVE

Source: O'Brien-Kreitzberg & Associates



## KEY FINDINGS ON ORGANIZATIONAL STRUCTURE

The following are the key findings of the Joint LRT Advisory Committee based on review of the organizational alternatives described previously.

- o Existing legislation gives authority to construct Light Rail Transit to the Regional Railroad Authorities. The Metropolitan Transit Commission also has the authority to construct transit facilities. The Department of Transportation has the authority to construct transit facilities within trunk highway rights-of-way but may not have the authority to construct rail facilities. Both the counties and Mn/DOT have significant experience in designing and constructing major public works projects.
- o The Metropolitan Transit Commission is identified by legislation as the operator of LRT. It will be necessary for the MTC to have an ongoing role in the design and construction of the LRT system to ensure a system which operates efficiently and can be easily maintained. Towards this end, MTC will need to add senior staff experienced in LRT operations and maintenance during the current design phase, and add additional staff as construction proceeds and the start of revenue operations approaches.
- o A number of agencies are currently involved at different levels of effort in LRT planning and design including the seven county Regional Railroad Authorities, the Minnesota Department of Transportation, the Regional Transit Board, the Metropolitan Council and the Metropolitan Transit Commission. Each of these organizations can contribute to the successful implementation of LRT in the Twin Cities but there is a need to coordinate activities on a regional basis.
- o Preliminary design (10%) or preliminary engineering (30%) is currently underway on all Group A and B corridors under the direction of the Regional Railroad Authorities and Mn/DOT.
- o Significant community participation efforts and interaction with the cities has already been undertaken by the Regional Railroad Authorities in all Group A and B corridors. Changes in responsibility for these activities could delay implementation of LRT in the Twin Cities.
- o An ongoing effective public participation program is a key element in successfully reaching consensus on issues related to LRT design and construction. The Regional Railroad Authorities have demonstrated their ability to work with local units of government and neighborhoods to resolve LRT issues. Agencies governed by elected officials are generally more accountable to constituents.

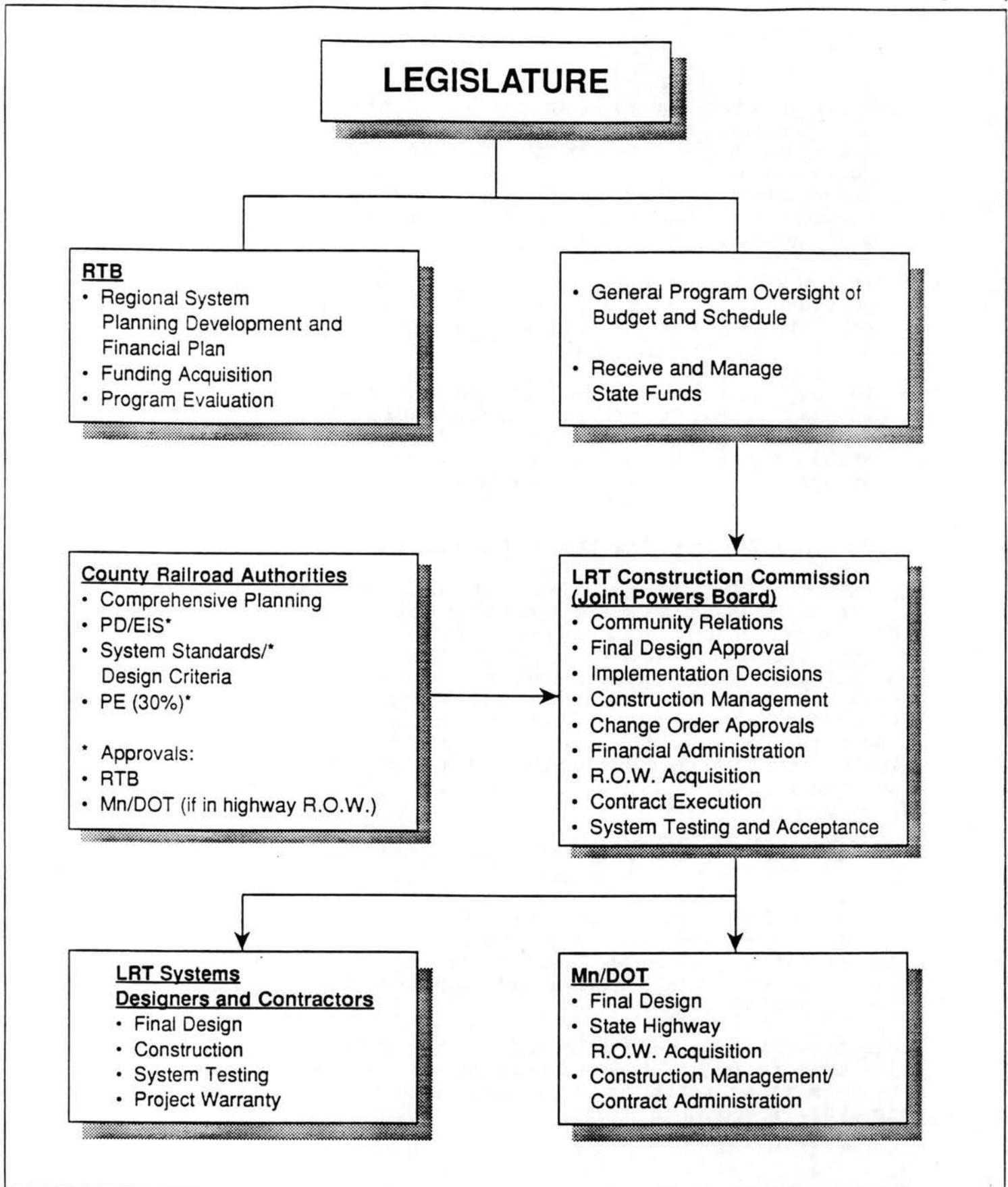
- o While several agencies in the Twin Cities have experience in LRT planning and design, no agency has direct experience in the final design and construction of a LRT system. The agency responsible for LRT implementation will need to add staff experienced in LRT final design, construction and program management. Experience in LRT operations and maintenance is also necessary and will be provided by the MTC.
- o It is desirable to have an organizational structure which provides a single point of authority with direct accountability to the Legislature. The current structure does not provide this mechanism.
- o The organization charged with the implementation of LRT should be structured to provide timely decisions so that schedules and budgets can be maintained. This will require a streamlined decision-making process, direct accountability, delegation of authority, and clear lines of responsibility.

#### RECOMMENDATION ON ORGANIZATIONAL STRUCTURE

The Joint LRT Advisory Committee has recommended that a LRT Construction Commission be formed by joint powers agreement. The LRT Construction Commission (LRTCC) would be the agency responsible for implementing LRT in the Twin Cities. It would be established with representation from the Regional Railroad Authorities, Mn/DOT, RTB, MTC and affected cities and would be structured as shown in Figure 3-8. The LRT Construction Commission would be the clearly identified "owner" or agency with single point accountability and responsibility for the implementation of LRT in the region. The recommended voting structure would be:

- o CRRAs - one vote each, two votes when a corridor in that county commences final design
- o MTC - one vote
- o Mn/DOT - non-voting, ex-officio
- o RTB - non-voting, ex-officio
- o Cities - non-voting, ex-officio (if a corridor is under final design or construction within that jurisdiction)

Corridor-specific subcommittees of the LRTCC would be established with membership of affected county Regional Railroad Authorities. The Commission would have its own staff, including an executive director.



LIGHT RAIL TRANSIT COORDINATION PLAN



**RECOMMENDED ORGANIZATION FOR IMPLEMENTATION OF LRT**

FIGURE 3-8

Agency responsibilities are identified in Figure 3-9. The LRT Construction Commission, through its own staff or through delegation to an existing agency, would be responsible for the final design and construction of all LRT corridors. The RTB and the Metropolitan Council would continue to set regional policies and priorities and would continue to review and approve LRT plans and designs. A state or regional agency would provide overall program management oversight including periodic reviews of budgets, schedule, design and construction progress to ensure that the LRTCC financially accountable and taking appropriate actions to resolve problems which arise during design and construction. The MTC would be the ultimate owner and operator of the LRT system. The Regional Railroad Authorities would continue to have lead responsibility for LRT corridor planning, environmental clearance, and preliminary engineering through the 30 percent level of design.

Guidelines which will be followed in structuring the LRT Construction Commission (LRTCC) and the supporting commission staff are as follows:

- o The LRTCC will be structured to provide a mechanism for timely decisions to keep projects on schedule and within budget. The decision-making process will be streamlined with clear lines of responsibility, delegation of authority and direct accountability.
- o The LRTCC or its designee will be authorized to commit and enter into all agreements necessary to secure right-of-way and other property, implement required environmental mitigation measures, interagency agreements and other clearances, assurances and agreements needed to construct an LRT project under local, state and federal laws and regulations.
- o The LRTCC or its designee will have the authority to own outright or have the leasehold, permit, lease-purchase agreement, franchise or other evidence of the agency's ability to construct LRT on a particular right-of-way and to hold and use equipment and rolling stock.
- o The LRTCC will have an assured flow of funding which can be budgeted and disbursed to cover all costs, internal and contractual, associated with designing and building the LRT project.
- o The LRTCC and its designee will have a technical staff of specialists, skilled and experienced management and knowledgeable and goal oriented leadership.
- o The LRTCC will have a clear delegation of authority from participating organizations to the Joint Powers Board, from the board to its management, and from its management to its technical staff.

**Legend**

-  = Lead Role
-  = Approval Authority
-  = Advise
-  = No involvement

LRT Implementation Activities	Participants							
	LRTCC (JPB)	Mn/DOT	RTB	Metro Council	CRRA's	MTC	Local Jurisdictions	Advisory Groups
Funding Acquisition (Legislation)	Advise	Advise	Lead Role	Advise	Advise	Advise	Advise	Advise
Regional System Planning	Advise	Advise	Lead Role	Approval Authority	Advise	Advise	Advise	Advise
General Program Management Oversight	To Be Determined							
Corridor Planning	Advise	Advise	Approval Authority	Approval Authority	Lead Role	Advise	Advise	Advise
Preliminary Design (10%)/E.I.S. *	Advise	Approval Authority	Approval Authority	Approval Authority	Lead Role	Advise	Approval Authority	Advise
System Standards/Design Criteria	Advise	Approval Authority	Approval Authority	Advise	Lead Role	Approval Authority	Advise	Advise
Preliminary Engineering (30%) *	Advise	Approval Authority	Approval Authority	Advise	Lead Role	Advise	Approval Authority	Advise
Final Design (100%) *	Approval Authority	Approval Authority	Approval Authority	Advise	Advise	Advise	Approval Authority	Advise
R.O.W. Acquisition *	Approval Authority	Approval Authority	Advise	Advise	Advise	Advise	Advise	Advise
Construction/Management *	Approval Authority	Approval Authority	Advise	Advise	Advise	Advise	Advise	Advise
System Testing	Lead Role	Advise	Advise	Advise	Advise	Approval Authority	Advise	Advise
Operating/Maintenance	Advise	Advise	Approval Authority	Advise	Advise	Lead Role	Advise	Advise
Marketing	Advise	Advise	Advise	Advise	Advise	Lead Role	Advise	Advise
Regional LRT Evaluation	Advise	Advise	Lead Role	Advise	Advise	Advise	Advise	Advise

\* Depending on Corridor



**RESPONSIBILITY MATRIX  
LRT CONSTRUCTION COMMISSION  
(JOINT POWERS BOARD)**

## TRANSITION ISSUES

The recommended organizational structure will require a transition from existing roles and responsibilities for final design and construction but continued direct participation by the Regional Railroad Authorities in planning and preliminary engineering. The following are the key issues which will need to be addressed during this transition.

- o Legislative approval of a funding source for LRT final design and construction is needed.
- o The participating agencies would need to prepare and agree to a formal joint powers agreement. The agreement should address the powers and responsibilities of the LRTCC, representation and voting privileges, termination conditions, financial contributions, a decision-making strategy, and other related issues.
- o New staff would need to be hired and staff transfers from existing agencies may need to be made.
- o The Regional Railroad Authorities would continue to complete projects through 30 percent preliminary engineering. A methodology needs to be established for transferring projects and ensuring that commitments made during preliminary engineering are implemented.
- o The RRA property tax levy authority would need to remain to provide the RRAs with a funding source for planning and preliminary engineering and to support the requirement for a minimum 10 percent local match for construction of non-federally funded Group B and C corridors.
- o MVET matching funds are currently being used by the county RRAs for planning and preliminary engineering. If MVET funds are replaced by a regional funding source, a mechanism for providing funds to the county RRAs for these activities would be needed.
- o The Joint LRT Advisory Committee would continue to serve as a regional LRT policy advisory committee to the RTB and would advise the RTB on regional LRT system policy and funding issues as they arise.

## RELATED ORGANIZATIONAL ISSUES

There are three related issues which will need to be resolved before the implementation of LRT final design and construction. These include: (1) ownership, (2) interagency or master cooperative agreements, and (3) cost participation. Each is discussed below.

### Ownership

The LRT Construction Commission (Joint Powers Board), as the "owner" during the construction of the LRT system, would be responsible for acquiring all of the assets needed to build and equip the system. Once the project is completed and all claims settled, the ownership would be transferred to the MTC as the operating agency. For the most part, the assets would be owned outright, but there could be significant exceptions as follows:

- o Right-of-way Easements. Right-of-way may be secured in the form of easements or joint-use agreements rather than acquisition. Examples may be highway rights-of-way or rail right-of-way owned by a county Regional Railroad Authority. Use of these rights-of-way may be through permanent easement or an interagency agreement for joint use. The interagency agreement would usually include any cost sharing provisions for the use of the right-of-way and any provisions regarding liability for accidents or occurrences on the right-of-way.
- o Physical Improvements. Physical improvements (civil works) such as guideway improvements would be owned by the LRTCC during construction and transferred to the MTC when revenue operation begins. The ownership may be shared where there is joint use such as a single bridge structure with both LRT tracks and highway lanes.
- o Light Rail Vehicles. Vehicles would ultimately be owned by the MTC as the LRT operator. They may, however, be purchased initially by the LRTCC with ownership transferred when revenue operation begins. If vehicles are leased or financed rather than purchased outright, the legal title would remain with the financing agency for the duration of the agreement and then would be transferred to the MTC.
- o Operations and Maintenance Facilities. The LRTCC would own the operations and maintenance facilities during construction but would transfer ownership to the MTC when the system is ready for revenue operations.
- o Non-Revenue Vehicles. Specialized equipment used for track maintenance, test vehicles, and other operations and maintenance activities would be owned by the MTC.

- o Stations. Stations provide an opportunity for a variety of ownership options including ownership by the LRTCC or MTC, joint ownership with a local unit of government, and joint development with a private developer.
- o Park-and-Ride Lots. Park-and-ride lots could be owned by LRTCC, MTC, Mn/DOT or a city, or leased as part of a joint development project. In cases where ownership is other than MTC, an interagency agreement would be needed to provide for operations and maintenance of the facility.
- o Other Equipment. In general, the MTC would own all miscellaneous equipment and facilities (fare collection, for example) required to operate and maintain the LRT system. The LRTCC would own any equipment or facilities needed for the construction of the system.

#### **Interagency or Master Cooperative Agreements**

Interagency or master cooperative agreements are a strategy for utilizing existing facilities or services for the construction or operation of an LRT system. They are especially useful in facilitating the assembly of right-of-way and in sharing technical services and expertise. Cooperative agreements may be needed for numerous reasons: Examples include:

- o Agreements among state, regional and local agencies for assembly of right-of-way, joint-use, or technical services.
- o Agreements with utility companies (electricity, gas, transmission lines, etc.) will be needed for utility relocations and if the utility and the LRT are using a common right-of-way.
- o Agreements with federal and state agencies concerning compliance with environmental clearances, employee rights, health and safety concerns, river crossings, construction at or near an airport, etc.

#### **Cost Participation Policies**

During the construction period, the costs for building the LRT system will be the primary responsibility of the LRTCC. Any costs resulting from construction directly involving another public or private agency would be shared between the agencies involved according to a previously negotiated formula.

Continuing cost-sharing items include two major categories: (1) sharing of liability for accidents, and (2) sharing of continuing costs for maintaining joint facilities. Both cases would require a memorandum of understanding. Arrangements for assigning or sharing responsibility for liabilities will have to be developed on a case-by-case basis. In general, the LRTCC or the MTC would share the costs of maintenance of joint facilities in proportion to its use of the facility. In cases such as LRT within a trunk highway right-of-way, maintenance of the LRT system would be the responsibility of MTC with a permanent easement from Mn/DOT.

Generally, the LRTCC would be responsible for the costs of replacement in kind for any third party facilities disturbed by construction through negotiation with the affected property owner. Costs for any additional improvements or enhancements would be at the expense of the third party.

**CHAPTER 4**  
**IMPLEMENTATION STRATEGIES**

## CHAPTER 4 IMPLEMENTATION STRATEGIES

As used in this report, *implementation* is defined as the design, construction and testing of the LRT system and consists of the activities required to complete the project's physical components. These components are generally divided into two major categories: facilities and systems.

- o **Facilities**--the facilities or "civil works" include items such as the roadbed or guideway, foundations, bridges, subsurface structures such as tunnels and electrical ductbanks, grading and sitework, stations, parking lots, and yard and shop facilities. The facility elements are primarily the *constructed* components of the system.
- o **Systems**--the systems elements include items such as vehicles, trackwork, electrification, train signals, communications, and fare collection systems. These elements are primarily the *manufactured and installed* components of the system.

It will be necessary to contract for the purchase of services and products at various stages in an LRT project due to the need for specialized technical expertise, the need to acquire vehicles and other manufactured products, and the need to supplement the owner's staff during certain phases of an LRT project. There are several different ways that the lead agency can contract for these services and products. These decisions have the potential to affect project cost, schedule and quality. Therefore, the legislation requiring the preparation of the Regional LRT Coordination Plan specified that alternative implementation strategies be investigated. The purpose of this chapter is to describe alternative implementation strategies and their advantages and disadvantages.

It is important to note that a single implementation strategy does not have to be used for all LRT corridors. In fact, it is advisable to select and adjust implementation strategies to best meet the needs of each individual corridor since each will likely have unique circumstances and characteristics affecting design and construction. Regional coordination can be achieved through establishing uniform regional systems specifications and policies regarding key design elements. Any implementation strategy can and should reflect these regional policies and design guidelines.

## DESCRIPTION OF ALTERNATIVE IMPLEMENTATION STRATEGIES

The following alternative implementation strategies were investigated as part of the LRT Coordination Plan (see Figure 4-1):

- o Current Industry Practice
- o Turnkey
- o Hybrid Combination

Each of these alternatives is described below. There are a number of contracting procedures that may be used, depending on the type of contract. These procedures include pre-qualification, two-tiered and two-step procurement, negotiated contracts, cost plus fee contracts (fixed or negotiated), cost reimbursable contracts and other variations used in soliciting proposals and developing final contractual arrangements.

### Alternative 1 - Current Industry Practice

It is the current industry practice for the owner (lead agency) to complete the design of the facilities (civil works) to a 100 percent design level, either with the agency's own staff or by using one or more consultants (see Figure 4-2). Performance specifications are developed for the systems elements. Individual construction or procurement contract packages are put out for bid and awarded to the lowest responsive and responsible bidder.

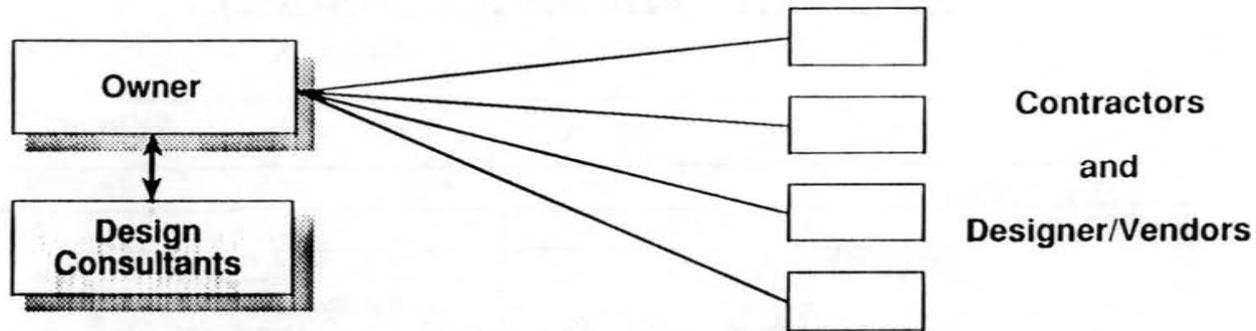
The Design/Build approach for the systems elements has become desirable because known or "off-the-shelf" system elements--such as the vehicle, trackwork, signals and traction power systems--can be purchased from vendors specializing in each of these elements with a minimal need for local "customization". Vendors typically receive performance and design criteria for the element and guarantee that performance requirements will be met for a fixed price.

The more traditional approach (100 percent final design by the owner) is commonly used for the civil elements because there are more unknowns which cannot be resolved until final design is completed and, sometimes, until construction is started.

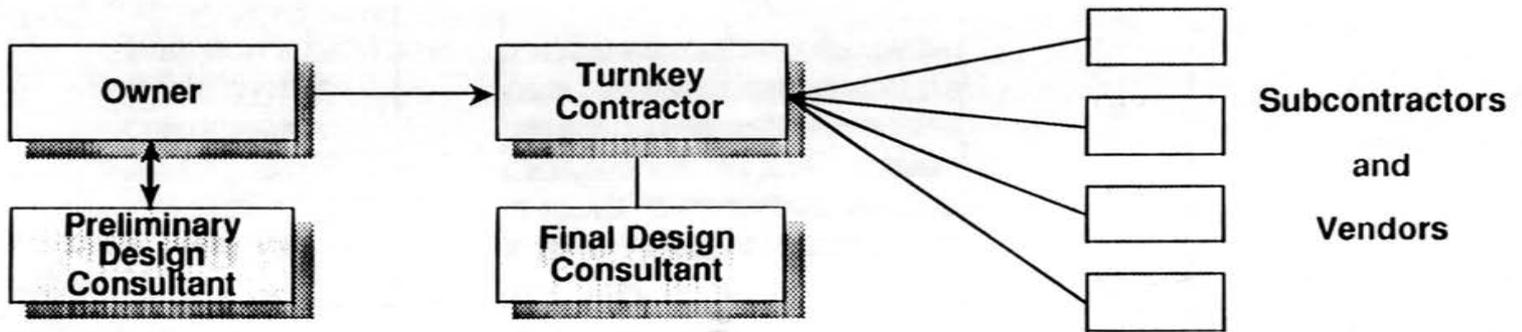
Key points about the current industry practice are:

- o This approach requires multiple contract packages for facilities and systems elements. All major contracts are with the owner. The owner must manage the interface among contractors.

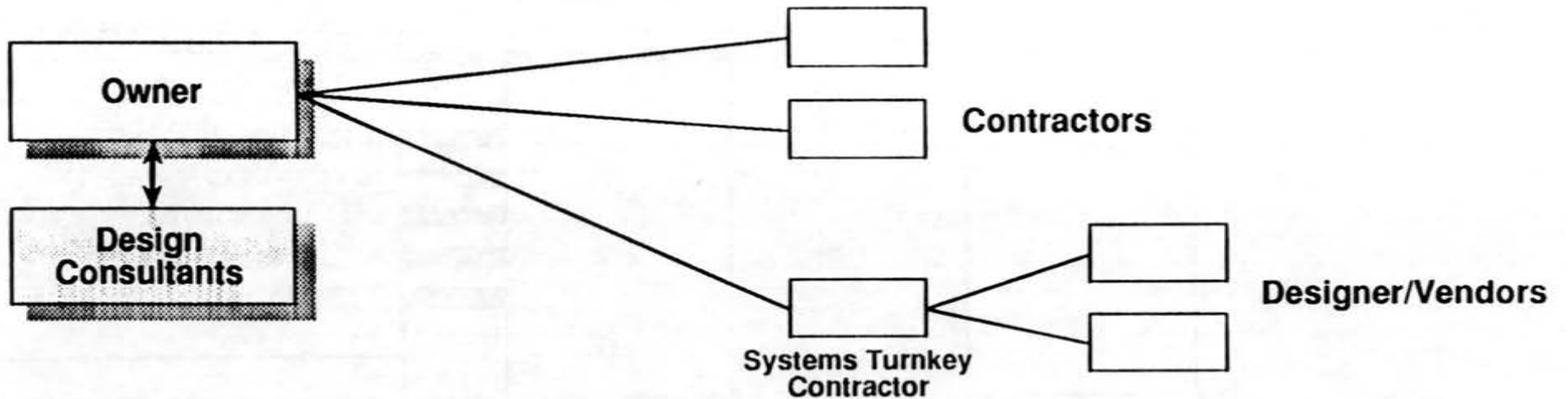
**CURRENT  
INDUSTRY  
PRACTICE**



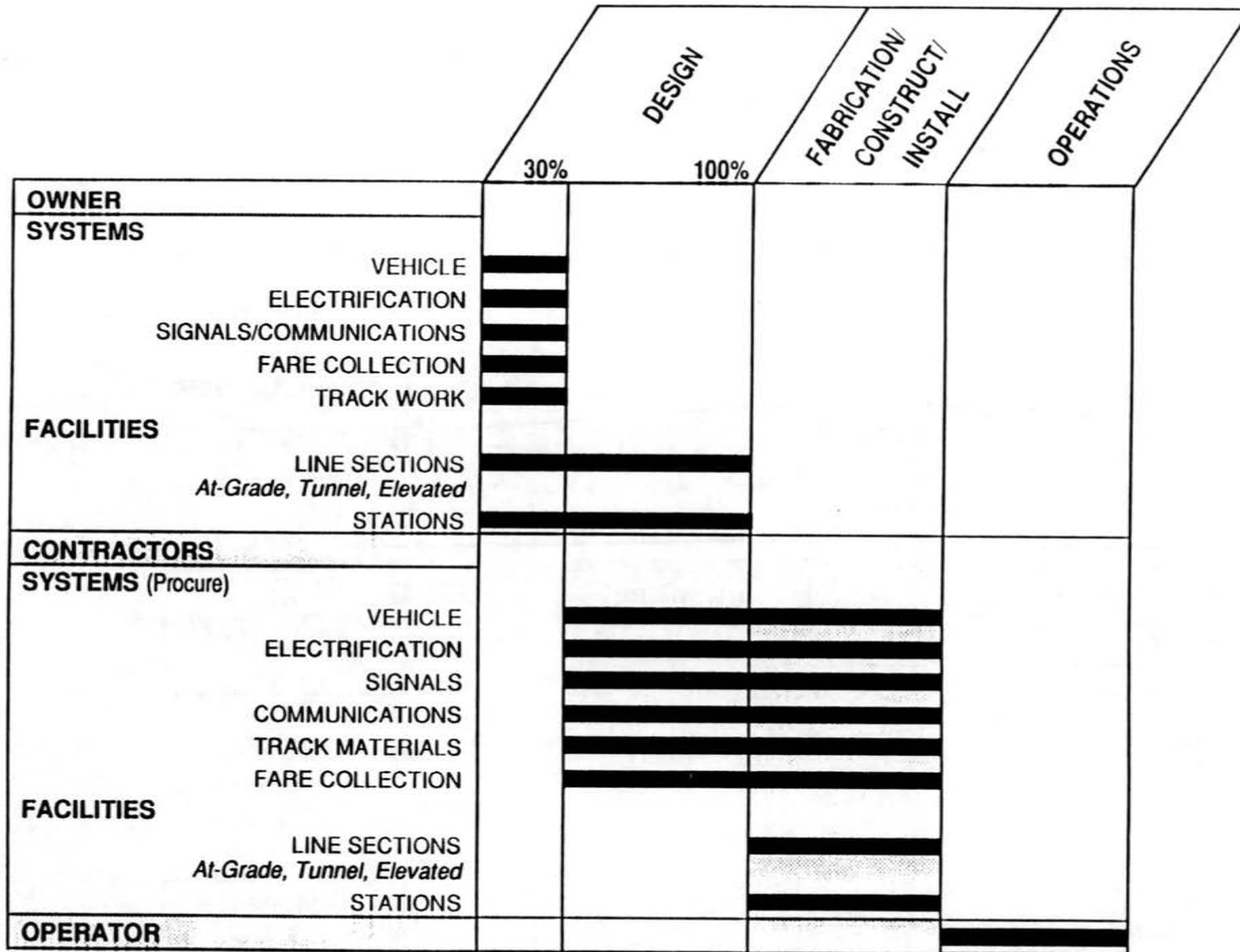
**TURNKEY**



**HYBRID**



**TYPICAL CONTRACTING RELATIONSHIPS**

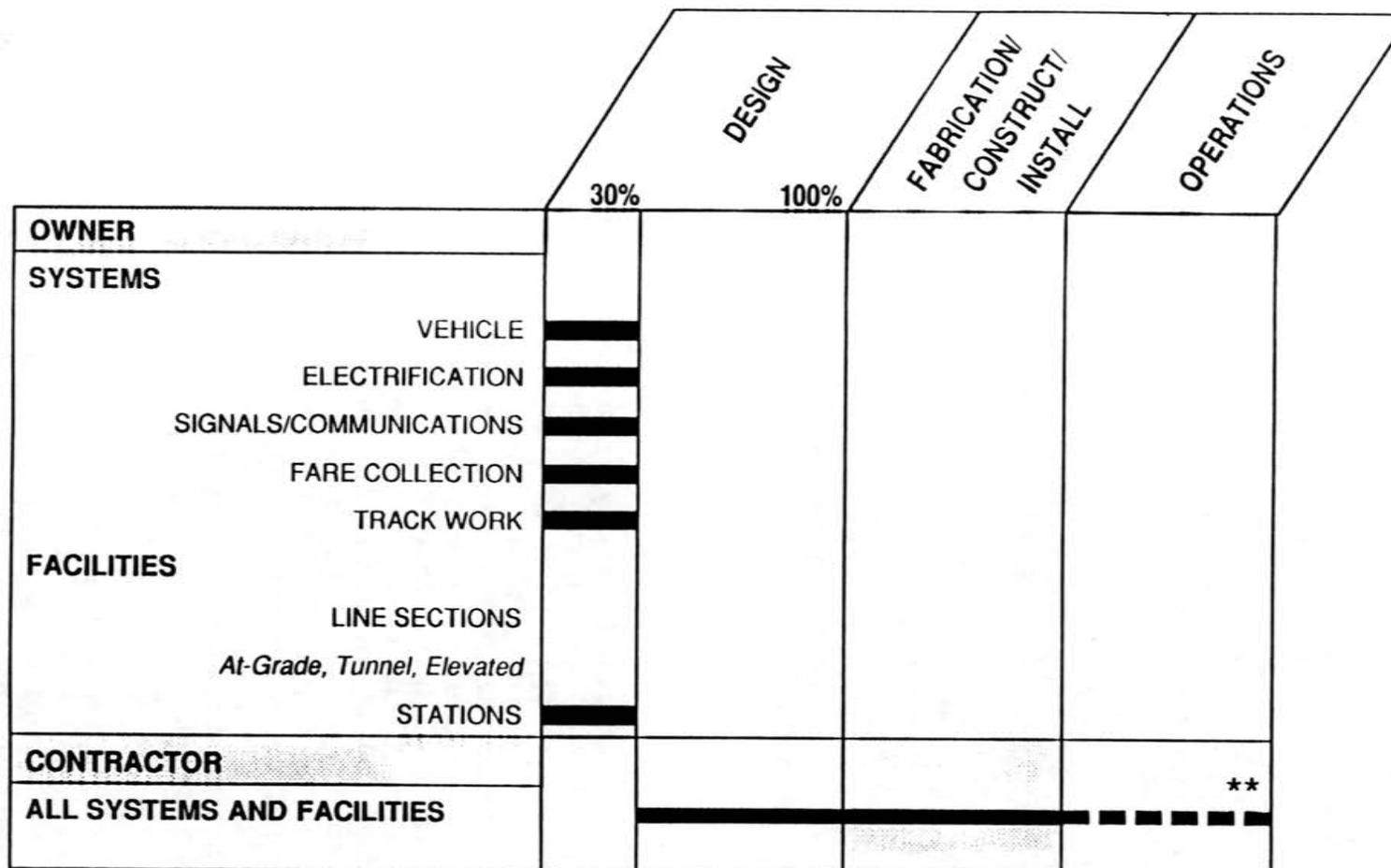


- o The owner (lead agency) retains the responsibility for overall project management. The owner has direct control over all aspects of the construction and installation.
- o Construction documents are comprehensive and complete since they are based on a 100 percent design.
- o The contractor selected for facilities construction does not participate in the design phase. The project price for the civil works is not finally established until after design is 100 percent complete.
- o The contractor selected for systems procurement and installation completes any additional design and completes installation based on detailed performance specifications.
- o The owner bears major project risks until construction contracts are signed, then a large portion of the risks are transferred to the contractor.
- o Contracts can be staggered as necessary and awarded as funding becomes available. The owner can schedule work in a sequence which best uses financial, staff, consultant and contractor resources.

#### **Alternative 2 - Turnkey**

Under a turnkey implementation strategy, the owner contracts with a single contractor for the design and construction of facilities and the manufacture and installation of systems (see Figure 4-3). The turnkey contractor manages a consortium of designers, construction contractors, manufacturers, etc. A negotiated bid process rather than a competitive bid process can be utilized. The turnkey contractor is responsible for the final design of the facilities following preliminary engineering (30%) by the owner. The turnkey contractor also completes any required design of the systems elements based on the performance specifications. The contractor then builds and equips the entire LRT line for a fixed price and on an agreed upon schedule. It is also common for the turnkey contractor to be required to operate the system for a specified period of time to ensure that the system is acceptable to the owner. Key elements of the turnkey implementation method include:

- o A turnkey implementation strategy calls for a significantly different sequence of events during the final design and construction of an LRT project than the conventional approach to design and construction.



\*\* Generally 5 year minimum with possible extension

NOTE: Turnkey may also include private financing.

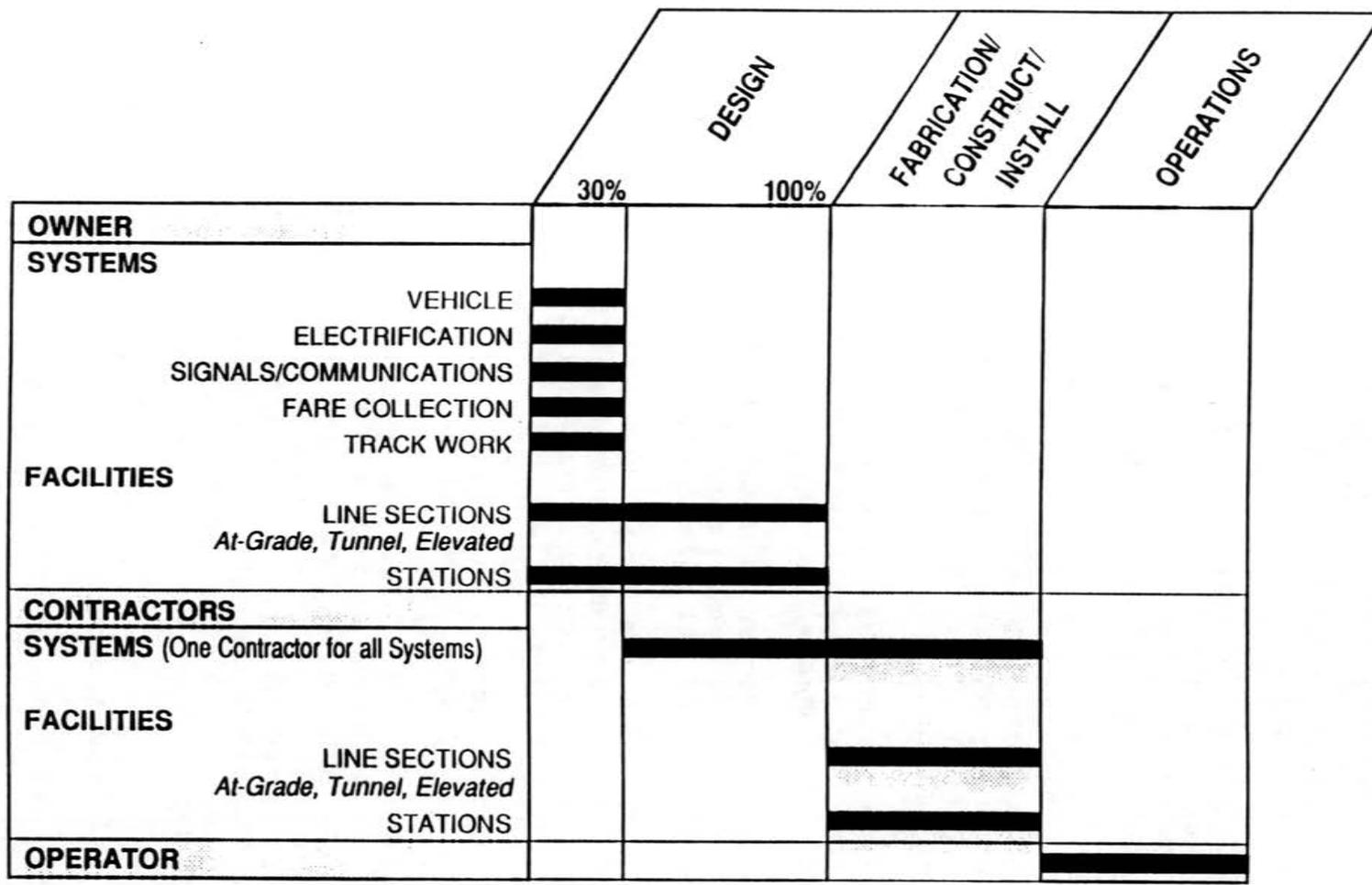


- o Under the turnkey approach, the owner must bring together the project description, funding commitments and contract terms for all aspects of the LRT project at one time so that a fixed price can be established and bid. Typically, complete project financing must be available and right-of-way and easements must be acquired and ready for construction before a turnkey contract can be awarded.
- o The turnkey contract documents must be specific about the basis for award to avoid conflicts during the construction process. Turnkey bid documents are incomplete by definition; detailed design is a part of the contractor's services.
- o The project price is fixed and is negotiated prior to completion of 100 percent design. Therefore, bidders must perform a significant amount of design and cost estimating work to determine their bid price and must add a contingency larger than with conventional contracts to account for potential project unknowns.
- o The turnkey contractor has increased opportunity to overlap design, procurement and construction phases to shorten the schedules of these phases.
- o The risk to the contractor is greater under a turnkey approach because the total project price is negotiated before the design is complete and all site conditions are known.
- o The turnkey contractor acts as the owner's project manager during design and construction. The ability of the owner to control project price, schedule and quality will be dependent on the conditions of the turnkey contract.
- o The turnkey contractor is required to coordinate the work of the individual contractors and manage interface coordination.

A turnkey contractor may also be responsible for financial components of the project that reduce the net cost to the public. Financing by the contractor may take the form of loans or lease/buy backs. There could also be participation at stations through joint development. Recently the Urban Mass Transportation Administration (UMTA) has been encouraging private financing of public projects due to limited availability of government funding.

### **Alternative 3 - Hybrid Alternative**

A third option was considered which combines the conventional approach for the facilities (civil) aspects with a turnkey approach for the systems aspects of the project (see Figure 4-4). Under the hybrid approach, the owner (lead agency) would complete the design of facilities to a 100 percent level, either with the agency's own staff or by using one or more consultants. The



**HYBRID APPROACH**

**FIGURE 4-4**

agency would then issue multiple contract packages for the construction of facilities, each of which would be competitively bid. Systems performance specifications would be completed for the design, manufacture and installation of the systems components. A single contract package would be issued to a turnkey contractor responsible for the design and installation of all equipment for the LRT project.

Recent Automated Guideway Transit or people mover projects in North America have used a combination of the conventional approach for the facilities elements and the turnkey approach for the systems elements. Under this combined approach, the owner provides the right-of-way and directs the design and construction of facilities. A single turnkey contractor is selected with responsibility for furnishing vehicles, and designing, furnishing and installing trackwork, electrification, signals and automatic controls systems.

This approach could involve private financing for some aspect of the LRT project.

#### CRITERIA FOR SELECTING IMPLEMENTATION METHOD

It is important to recognize in selecting a preferred implementation strategy for a specific LRT corridor that there is no "right" way to contract for design and construction services or to procure vehicles and equipment. Each corridor will have unique conditions which will influence the decision on the best way to implement the LRT program in that corridor. Always, the overall goal should be to provide the best, most reliable transportation system for the community it will service and to do so within budget and on schedule to the greatest extent possible. The most important criteria for selecting an implementation strategy are:

- o **Impact on project cost.** A conventional approach to contracting allows for better construction cost estimating because it is based on a 100 percent design for the civil works. However, the turnkey approach is typically negotiated on the basis of a fixed price for both design and construction. The number and degree of unknown conditions and the types of facilities proposed in the corridor under question will most likely determine which contracting approach will result in the lowest cost for that corridor.

- o **Impact on project schedule.** A turnkey contract typically allows for overlapping of tasks more easily than a conventional approach, thereby providing the opportunity for a shortened construction schedule. However, the negotiation of a turnkey contract can require an extended period of time depending on the complexities and uncertainties associated with a given corridor. The conditions in the corridor under question such as citizen involvement, utility relocations, number of unknowns and soils conditions will most likely determine which contracting approach will result in the best schedule control.
- o **Owner risks.** Under the conventional approach, the owner bears the risks of the project through 100 percent design and typically bears a greater share of the risk throughout the project. Under the turnkey approach, a greater share of the risk is transferred to the turnkey contractor.
- o **Owner control.** The owner retains more direct control over design and construction with the conventional approach. The turnkey contractor acts as the owner's agent under the turnkey approach. The amount of control exercised by the owner under the turnkey approach is determined by the terms of the contract. It is likely that contingencies will be higher in a turnkey contract if more owner control is required.
- o **Quality of end product.** The owner retains more quality control over the project under a conventional approach but reviews, approvals and rigorous specifications can be incorporated into a turnkey contract. The degree of control will be determined by the terms of the turnkey contract.
- o **Requirements for funding commitment.** Full funding commitment is required at the start of final design and construction for all aspects of the LRT project when a turnkey contract is negotiated. Under the conventional approach, the owner has the ability to let contracts and schedule the project in direct relationship to the availability of funding, right-of-way availability and staff resources.

## **GUIDELINES FOR SELECTING AN IMPLEMENTATION STRATEGY**

The following guidelines are intended to assist the owner (lead agency) in selecting implementation strategies when constructing LRT in the Twin Cities.

1. The status of the project should be clear.
  - Is the project sufficiently developed to proceed to the next step?
  - Is right-of-way available?
  - Is funding assured?
2. The owner should be adequately prepared to proceed with the preferred implementation strategy.
  - Is there adequate, qualified staffing and an organization plan suited to the proposed strategy?
  - Is the owner experienced in managing the proposed strategy?
  - Is the implementation plan, bidding schedule and design schedule reasonable and achievable?
  - Does the owner have full community and political support to proceed as desired?
  - Are key inter-agency agreements and regulatory approvals in place for the next step?
3. The owner should determine the degree of control needed for project design and construction.
  - What level of control does the owner desire?
  - What level of community and public input is desired or required?
  - How much flexibility does the owner desire to adapt to changing local conditions and developments?
4. The characteristics of the project should be suitable for the proposed strategy.
  - Are there complex structures or alignment issues which may be difficult to resolve?
  - Are there numerous interfaces with other agencies' facilities (highways, railroads, utilities) which require significant continuing coordination?
  - Are the characteristics of the corridor to be implemented unique and more suited to one strategy than another?
5. Contractual issues should be resolved to the owner's satisfaction.
  - Level of detail in documents, schedule, evaluation procedures and contractual requirements for alternative strategies.
  - Ability to pre-qualify bidders or vendors.

- Ability to provide for special problem areas.
- Ability to maintain price competition.
- Flexibility in dealing with work-around items and change orders.
- Project management qualifications.
- Quality control provisions.
- Provisions for inspection and acceptance of contractor work.
- Performance provisions, bonding, warranties.
- Use of local contractors or vendors.

#### **FINDINGS AND CONCLUSIONS ON IMPLEMENTATION STRATEGIES**

The following are the key findings and conclusions of the Joint LRT Advisory Committee based on research into alternative implementation strategies for an LRT construction program in the Twin Cities.

##### **Findings:**

- o Any or all of the alternative implementation strategies could be used effectively to design and construct LRT in the Twin Cities if the implementation strategy is selected on the basis of design and construction needs in individual corridors.
- o The federal government (UMTA) has expressed a strong interest in projects which can incorporate private financing--to reduce the net cost of the project costs.
- o Due to federal interest in private financing and turnkey approaches, an effort should be made to identify a corridor, facility or group of facilities which would be an attractive project to the private sector for investment purposes. If a corridor is selected for this purpose, it should have a clear right-of-way, a straight-forward design and a minimum number of unresolved issues. If a facility (for example, a station or the yard/shop facility) is selected, it should provide the opportunity for a financial return to the private investor and should be a straight-forward project with available right-of-way and a minimum of unresolved issues.
- o While there is considerable interest in turnkey implementation of transit systems, to date most North American cities have chosen a conventional approach, using conventional methods for the facilities design and construction and a design/build or turnkey approach for the design, furnishing and installation of the systems elements.

- o Both design/build and turnkey contracts for the systems elements of an LRT program have been successful implementation strategies, particularly where "off-the-shelf" technology is used. However, it will be important to avoid an early commitment to proprietary products so that future opportunities are not constrained.
- o The Twin Cities has not yet constructed an LRT line and, therefore, has limited experience on which to base the early decisions which will be required to negotiate a turnkey contract for the entire Group A system (Central Corridor, two downtown distribution systems, and the central yard/shop facility). It would be desirable for the owner to retain substantial control over the first LRT project in the region until this experience is achieved.
- o The Central Corridor and the downtown distribution systems will be a very complex design and construction project. In addition, there are numerous design issues along the corridor that remain unresolved and will require extensive community and neighborhood participation. However, it is assumed that these issues will be resolved during preliminary engineering.
- o Systemwide design and performance criteria should be established and adopted prior to completion of preliminary engineering (30%) on the first LRT corridor.

**Conclusions:**

- o All three proposed implementation strategies are potentially suitable for use in the Twin Cities.
- o The selection of the best implementation strategy is dependent on conditions within existing corridors and the ability to negotiate an acceptable contract or contract(s).
- o Therefore, the selection of a preferred implementation strategy should be made by the responsible agency (owner).
- o The implementation strategy selected for a specific corridor should be the alternative which best addresses the recommended selection criteria of impact on project cost, impact on project schedule, owner risks, owner control, quality of end product, and requirements for funding commitment.

**CHAPTER 5**  
**SCHEDULE AND BUDGET**

## CHAPTER 5 SCHEDULE AND BUDGET

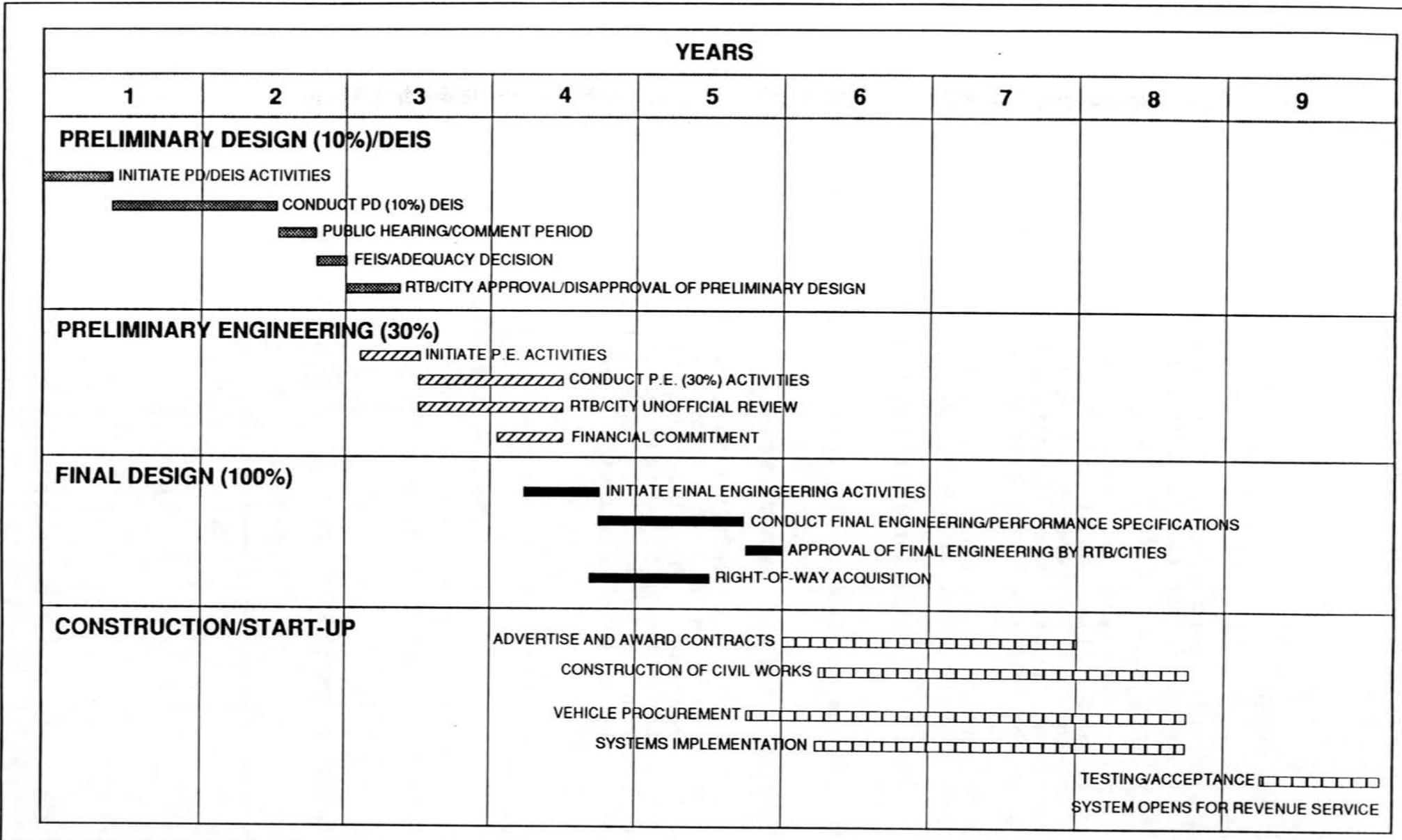
The process of developing a ten-year implementation schedule for LRT was an interactive process that involved evaluating various levels of funding with different frequencies of initiating LRT construction in new corridors. Increased levels of funding would support a higher frequency of starting construction of LRT in selected corridors. This chapter reports on the background data, the alternatives, and the recommended ten-year and two-year LRT implementation schedules. The alternative schedules and budgets were based on the following background data:

- o Time requirements to complete a typical LRT corridor for the different implementation alternatives.
- o Cost estimates (1991 dollars) for each corridor in the ten-year plan.
- o Revenue sources and amounts to pay for the LRT service.

### TIME REQUIREMENTS FOR LRT IMPLEMENTATION

Figures 5-1 through 5-4 present the work tasks and time schedule for the implementation of LRT according to four different implementation methods. The time schedules include state and federal required reviews and approvals of the preliminary design (10%) and final design (100%) by local and regional units of government. The expected completion time for each method is summarized below:

Implementation Method	EIS Type	Expected Time For Completion (Months)
Current Industry Practice	State	106
Turnkey	State	107
Current Industry Practice	Federal	116
Turnkey	Federal	116

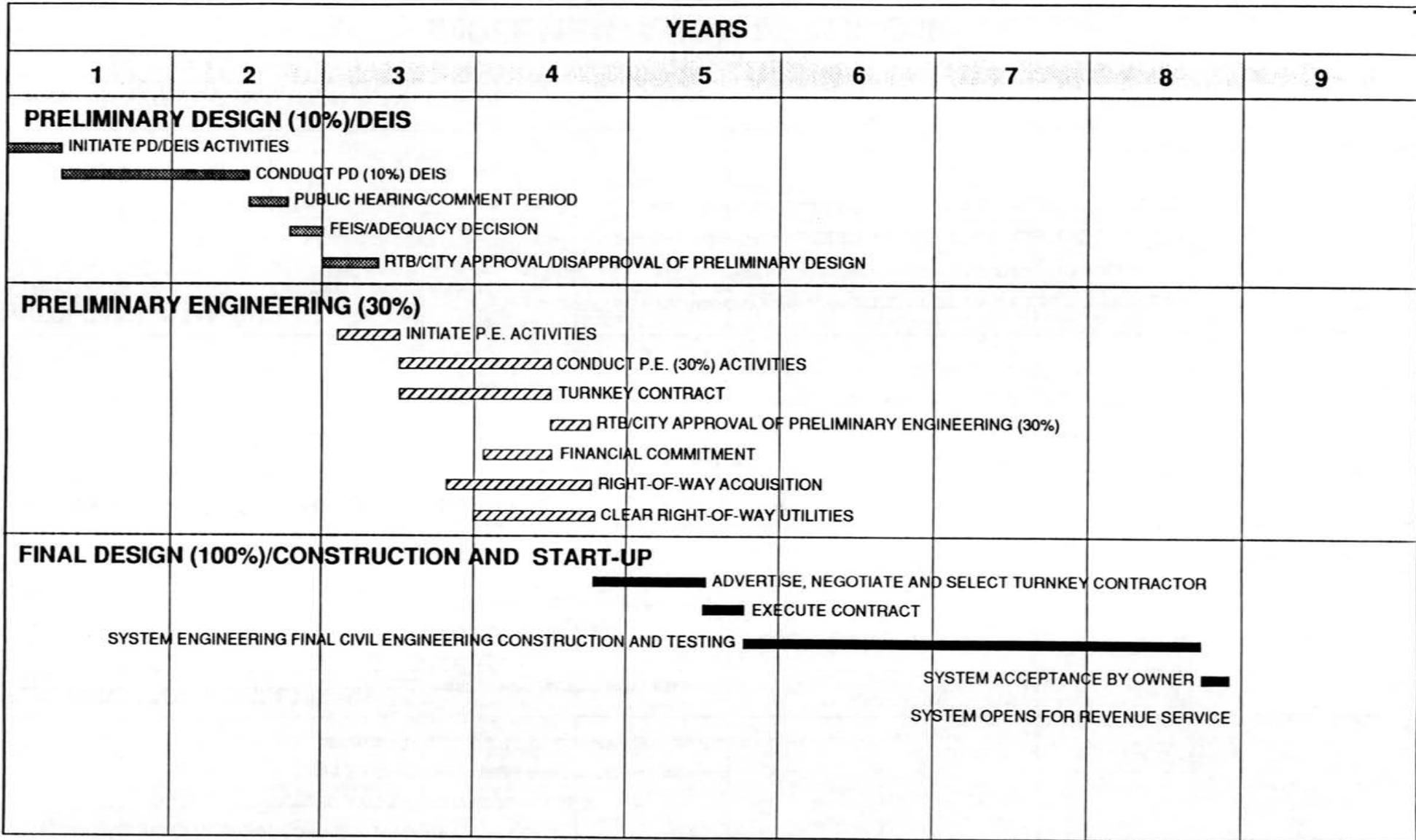


LIGHT RAIL TRANSIT COORDINATION PLAN



## IMPLEMENTATION METHOD I: CURRENT INDUSTRY PRACTICE WITH STATE EIS

FIGURE 5-1

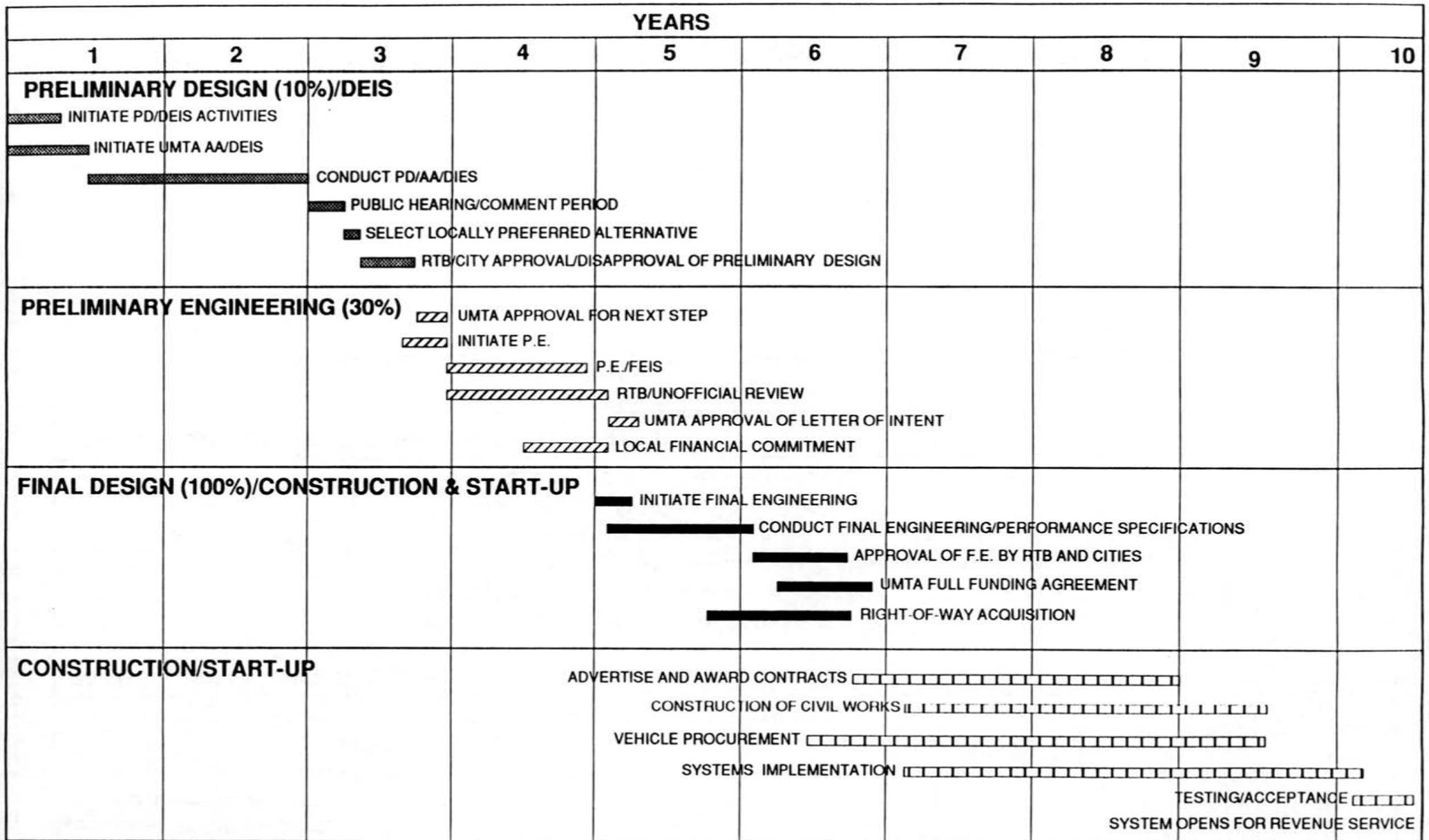


LIGHT RAIL TRANSIT COORDINATION PLAN



**IMPLEMENTATION METHOD II:  
TURNKEY WITH STATE EIS**

FIGURE 5-2

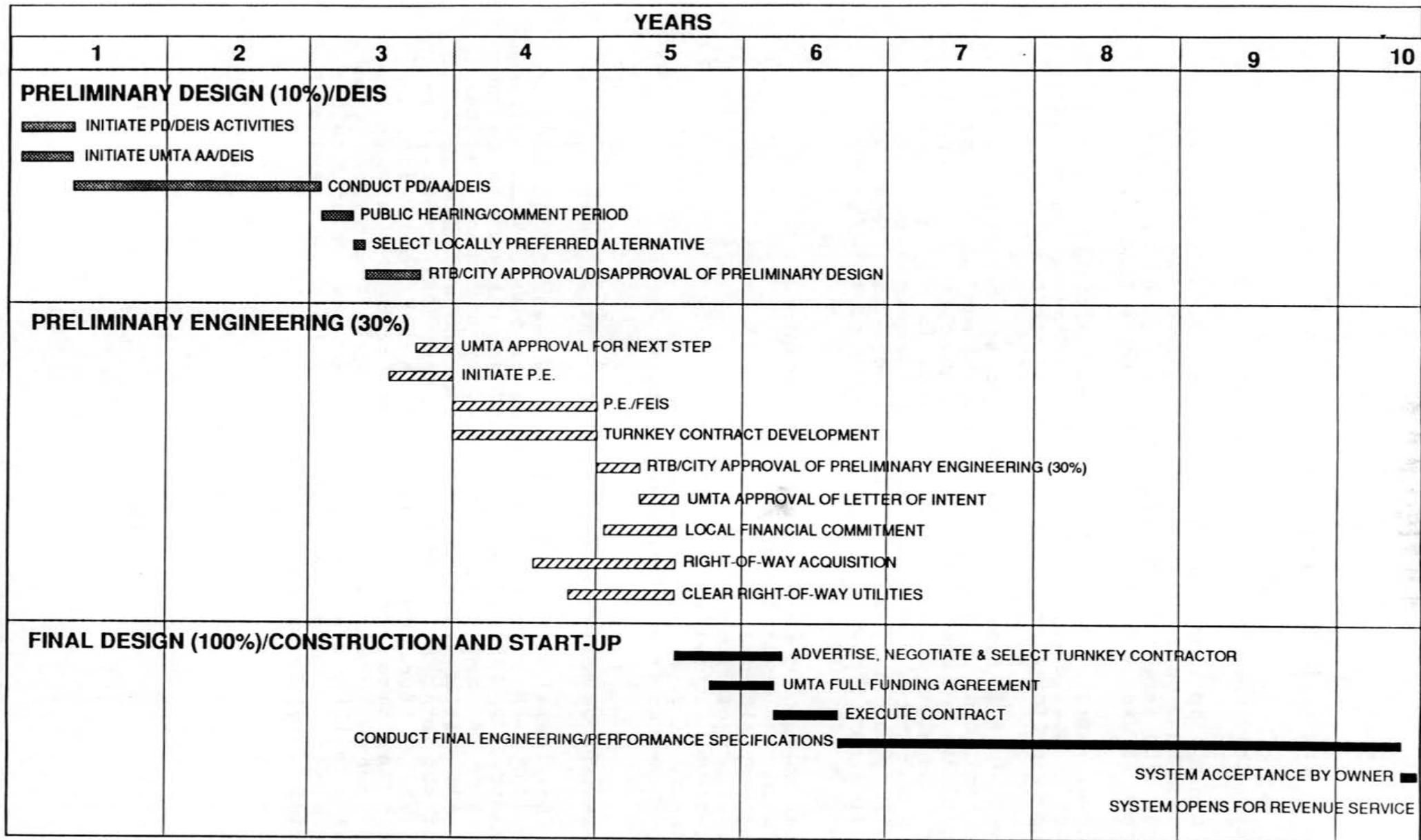


LIGHT RAIL TRANSIT COORDINATION PLAN



## IMPLEMENTATION METHOD III: CURRENT INDUSTRY PRACTICE WITH FEDERAL EIS

FIGURE 5-3



LIGHT RAIL TRANSIT COORDINATION PLAN



## IMPLEMENTATION METHOD IV: TURNKEY WITH FEDERAL EIS

FIGURE 5-4

Analysis of the typical schedules reveals the following points:

- o The federal alternatives analysis DEIS process takes approximately one year longer than a state EIS process.
- o The turnkey implementation method saves time once the contract is executed; however, the time required to develop the contract, to select the turnkey contractor, and to execute the contract is expected to offset much of these time savings.
- o The total expected time between project initiation and system opening ranges between 8 and 10 years. Many of the corridors in the Twin Cities are one to two years into the process.

An analysis of the range of time required to complete each task was also completed. Figure 5-5 presents the minimum, maximum and expected times for the current industry practice implementation strategy. As this figure shows, the range in time to implement LRT in a corridor can vary greatly. The expected time is just under nine years to complete the environmental, engineering, construction and testing activities. Some of the factors that influence the schedule include:

- o process to resolve conflict and make decisions
- o resolution of location/stations
- o project opposition
- o availability of financing
- o right-of-way acquisition
- o complexity of construction
- o review time required by approving agencies

#### **COST ESTIMATES FOR TEN-YEAR IMPLEMENTATION PLAN**

The LRT Development and Financial Plan presented capital cost estimates for each corridor in the ten-year plan. These values were presented in 1988 dollars and were generally based on the comprehensive LRT system plans developed by the County Regional Railroad Authorities. Figure 5-6 presents the estimated capital costs for the Group A, B and C corridors in 1991 dollars. The Group B and C corridors as presented in the Development and Financial Plan were modified to remove both the Minneapolis downtown tunnel systems and the central operations and maintenance facility costs as these costs are now included in the Group A costs. These costs will be refined as additional engineering activities are completed.

ACTIVITY	LENGTH OF TIME (MONTHS)		
	MINIMUM	MAXIMUM	EXPECTED
Preliminary Design (10%)/EIS	19	34	24
City Approval/Disapproval	3	6	4
Preliminary Engineering (30%)/ Financial Commitment	8	27	15
Final Engineering (100%)/R.O.W. Acquisition/ Award Contract	15	46	21
Implementation (Vehicles, System and Civil)	24	66	36
Testing/Acceptance	4	8	6
Total (Months)	73	187	106

NOTE: Assumes current industry practice as the implementation method and a state EIS.  
For a turnkey and federal EIS the differences are approximately the same.



<b>CORRIDOR</b>	<b>1991 ESTIMATED COST (\$M)</b>
<b>Group A</b>	
Downtown Minneapolis	\$125.4
Downtown St. Paul	28.5
Central Operations and Maintenance Facility	33.1
Central Corridor Between Downtowns	<u>\$185.5 - \$250.5</u>
Subtotal	\$372.5 - \$437.5
Use	\$400.0 *
<b>Group B</b>	
Minneapolis Tunnel Extension	60.4
Minneapolis Northeast	200.3
Minneapolis Northwest	128.5
I-35W (96th)	174.2
Hiawatha (GSA)	75.6
St. Paul South (TH 110)	<u>132.9</u>
Subtotal	\$771.9
<b>Group C</b>	
Minneapolis Southwest	81.9
St. Paul Northeast	91.7
St. Paul Northwest	105.3
Hiawatha Extension to GSA	67.8
I-35W Extension to TH 13	<u>60.6</u>
Subtotal	407.3
<b>TOTAL</b>	<b>1,579.2</b>

\* The cost varies +/-10% depending upon the alignment chosen; this cost estimate will be refined in the future. The Group B and Group C Corridor costs differ from the values in the Development and Financial Plan in two ways: the costs are 1991 dollars versus 1988 dollars and the proportionate share of the downtown distribution systems and operations/maintenance facility are now included in Group A. Capital costs are based on work completed in 1987/1988 and reported in the County Comprehensive LRT System Plans.



## CANDIDATE REVENUE SOURCES FOR LRT CONSTRUCTION

The LRT Development and Financial Plan identified candidate funding sources for the capital cost of the proposed LRT service. This plan was used as the basis of the analysis. The sources analyzed included:

- o Regional Sales Tax--In 1988, a one percent regional sales tax generated approximately \$186 million; escalating this value at 4.5 percent per year results in a value in 1991 dollars of \$212 million.
- o Federal funds were assumed to be \$200 million (1991 dollars) over the ten-year time schedule for three Group B corridors.
- o County funds were assumed to be ten percent of the cost of non-federal Group B Corridors.

The potential exists for private sector contribution for the LRT system, particularly for development rights around stations and cross-border leases. These amounts could range between 3 and 15 percent of system cost. To be conservative, private contributions are not assumed as a revenue source in the budget analysis. The Development and Financial Plan also recommended that 30 percent be funded by state funds. This revenue source is not included in the analysis.

The LRT Development and Financial Plan recommended use of the Motor Vehicle Excise Tax (MVET) and RTB levied property tax to pay for LRT and bus operating deficits.

## ANALYSIS ASSUMPTIONS

The following analysis assumptions were made in order to develop alternative schedule and budget scenarios:

- o The ten-year timeframe is 1992 to 2001.
- o All values are in 1991 dollars.
- o Constant dollars are used; the rate of increase for revenues and expenses is assumed to be the same.
- o Group B Corridors are not staged by name; an average cost/corridor of \$154.4 million (\$771.9 million divided by 5) is used for Group B Corridors.
- o Group C Corridors are not staged by name; an average cost/corridor of \$81.5 million (\$407.3 million/5) is used.
- o Three Group B Corridors (B-1, B-3 and B-5) are assumed to be federally funded.

- o Federal funds do not exceed 75 percent of the cost of Group B federally funded corridors.
- o Up to \$200 million of federal funds is assumed available over the ten-year period.
- o Interest income on fund reserves and interest expenses on fund deficits is not considered.
- o One cent, 1/2 cent and 1/4 cent Twin Cities metropolitan area sales tax options are analyzed.
- o Both "Pay as you go" and bonding are analyzed as funding methods.
- o 12, 24, 30, 36 and 42 months between corridor project starts are analyzed.

#### **ALTERNATIVE TEN-YEAR IMPLEMENTATION SCHEDULES**

Three types of schedules were analyzed. Defined below are the cash flow tables developed during the planning process:

- o **"Pay as You Go" With and Without Federal Funds**
  - 1/2 cent sales tax, 12 months between corridor projects and federal funding
  - 1/4 cent sales tax, 30 months between corridor projects and federal funding
  - 1/4 cent sales tax, 36 months between corridor projects and federal funding
  - 1/4 cent sales tax, 42 months between corridor projects and federal funding
  - 1/4 cent sales tax, 66 months between corridor starts and without federal funds
- o **Bonding With and Without Federal Funds**
  - 10-year bond, 1/4 cent sales tax, 30 months start between corridors and federal funding
  - 20-year bond, 1/4 cent sales tax, 30 months start between corridors and federal funding
  - 10-year bond, 1/4 cent sales tax, 66 months between corridor starts without federal funds

- o **One Cent Sales Tax for Broad-Based Transportation Funding With and Without Federal Funds**
  - 42-month start between corridors with federal funds
  - 42-month start between corridors without federal funds
  - 12-month start between corridors with federal funds
  - 12-month start between corridors without federal funds

Each of these cash flow tables is available in the project files. Two of the alternatives are presented in this report.

- o Figure 5-7: 1/2 Cent Sales Tax, 12 Months Between Corridor Projects, "Pay as You Go", and Federal Funds
- o Figure 5-8: 1/4 Cent Sales Tax, 42 Months Between Corridor Projects, "Pay as You Go", and Federal Funds
- o Figure 5-9: Costs/Revenue (1991 dollars) for LRT/Feeder Bus System for 10-Year Implementation Schedule with 12 Months Between Corridor Projects and Federal Funds

Figure 5-10 presents a summary of the alternative scenarios and presents data on federal funds used, the maximum deficit, the fund balance in Year 2001, and the number of corridors started. Analysis of the cash flow tables and the summary table resulted in the following findings:

- o If a 1/4 cent sales tax is the primary revenue source, a 42-month frequency of corridor starts is possible. Federal funding is required to avoid unfunded deficits.
- o If a 1/4 cent sales tax is the primary revenue source and no federal funds are used, 66 months between corridor starts is required to have a zero fund balance in 2001.
- o With a 1 cent sales tax, significant revenues are available for non-LRT construction needs.
- o To use a bond issue to allow greater capital expenditures in the first ten years (e.g., frequency of starts shorter than 42 months), requires a commitment of 20 years of revenue versus 10 years.

ITEM	CALENDAR YEAR									
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>COSTS</b>										
A-1 Downtown St. Paul/Midway	4	12	31	56	56	17	—	—	—	—
A-2 Downtown Minneapolis/University/Y & S	15	38	68	68	21	—	—	—	—	—
B-1 Group B (FE 6/93 & FED\$)	2	7	12	47	48	35	2	—	—	—
B-2 Group B (FE 6/94 & N-F\$)	1	2	7	12	47	48	35	2	—	—
B-3 Group B (FE 6/95 & FED\$)	—	1	2	7	12	47	48	35	2	—
B-4 Group B (FE 6/96 & N-F\$)	—	—	—	2	7	12	47	48	35	2
B-5 Group B (FE 6/97 & FED\$)	—	—	—	1	2	7	12	47	48	35
C-1 Group C (FE 6/98)	—	—	—	—	1	1	4	6	47	25
C-1 Group C (FE 6/99)	—	—	—	—	—	1	1	4	6	24
Subtotal	22	60	121	193	194	167	149	142	115	86
<b>REVENUES</b>										
Regional Sales Tax (1/2 cent)	106	106	106	106	106	106	106	106	106	106
Federal Funds	—	—	10	40	25	25	25	25	25	25
County (10% of Group B)	—	—	1	6	6	9	6	8	5	6
Subtotal	106	107	117	152	137	140	137	139	136	137
<b>NET</b>	84	47	(4)	(41)	(57)	(27)	(12)	(3)	21	51
Cumulative Reserve	84	131	127	86	29	2	(10)	(13)	8	59

NOTE: Cost of all Group B Corridors and Minneapolis Tunnel Extension were totaled and averaged, to arrive at a cost/corridor of \$154.M

LIGHT RAIL TRANSIT COORDINATION PLAN

**COSTS/REVENUE FOR 10-YEAR LRT IMPLEMENTATION  
SCHEDULE ASSUMING 42 MONTHS BETWEEN  
CORRIDOR CONSTRUCTION STARTS**  
(1991 \$M and 1/2 Cent Regional Sales Tax)



FIGURE 5-7

ITEM	CALENDAR YEAR									
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>COSTS</b>										
A-1 Downtown Minneapolis/University	15	38	68	68	21	—	—	—	—	—
A-2 Downtown St. Paul/Midway	4	12	31	56	56	17	—	—	—	—
B-1 Group B (FE 6/95 & FED\$)	—	1	2	7	12	47	48	35	2	—
B-2 Group B (FE 12/98 & FED\$)	—	—	—	—	—	1	5	9	35	48
B-3 Group B (FE 6/02 & FED\$)	—	—	—	—	—	—	—	1	1	2
Subtotal	19	51	101	131	90	65	53	45	38	50
<b>REVENUES</b>										
Regional Sales Tax (1/4 Cent)	53	53	53	53	53	53	53	53	53	53
Federal Funds	—	—	—	5	9	35	36	27	2	1
County (10% of Group B)	—	—	—	—	—	—	1	1	4	5
Subtotal	53	53	53	58	62	88	90	81	59	59
<b>NET</b>	33	2	(48)	(73)	(28)	23	37	36	21	9
Cumulative	33	35	(13)	(86)	(114)	(91)	(54)	(18)	3	12

NOTE: Cost of all Group B Corridors and Minneapolis Tunnel Extension were totaled and averaged, to arrive at a cost/corridor of \$154.M

NOTE: Only \$115.M of Federal Funds are utilized.

LIGHT RAIL TRANSIT COORDINATION PLAN



**COSTS/REVENUE FOR 10-YEAR LRT IMPLEMENTATION SCHEDULE ASSUMING  
42 MONTHS BETWEEN CORRIDOR CONSTRUCTION STARTS**

(1991 \$M and 1/4 Cent Regional Sales Tax)

FIGURE 5-8

ITEM	CALENDAR YEAR									
	1992	1993	1994	1995	1996	1997	1998 (1)	1999 (2)	2000 (3)	2001 (4)
<b>COSTS</b>										
LRT Capital Costs	22	60	121	193	194	167	149	142	115	86
LRT O&M Costs	—	—	—	—	—	—	11	21	29	37
LRT Operating Revenue (50% Operating Ratio)	—	—	—	—	—	—	(7)	(13)	(17)	(22)
Feeder Bus O&M Cost	—	—	—	—	—	—	8	14	28	33
Existing Bus System Deletions	—	—	—	—	—	—	(13)	(23)	(39)	(45)
Existing System Operating Revenue Lost (35% Operating Ratio)	—	—	—	—	—	—	5	8	14	16
Other Regional Transit Services <sup>5</sup>	94	96	98	99	101	103	106	108	110	112
Total Annual Cost	116	156	219	292	295	270	259	257	240	217
<b>REVENUES</b>										
Federal Funds	—	—	10	40	25	25	25	25	25	25
County (10% of Group B)	—	1	1	6	6	9	9	8	5	6
Regional Sales Tax (1%)	212	212	212	212	212	212	212	212	212	212
Total Revenues	212	213	223	258	243	246	243	245	242	243
<b>NET</b>										
Cumulative Surplus/Deficit	96	57	4	(34)	(52)	(24)	(16)	(12)	2	26
	96	153	157	123	71	47	31	19	21	47

(1) Highest O&M cost of three alignments alternative for the Central Corridor

(2) Group A plus one Group B corridor with the highest O&M cost

(3) Group A plus 1999 Group B corridor plus Group B corridor with second highest O&M cost

(4) Group A plus 1999 and 2000 Group B corridors plus Group B corridor with third highest O&M cost

(5) Source: RTB Five-Year-Plan. Assumes 2% per year increases in deficit. Includes MTC Regular Route, Metro Mobility, Opt-Out, and Rural/Small Urban bus services

Feeder bus O&M costs and route deletions taken from RTB-LRT Development and Financial Plan

LIGHT RAIL TRANSIT COORDINATION PLAN

**COSTS/REVENUE FOR LRT/FEEDER BUS SYSTEM FOR 10-YEAR IMPLEMENTATION  
SCHEDULE WITH FEDERAL FUNDING AND 12 MONTHS  
BETWEEN CORRIDOR CONSTRUCTION STARTS**

(1991 \$M and 1¢ Regional Sales Tax)



FIGURE 5-9

Level of Regional Sales Tax	Time Elapsed Between Corridor Starts (Months)	Federal Funds Used (Millions 1990 \$)	Federal Funds as Percent of Total Cost	Maximum Deficit (Millions 1990 \$)	Fund Balance 2001 (Millions 1990 \$)	No. of Corridors Started in Ten Years
1/4 Cent	30	\$166	21%	(\$130)	(\$65)	5
1/4 Cent	36	\$127	18%	(\$120)	(\$30)	5
1/4 Cent	42	\$115	18%	(\$114)	\$10	4
1/4 Cent	66	—	—	(\$107)	(\$10)	3
1/2 Cent	12	\$200	16%	(\$13)	\$59	8
1 Cent	42	\$115	18%	—	\$1,601	4
1 Cent	42	—	—	—	\$1,486	4
1 Cent	12	\$200	16%	—	\$1,119	8
1 Cent	12	—	—	—	\$919	8

LIGHT RAIL TRANSIT COORDINATION PLAN



**SUMMARY OF ALTERNATIVE SCENARIOS FOR  
10-YEAR IMPLEMENTATION PLAN**

FIGURE 5-10

## RECOMMENDED TEN-YEAR IMPLEMENTATION SCHEDULE

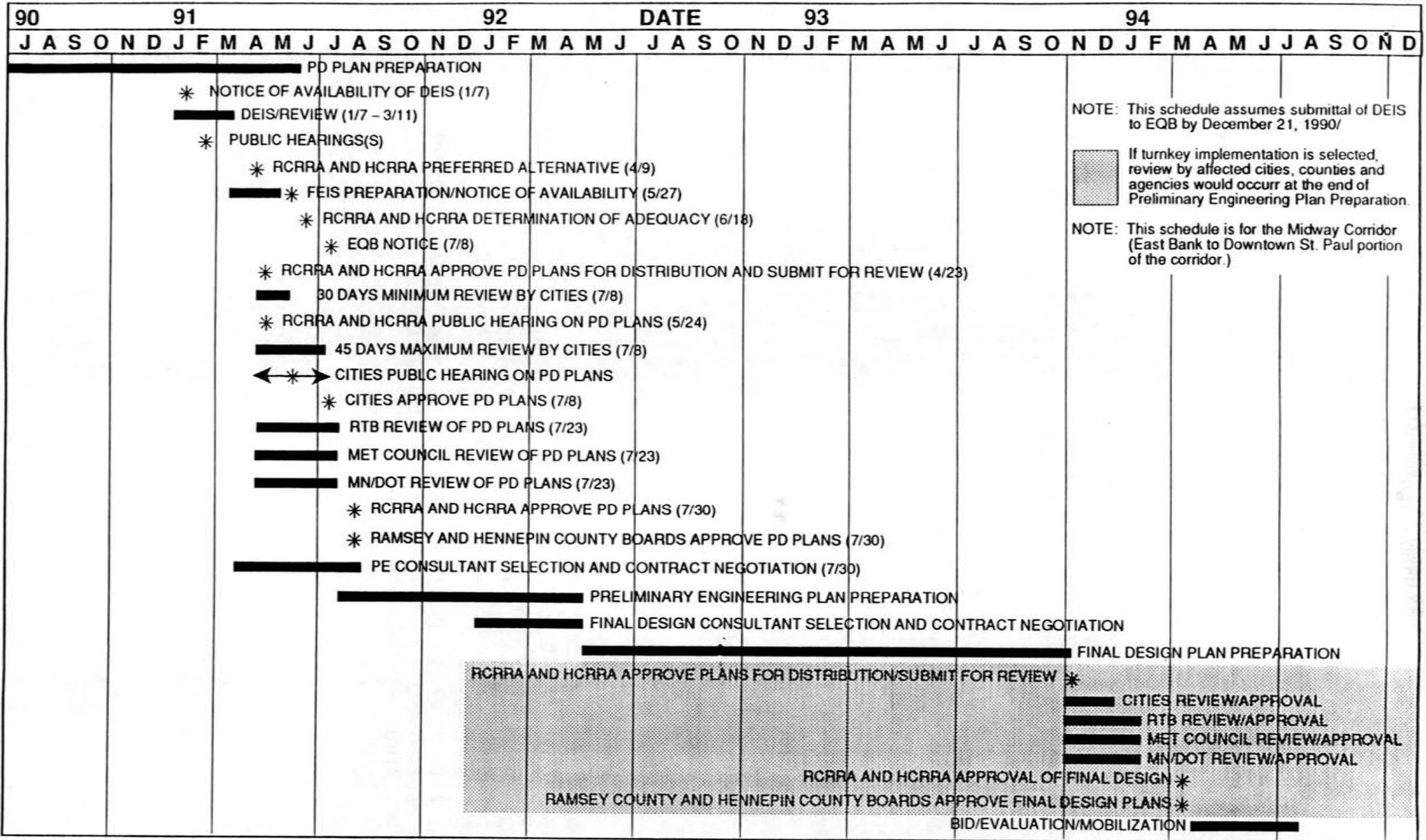
After analysis and discussion of the alternative ten-year implementation schedules and the funding alternatives, the Joint LRT Advisory Committee reached the following conclusions:

- o A 1 cent regional sales tax for transportation should be enacted.
- o 1/2 cent of that regional sales tax should be allocated to LRT construction (see Figure 5-7).
- o A 12-month frequency of starts between corridors is appropriate with a 1/2 cent regional sales tax.
- o The 12-month frequency results in eight corridors being started and four corridors in operation by 2001.
- o A 1/2 cent sales tax, if enacted on January 1, 1992, allows a "pay as you go" approach to funding with minor use of bonding to cover short-term revenue needs.
- o Federal funding should be pursued and planned for three Group B Corridors at a level of \$200 million (1991 dollars) over the ten-year schedule.

## TWO-YEAR SCHEDULE FOR LRT IN THE CENTRAL CORRIDOR

A detailed schedule of activities was prepared for the completion of all activities necessary to complete final engineering (100%) plans for the Central Corridor. Figure 5-11 presents the schedule for the Central Corridor. The tasks are listed below:

- o State EIS Activities
  - Prepare DEIS
  - County RRA approves DEIS for distribution
  - DEIS to EQB
  - DEIS Notice of Availability Published in EQB Monitor
  - Distribute Document/Press Release
  - 30-Day Comment Period/Review
  - Public Hearing Within 30-Day Period
  - Select Preferred Alignment
  - County RRA approves FEIS for distribution
  - FEIS Submitted to EQB
  - FEIS Notice of Availability Published in EQB Monitor
  - Distribute Document/Press Release
  - 10-Day Wait Period
  - Adequacy Determination by County RRA
  - Notice of Determination in EQB Monitor



NOTE: This schedule assumes submittal of DEIS to EQB by December 21, 1990/

 If turnkey implementation is selected, review by affected cities, counties and agencies would occur at the end of Preliminary Engineering Plan Preparation.

NOTE: This schedule is for the Midway Corridor (East Bank to Downtown St. Paul portion of the corridor.)

LIGHT RAIL TRANSIT COORDINATION PLAN

## CENTRAL CORRIDOR PROJECT SCHEDULE (SEPTEMBER 25, 1990)



FIGURE 5-11

- o Preliminary Design (10% Level of Engineering)
  - Document/Drawing Preparation
  - RRA Approves/Transmits to Cities, RTB, Metropolitan Council and Mn/DOT
  - 30-Day Review Period by Cities
  - RRA Public Hearing After 30-Day Period
  - 45-Day Review Period
  - City Public Hearing Within 45-Day Period
  - City Approves/Disapproves Preliminary Design
  - RTB Review/Comment Within 90 Days
  - Metro Council Review/Comment within 90 days
  - Mn/DOT Informal Review/Comment
  
- o Preliminary Engineering (30%)
  - Prepare Request for Proposal
  - Select Consultant
  - Execute Contract
  - Preliminary Engineering on Civil Works
  - Performance Specifications for Systems
  - City/RTB Unofficial Review
  
- o Financial Commitment
  - Financial Needs Analysis
  - State Enabling Legislation
  - Federal Grants
  - Other
  
- o Final Design (100%) of Civil Works
  - Prepare Request for Proposal
  - Select Consultant
  - Execute Contract
  - Complete Final Engineering on Civil Works
  - RRA Approves/Transmits to City, RTB and Mn/DOT
  - 60-Day Review Period
  - City Approves/Disapproves F.E. within the 60-Day Period
  - RTB Approves/Disapproves F.E. within 90 Days
  - Mn/DOT Approves/Disapproves

**CHAPTER 6**  
**DESIGN GUIDELINES**

## CHAPTER 6 DESIGN GUIDELINES

The purpose of this chapter of the LRT Coordination Plan is to establish a design philosophy which will guide the planning and engineering of LRT facilities and the development of performance specifications for LRT systems. These design guidelines are intended to respond to the following LRT goals which were endorsed by the Joint LRT Advisory Committee during preparation of the LRT Development and Financial Plan. Detailed design criteria and performance specifications will be developed as part of Preliminary Engineering (30% design). The region's goals for LRT are to:

- o Maximize ridership and improve transit service by reducing travel time, operating in exclusive right-of-way where feasible, and providing a high quality of service.
- o Improve cost-effectiveness of transit service.
- o Improve service to transit dependents.

The LRT system proposed for the Twin Cities is conceptually a high speed, high capacity, moderate cost, commuter service radiating out from the two metro centers. To accomplish these objectives, the system will utilize high-platform level boarding, exclusive (but not necessarily grade-separated) rights-of-way, and stations spaced approximately one mile apart. The system will be fully accessible to mobility impaired people. Vehicles will be operated singly or in trains of up to three vehicles per consist, dependent on ridership demand. LRT will serve as the backbone of the regional transit system, supported by a bus system which will be reconfigured to feed the LRT lines.

The primary market segment for LRT will be trips between a point located in one of the proposed LRT corridors and downtown Minneapolis, downtown St. Paul, or the University of Minnesota area. Secondary markets will include trips with both ends in one corridor and corridor-to-corridor trips. For these secondary corridor-to-corridor trips, it would be desirable to maintain higher travel speeds through the downtown areas.

One of the most important potential advantages of light rail is that it can improve the cost-effectiveness of a regional transit system. However, the implementation of light rail requires a major capital investment. The LRT system to be built in the Twin Cities should be reliable and moderate in cost. To accomplish this objective, the LRT system will utilize conventional "off-the-shelf" LRT technology. Designs and materials will be

selected which are attractive but are moderate in cost, easy to install and inexpensive to maintain. Grade separations and tunnels will be provided only where it can be shown that they are needed to address topographic or operational concerns. Such facilities will be evaluated for cost-effectiveness before they are constructed.

#### **LIGHT RAIL VEHICLES**

The light rail vehicle selected for the Twin Cities will be a vehicle of proven technology and consistent with most modern LRT systems (see example in Figure 6-1). The vehicle will be single articulated, six axles, 90 feet long, 12 feet 9 inches high, and 8 feet 9 inches wide, dual directional and capable of being coupled in multiple consist up to a maximum of three vehicles. It will have eight doors, four on each side; will be accessible; and will be designed for high-platform loading. Seat spacing will be maximized to the extent possible while maintaining a minimum 76 passenger seats in each vehicle.

The doors will be sliding doors equipped for either passenger activation or sole operator operations. An indicator light will be provided at each door to indicate that the door request has been received. A two-tone chime will sound prior to each door closing. A pull cord type stop request signal will be provided.

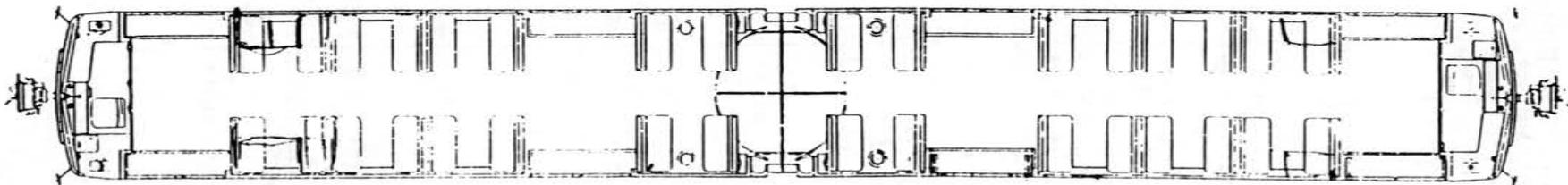
Vehicles will have heating and air conditioning. Passenger windows will have openable transoms at the top of each window. The door thresholds will be heated to reduce the accumulation of snow and ice.

The exterior color scheme will be similar to the new MTC bus fleet. Route, run and end signs will be electronic and able to be changed from the operator's cab.

#### **STATIONS**

The overall design goals for LRT stations in the Twin Cities will be to:

- o Meet safety and functional requirements without compromise.
- o Provide facilities which are accessible to the elderly and the disabled.
- o Provide movement patterns for patrons which are easy to understand.
- o Establish the system's image through simple, logical and strong designs.



LIGHT RAIL TRANSIT COORDINATION PLAN



## TYPICAL INTERIOR AND EXTERIOR VIEW OF LRV

SOURCE: Hennepin County Regional Railroad Authority

FIGURE 6-

- o Accommodate maintenance and replacement issues.
- o Be cost-effective.

Most stations will be at-grade stations with center or side platforms (see Figure 6-2). Stations in freeway medians or depressed or elevated track sections will be two-level stations with vertical access from a mezzanine level to a track level platform. Stations in tunnels will be subway stations.

Station design plans will be developed in increasing detail during preliminary design (10%), preliminary engineering (30%) and final engineering (100%). All stations in the system will be similar functionally. A limited number of architectural prototypes of stations will be developed from which a specific station design will be prepared. Each station will be made compatible with its surrounding environment through variations in design details and finishing materials. Cities will have the opportunity to review and approve station designs.

#### **Platform Dimensions**

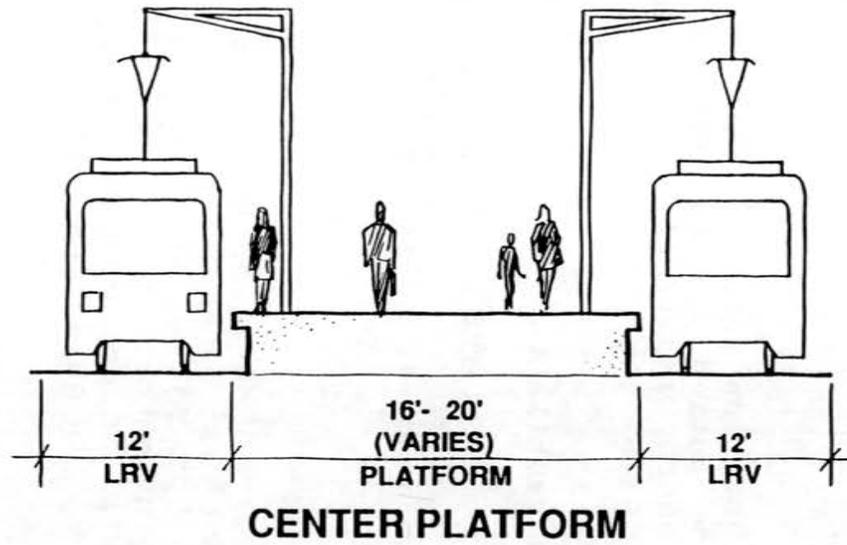
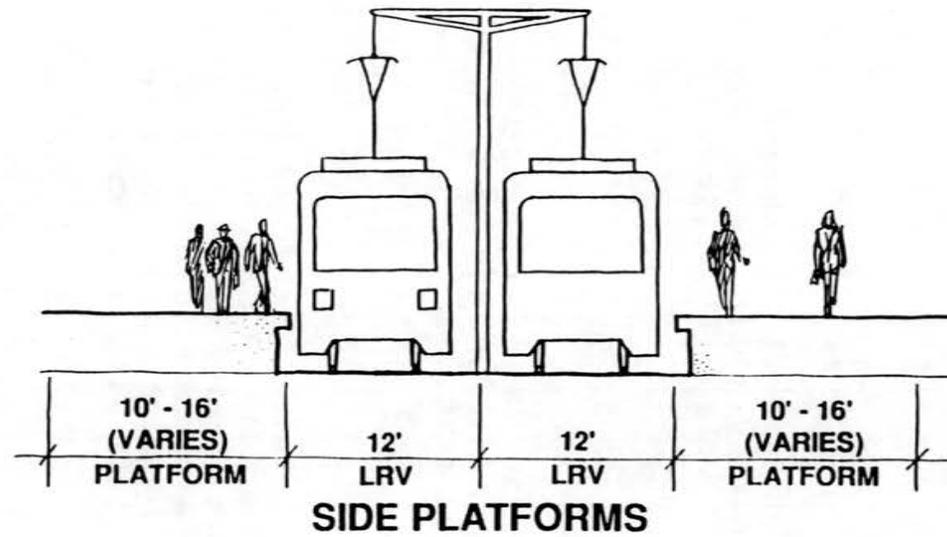
All stations will be high platform stations (39 inches above the top of the rail) to accommodate level boarding. LRT platforms will be 300 feet long to accommodate three-vehicle trains. The absolute minimum platform width will be 10 feet for a side platform and 20 feet for a center platform. The preferred minimum will be 12 feet for a side platform and 24 feet for a center platform.

#### **Vertical Circulation**

Elevators will be provided where ramps are impractical. Escalators will be provided in both directions when the vertical rise exceeds 12 feet. Ramps and stairways will conform to appropriate codes.

#### **Fare Collection**

A minimum of two self-service ticket and validation machines will be provided at all stations. The total number of machines at each station will depend on predicted patronage.



LIGHT RAIL TRANSIT COORDINATION PLAN

## TYPICAL STATION CONFIGURATIONS

SOURCE: Hennepin County Regional Railroad Authority

FIGURE 6-2



## **Communications**

Public address systems will be provided at all stations. Closed-circuit television monitoring will be provided at all subway and open two-level stations and at selected at-grade stations. Public telephones will be provided at all stations. Emergency phones will be provided at all subway stations.

## **Restrooms**

Public restrooms will not be provided at stations. Operator layover rooms and restrooms will be provided at selected station locations.

## **Lighting**

Lighting in station areas and park-and-ride lots will be designed to reinforce patron circulation and security while minimizing impact on nearby neighborhoods. Light levels will conform to applicable codes.

## **Heating and Ventilation**

Heating and ventilation will be provided as required in subway stations. Heating will be provided within the shelter areas on the platform at at-grade and open two-level stations.

## **Acoustics**

Stations will be designed to keep noise levels at the stations below guidelines established by the American Public Transit Association (APTA). Stations will be designed to buffer surrounding neighborhoods from rail, bus and auto noise. Noise abatement will be provided as needed to keep neighborhood noise levels below APTA guidelines and in compliance with local codes.

## **Materials, Finishes and Landscaping**

Finishing and landscaping materials will be selected to provide an attractive but safe, durable and easily maintained environment. Modular furniture will be utilized. A landscape buffer will be constructed between LRT stations and sensitive visual receptors. The buffer will consist of landscaping berms and walls as necessary. Station design and landscaping will conform to local ordinances and codes.

### **Signs, Graphics, Artwork**

A uniform system of graphic design and signage will be utilized throughout the system to create a regional system identification and to contribute to a system which is easy to understand and use. Signs will be simply designed and easy to read. The extent and appropriate locations for artwork will be determined for each station in conjunction with the local community.

### **Advertising and Concessions**

Advertising will be allowed at LRT stations but will be carefully controlled to maintain a pleasant environment for patrons, to prevent interference with passenger circulation, and to limit impacts to neighborhoods. Concessions will not be provided at stations either by shops or vending machines.

### **Safety and Security**

Fire/life safety criteria will be based upon national standards. A local fire/life safety committee, consisting of representatives of all emergency services of state, county and affected cities, will be formed to comment on and approve proposed safety standards. Station attendants will not be provided. Subway and two-level stations will have the capability to be secured during non-operating periods. Subway, two-level stations and selected at-grade stations will be monitored by central security personnel via closed-circuit television.

### **ACCESSIBILITY FOR SENIORS AND THE DISABLED**

One of the design objectives of the regional LRT system is to provide a modern rail transit system that will be accessible to all transit users. Design criteria will be developed to achieve the highest quality, safest and most accessible system possible. The Regional Transit Board and the County Regional Railroad Authorities will work with the disabled and elderly community to achieve this objective. More detailed information is provided in the "Background Materials" notebook which is available for review at the Regional Transit Board.

## Vehicle Design Issues

Boarding--High-platform loading will be used to facilitate greater access between the LRT platform and the vehicle. Wheelchair passengers will access the station platform by ramps for at-grade stations or elevators for subway or two-level stations. No mechanical devices will be necessary for loading of passengers in wheelchairs. All doorways will be equally accessible. Design guidelines are:

- o The horizontal gap between the vehicle and platform will be 2-1/2 inches and will be maintained to a tolerance of +1/2 inch to -1/2 inch.
- o The top of the platform will be level with the vehicle floor height and will be maintained to a tolerance of +1/4 inch to -1 inch.
- o Door openings will be 48 inches.
- o Aisle width will be a minimum of 24 inches.

Door Operation--Passenger activation buttons on doors will be located and marked for easy access by the physically and visually handicapped. Those passengers unable to activate the door button will be required to use the lead vehicle to ensure that the operator can see the passenger.

Wheelchair Tiedown Devices--Two wheelchair tiedown devices will be provided at each door vestibule (eight per car). The tiedown will be of the wheel clamp-type and located under a flip-up seat. The seat and the device will be manually operated. A voice intercom system will be easily accessible at each wheelchair tiedown location to provide direct access to the train operator. It will be the passenger's choice whether to use the tiedown and it will be the passenger's responsibility to secure the wheelchair to the tiedown device unless the operator is notified otherwise. Passengers needing assistance will be required to enter the lead vehicle directly behind the operator.

Interior Safety Appliances--Seating capacity will be maximized in light rail vehicles and continuous handhold capabilities will be provided.

Train Identification and Destination Announcements--Vehicles will be equipped with an on-board public address system to allow the train operator to make both internal and external announcements. In addition, each vehicle will be equipped with route/destination signs above the front windshield and along the side.

## Station Design Issues

Platforms--Platforms will be designed to provide shelters for weather protection, limited bench seating and wheelchair and standee space, tactile warning strips along the perimeter edge of the platform, and minimum design clearances.

Vertical Access--A minimum of one ramp will be provided at all at-grade stations to provide access from the ground level to the raised platform. These ramps will be covered for weather protection. Elevators will be provided where ramps are impractical and at all stations which are provided escalators. Elevators will be sized to accommodate a wheelchair.

Auxiliary equipment--Stations will be provided with vending, emergency and communication equipment that will be accessible to the disabled community. Identification of essential facilities will be by raised letters or numbers. Vending and validation equipment will be designed to facilitate "touch" operation. Warning signals will be both visual and audible. Lettering for all warning and emergency facilities will be a minimum of 4 inches high.

Walkways--Walkways will be at least 48 inches wide with gradients not greater than 5 percent. Walks will have a continuous surface. When walks cross other walks or driveways, they will blend to a common grade.

Track Crossings--Stations will be designed to maximize sight distance and to provide automatic flashing lights and bell alarms when sight distance is inadequate for safe pedestrian crossings. Where "Z" barriers are used at pedestrian crossings, these barriers will be designed to allow for wheelchair movements and will be a minimum of 48 inches wide. Sidewalk and ramp surfaces will be slip-resistant with tactile warning strips provided in advance of the trackway. Rail flangeways will be a minimum width, with solid edges. The top of rail head will not be more than 1/4 inch above the pavement surface.

Park-and-ride--At park-and-ride stations, handicap parking stalls will be as close as possible to the station platform. The number of handicap stalls will be proportional to the total number of stalls but there will be a minimum of three handicap spaces wherever park-and-ride is provided.

## **PARK-AND-RIDE AND BUS TRANSFER FACILITIES**

The location and size of park-and-ride lots and bus transfer facilities will be dependent upon patron need as evidenced through ridership forecasts, site availability, and neighborhood compatibility. A conceptual plan for a park-and-ride site and bus transfer facility is shown in Figure 6-3. In most instances, park-and-ride facilities will be provided only at stations more than 3-4 miles outside the edge of downtown Minneapolis or St. Paul. Station areas will be designed to provide priority access to the station platforms as follows:

- 1 - Walk-up patrons
- 2 - Bicycles
- 3 - Feeder bus drop-off
- 4 - Handicap parking
- 5 - Auto drop-off/pick-up
- 6 - Auto park and ride

### **Walk-Up**

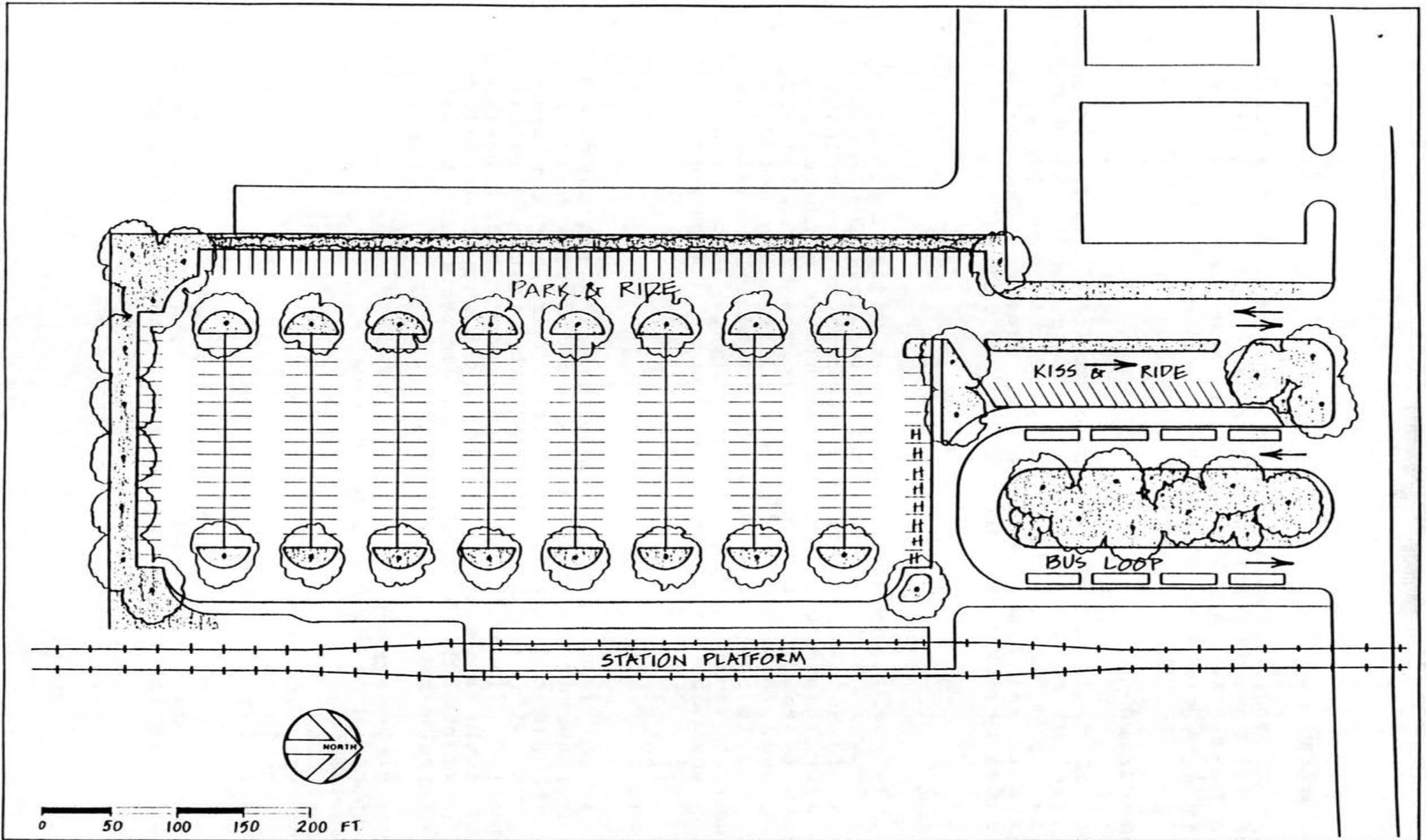
Convenient pedestrian access will be provided at all LRT stations. Pedestrian access will be as direct as possible with a minimum amount of pedestrian/auto and pedestrian/bus conflict.

### **Bicycle Access**

Bicycle access will be provided at all stations where there is expected demand. Bicycle access routes will be coordinated with entrances to the park-and-ride lot or station site. Bicycle storage lockers and racks will be provided as required by expected demand. Bicycles will be allowed on light rail vehicles during off-peak periods.

### **Feeder Bus Drop-Off and Busways**

The number of bus bays will be based upon feeder bus demand. An adequate number of bus bays will be provided to accommodate peak hour bus demand in off-street locations assuming a timed-transfer feeder bus system. Bus bays will be designed to provide easy maneuverability and patron boarding. Bus stalls will be as close to the LRT platform as practical. Bus lanes should be separated from auto lanes wherever possible and should be designed for heavier loading.



LIGHT RAIL TRANSIT COORDINATION PLAN

**CONCEPTUAL SITE PLAN FOR LRT  
PARK/RIDE LOT AND BUS TRANSFER FACILITY**



FIGURE 6-3

### **Handicap Parking**

The number of handicap stalls will be proportional to the total number of stalls provided per current codes, but there will be no less than three stalls provided at all park-and-ride lots. The minimum width of a handicap parking stall will be 12 feet.

### **Auto Drop-Off/Pick-Up**

The number of stalls provided for auto drop-off of LRT patrons will be based on ridership forecasts. These stalls should be located away from the general parking area, if possible, with easy access to and from the connecting streets. The stalls should be clearly marked as short-term parking only.

### **Auto Parking**

The number of stalls provided for park-and-ride will be based on ridership forecasts and site availability. Park-and-ride lots should be designed to provide traffic access which is coordinated with the existing street system and designed to minimize local street traffic impacts. Lots will be designed to conform with applicable local codes and ordinances. Landscaping and noise abatement will be provided as necessary to minimize visual and noise impacts on nearby neighborhoods. Adequate lighting will be provided to ensure a safe and secure environment for patrons.

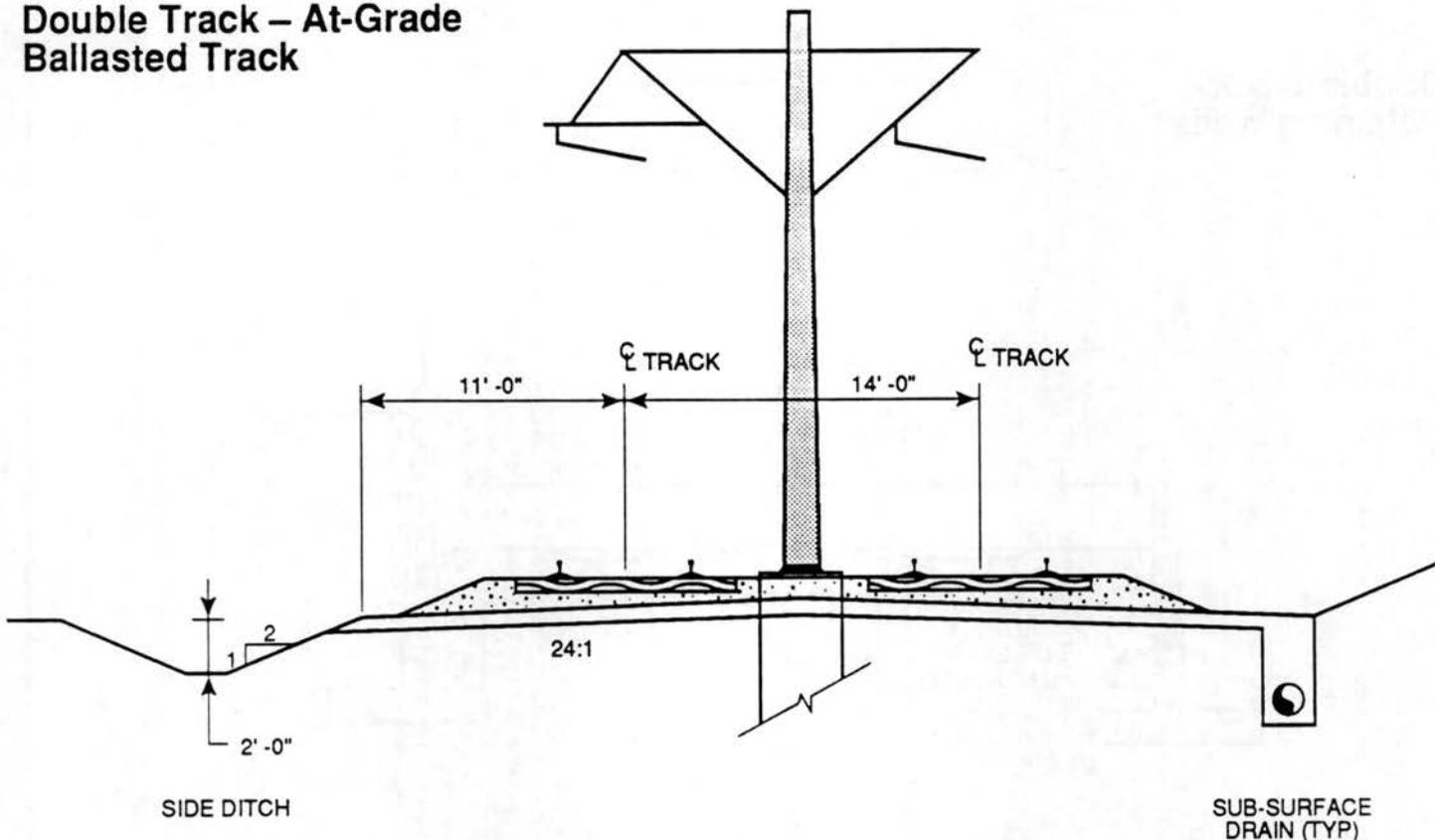
### **TRACK SYSTEM**

The track system of an LRT system is defined as consisting of all elements from above the subgrade to and including the rail which supports and guides a transit vehicle. There are two basic systems, one with ballast and the other without ballast (ballastless). However, there are many interchangeable components within each system. To choose the appropriate system and its components, the following general criteria will be used to complete preliminary and final design:

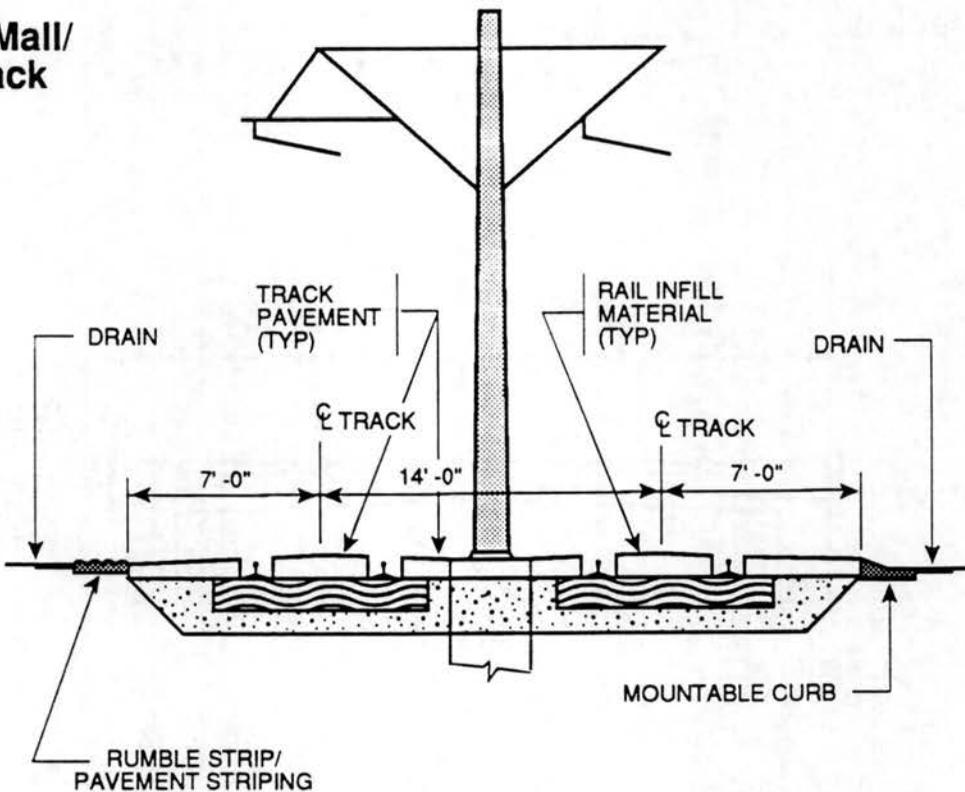
- o Safety and ride comfort
- o Cost, both capital and future maintenance
- o Constructability
- o Maintainability
- o Environmental conditions
- o Cathodic condition
- o Site specific conditions and limitations

In general, conventional technology and standard materials will be utilized. Typical cross-sections are shown in Figures 6-4, 6-5 and 6-6. General design criteria for the track system are as follows.

**Double Track – At-Grade Ballasted Track**



**Double Track – Mall/Street Paved Track**



LIGHT RAIL TRANSIT COORDINATION PLAN

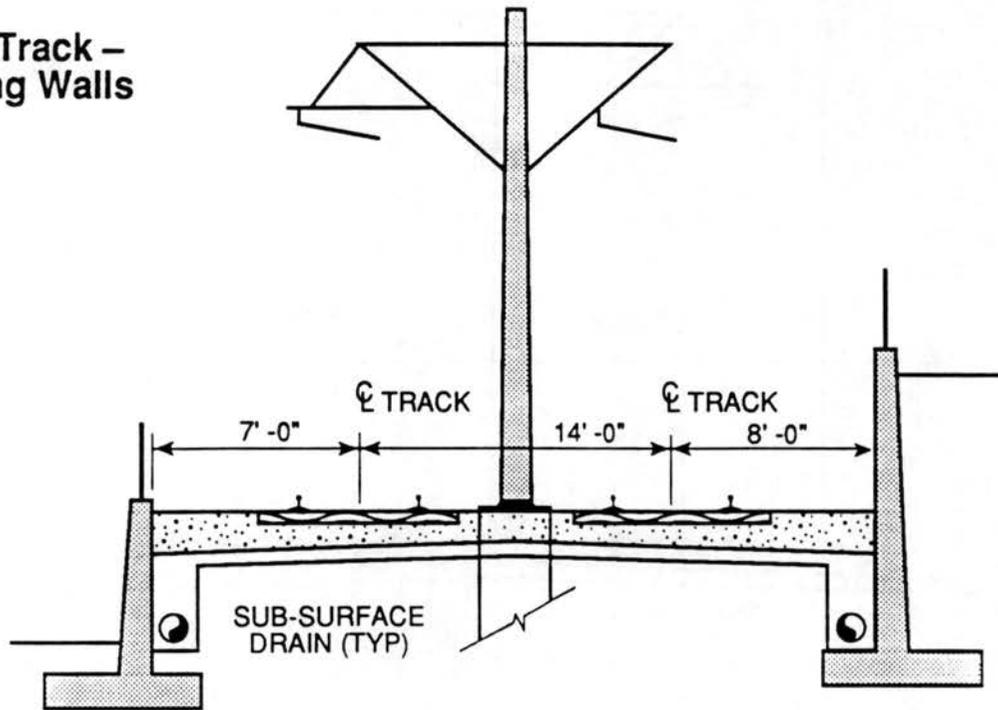
**TYPICAL CROSS-SECTIONS: AT-GRADE BALLASTED AND PAVED TRACK**



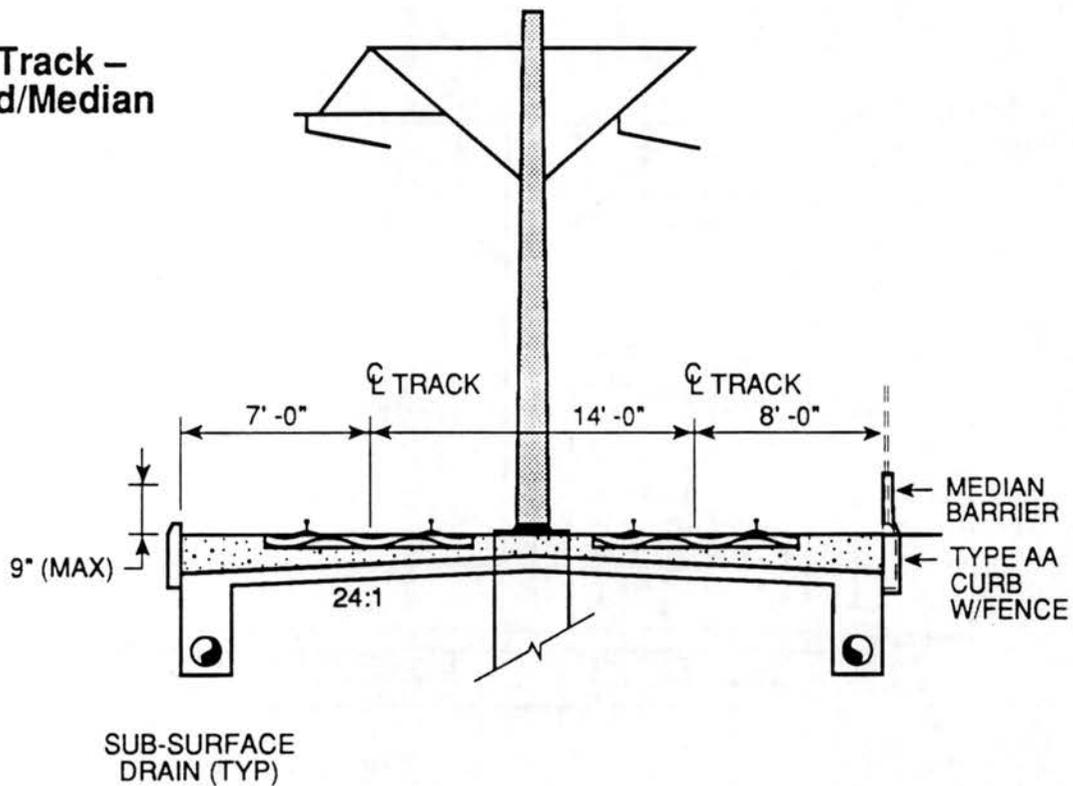
SOURCE: Hennepin County Regional Railroad Authority

FIGURE 6-4

**Double Track – Retaining Walls**



**Double Track – Retained/Median**



LIGHT RAIL TRANSIT COORDINATION PLAN

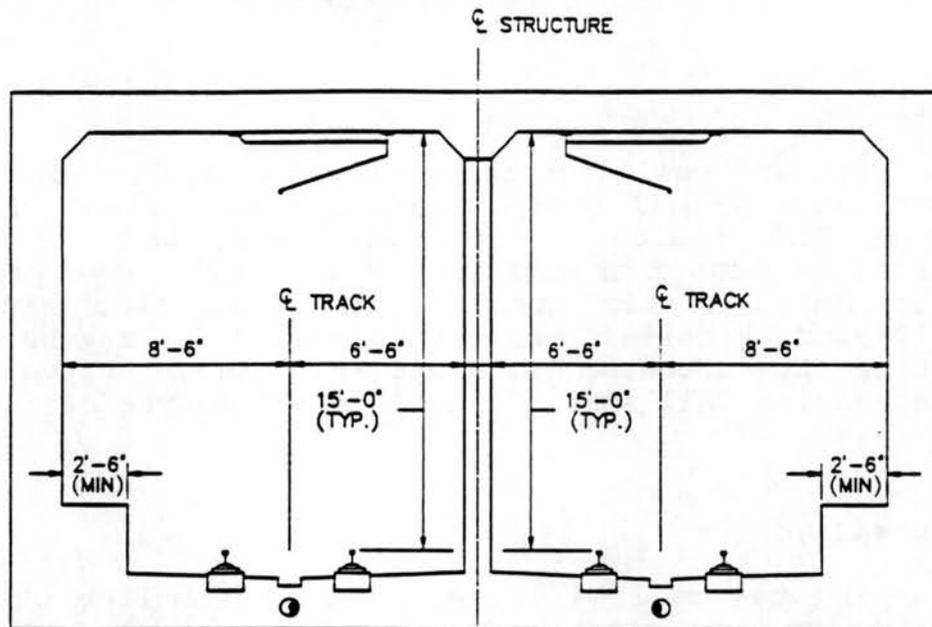


**TYPICAL CROSS-SECTIONS:  
AT-GRADE BALLASTED TRACK**

SOURCE: Hennepin County Regional Railroad Authority

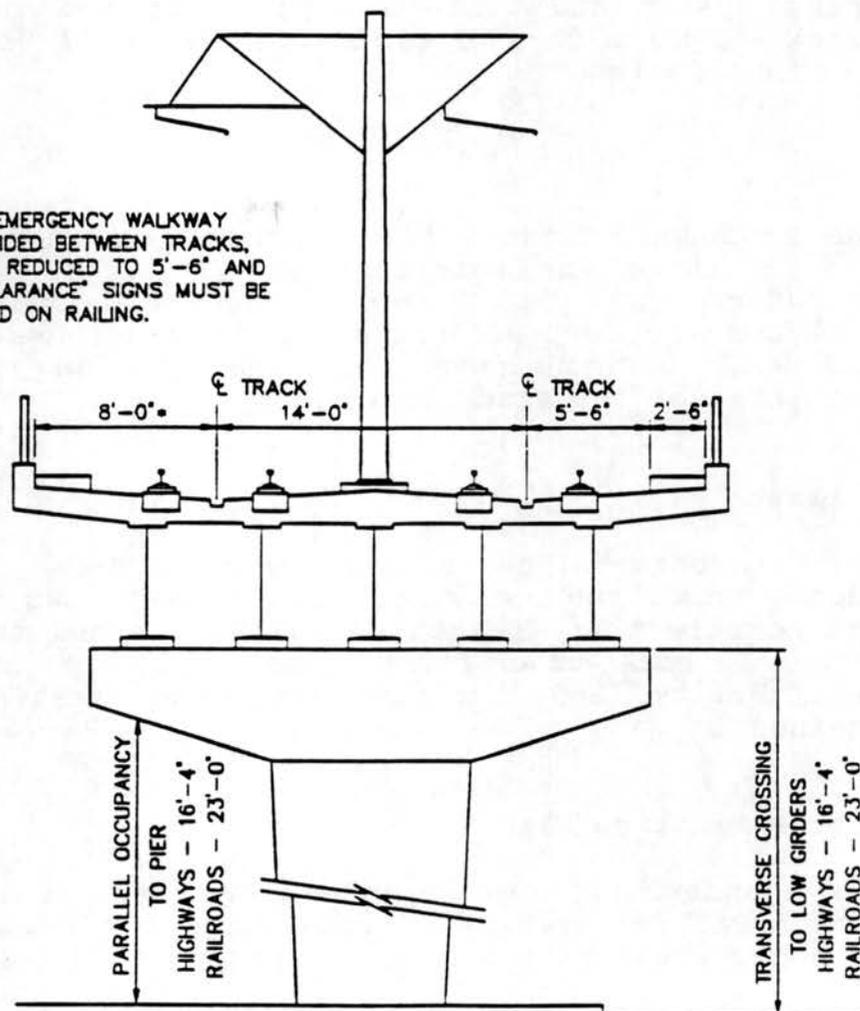
FIGURE 6-5

**Double Track –  
Cut & Cover Tunnel**



**Double Track –  
Aerial Structure**

- WHERE EMERGENCY WALKWAY IS PROVIDED BETWEEN TRACKS, MAY BE REDUCED TO 5'-6" AND "NO CLEARANCE" SIGNS MUST BE PROVIDED ON RAILING.



LIGHT RAIL TRANSIT COORDINATION PLAN

**TYPICAL CROSS-SECTIONS: GRADE-  
SEPARATED DIRECT FIXATION TRACK**

SOURCE: Hennepin County Regional Railroad Authority

FIGURE 6-6



## **Rail**

The standard rail section for the LRT system will be 115 lbs/yd, continuous welded (CWR) standard carbon steel rail. Curves of 1,500 feet radius or less will have wear-resistant rail and curves of less than 300 feet radius will have pre-curved, wear-resistant, jointed track. In paved track sections, either ballasted or ballastless girder rail Ri 59 may be specified as an option to standard rail-with-flangeway system. 132 lbs/yd restraining rail shall be used on all curves of radii of 500 feet or less.

## **Fastenings**

Standard tee rail will use a double shoulder plate with either cut spikes or elastic fasteners dependent upon final design. Rail anchors to box every other tie will be used with the cut spike system and will be applied to the rail for ballastless track. Spring clip or rigid fixation will be used as determined in final design.

## **Ties**

The proposed standard tie is creosoted wood timber, 7" x 9" x 8' - 6" size for mainlines and 7" x 9" x 8' - 0" size for secondary and yard tracks; however, concrete ties will be analyzed for cost-effectiveness in final design. Insulated tie pad will be considered in final design to improve cathodic qualities of the track section.

## **Ballast**

AREA standard ballast size 4A is recommended, with a minimum of 8 inches below the bottom of tie. All tracks will have a 12-inch and no more than 16-inch of ballast beyond the end of tie. The type of rock used for ballast will be determined by local availability and quality assurance testing done in final engineering.

## **Direct Fixation Slab**

Slab construction is dependent on specific site conditions and structural requirements. Insulating the track from the slab for cathodic protection will be developed in final design.

## **ELECTRIFICATION**

The traction electrification system will provide the direct current requirements for the propulsion and auxiliary equipment of the light rail vehicles. The train electrification system will not provide power to wayside equipment or control systems that are not on-board the vehicle. These systems will receive power from the nearest local NSP power supply points. The design will be based upon year 2010 operating projections for ridership and train frequency.

### **Overhead Contact System**

Electrical power (750 volts DC) will be provided to the light rail vehicles via a simple overhead catenary system with auto-tensioning. Poles and overhead wiring will be consistent throughout the system except in areas where architectural variations are needed to minimize visual impacts.

### **Substations**

1,000 kw or 1,500 kw substations will be located throughout the system at approximately 1.0 to 1.5 mile intervals. The substations will be modular in construction, compact, self-supporting and transportable. The location of the substations will be chosen to minimize community impacts as well as to enhance overall efficiency of the electrical system. Architectural enhancements will be provided where needed to limit community impacts. The capacity of the substations will be sized to minimize power losses and stray current effects. As a general rule, frequent smaller capacity substations are preferable to less frequent higher capacity substations. Controls and metering devices will be located within the substations. There will be notification to the control center if a substation loses power or goes off line.

## **SIGNAL SYSTEM**

The Twin Cities LRT system will operate in accordance with common rail transit operating procedures using both line-of-sight and traffic and train signal indications. Typically, line-of-sight running will be limited to lower speed sections with frequent vehicular cross-traffic or parallel traffic or street-running conditions. Train control signals will be used in higher speed sections or where the need for advance track occupancy knowledge is necessary. Traffic pre-emption and standard railroad crossing protection will be activated through vital track circuitry. Train and traffic safety will be the prime consideration in the design of the signal system and in the selection of its components. The system will be designed to conform to standard railway signal requirements and to conform to applicable codes.

### **Train Signal System**

The train signal system will be an Absolute Block System (ABS) with Automatic Train Stops (ATS) protection at each signal. The control center will not have remote control of the signal system. Routing through interlockers will be requested through a Train-to-Wayside Communication (TWC) system, or by wayside push-button controls. All interlockers will operate on a first-come-first serve basis.

### **Highway Crossing Protection**

Where required, conventional railroad highway grade crossing warning systems will be used. Protection will include flashing lights, bells and crossing gates. Track circuit lengths will be designed based upon operating speeds to provide minimum advance warning time of 20 seconds.

### **Traffic Light Pre-emption**

To maintain LRT schedules, traffic signal systems will be used to give preference to light rail trains at controlled intersections. The LRT designer will work with the municipalities involved to implement this system and will establish, by agreement, maintenance responsibilities.

### **OPERATIONS AND MAINTENANCE FACILITY**

The region's central light rail transit operations and maintenance facility will be located south of downtown Minneapolis, near I-94, north of East Franklin Avenue and west of Cedar Avenue. Rail access and egress for the maintenance and storage facility will occur via a northbound service track to a junction with the Central Corridor in the vicinity of the Metrodome, and a southbound service track to a junction with the Hiawatha Corridor at 28th Avenue and Hiawatha Avenue. The site has excellent accessibility for auto and truck traffic and is served by public transit along Franklin Avenue. In addition, a rail freight connection is possible via the Soo Line Railroad. This site of approximately 16 acres will be developed to provide for the following functions:

- o Maintenance, repair and storage of the light rail vehicle fleet

- o Administrative and operation headquarters for LRT management and staff, including crew management and dispatch center for LRT operators
- o Central control center for both bus and LRT operations
- o Power, signal and way maintenance shop facility and repair parts storage

The facility design allows for staged development dependent upon the corridor start-up schedule.

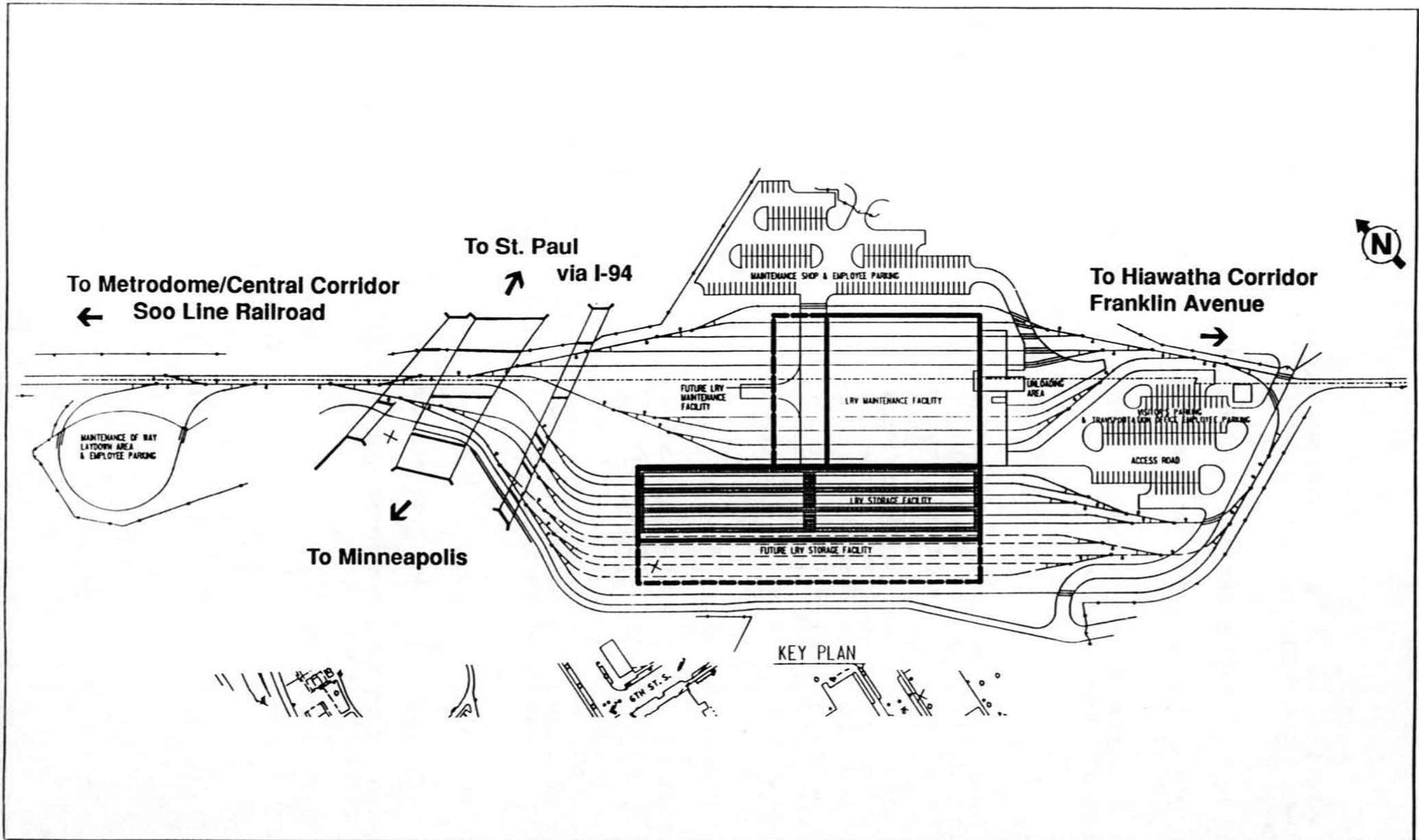
### **Yard Design**

The yard track layout as shown in Figure 6-7 achieves the maximum utilization of the site while offering high internal operating flexibility without the need for the operator to change to complete any yard movement. On-site LRV circulation is enhanced by loops at the north and south entrances to the yard and two run-through tracks located on the perimeter of the yard. The track configuration was determined by the available land, site constraints, required capacity, turnout criteria and the minimum turning radius of the vehicle. It was designed to avoid use of special trackwork.

### **Repair and Maintenance Shop**

The shop facility will provide a comfortable, all-weather working environment, equipped with the appropriate tools and machinery necessary to perform the maintenance and repair functions as detailed in the maintenance plan. The proposed initial shop area of 67,000 square feet is capable of maintaining a 50-car fleet. The expanded shop of 91,000 square feet would be capable of maintaining a fleet of 75 vehicles. Specific work stations will include:

- o Vehicle automatic car wash
- o Wheel truing machine
- o Daily inspection and preventive maintenance and heavy repair work areas
- o Top of vehicle working platforms and overhead cranes
- o Paint and blowdown booths



LIGHT RAIL TRANSIT COORDINATION PLAN

## CENTRAL MAINTENANCE AND STORAGE FACILITY

Source: Hennepin County Regional Railroad Authority

FIGURE 6-7



### **Vehicle Storage Facility**

The yard design will provide for an initial covered storage area of 36,000 square feet with non-covered storage of 8,000 square feet. The site has room to expand covered storage to 66,000 square feet and non-covered storage area to 12,000 square feet. The storage facility will have direct access to the crew dispatch center and to the maintenance shop. The building design will accommodate tracks of 6 vehicle lengths long to enhance staging and train dispatch. There will be paved aisles adjacent to each storage track to facilitate LRV servicing. The building will have minimum heat to prevent freezing.

### **Administrative and Operations Headquarters**

The LRT headquarters will be located on the second floor of the shop facility. The initial construction of 10,600 square feet will provide adequate space for activities detailed in the operating and maintenance plan. The space is expandable to approximately double its initial size. Key functions of the headquarters will include:

- o LRT administrative and engineering offices
- o Central control room for both LRT and bus operations
- o LRV operator dispatch center

### **Power, Signal and Way Maintenance Facility**

The power, signal and way maintenance facility will make use of an existing 9,000 square foot building on the site. This building will be equipped with tools and test facilities necessary for the maintenance of the physical parts of the system. Minimal office space and sheltered storage will also be provided with the building. Outside storage for spare part inventories will be provided adjacent to the building.

**CHAPTER 7**  
**OPERATIONS AND MAINTENANCE PLAN**

## CHAPTER 7 OPERATIONS AND MAINTENANCE PLAN

This section of the LRT Coordination Plan summarizes a more detailed Light Rail Operations and Maintenance Plan prepared by the Metropolitan Transit Commission. MTC, the agency responsible for the provision of public transit service throughout the Twin Cities metropolitan region, has been designated statutorily as the agency responsible for the operation of the proposed Light Rail Transit system. The MTC's initial operations and maintenance plan is a generic plan based on a assumption of an initial LRT system of 50 light rail vehicles operating on 30 route miles with 20 stations (equivalent to Group A and two Group B corridors). The plan will have to be revised and expanded as LRT engineering is completed.

The LRT operations and maintenance plan was based on information currently available from the Regional Railroad Authorities, and a survey of several new light rail systems in North America. The plan also reflects MTC philosophy with respect to the integration of rail and bus services.

### OPERATIONS PLAN

The LRT operations plan addresses overall operating policies as well as specific operational issues related to security, communications, signalization, dispatching and training.

#### Hours of Operation

The light rail system's hours of service will be comparable to those of the present bus system. Trains will leave their inner and outer terminals at 5:00 a.m. The last trains of the day will depart their terminals at 1:00 a.m. and pull-in to the shops at approximately 2:00 a.m.

Operating guidelines for hours of operation as set forth in the Regional LRT Development and Financial Plan are:

Weekday:	5:30 a.m. to 1:30 a.m.
Weekday Peak:	6:30 a.m. to 9:00 a.m. 3:30 p.m. to 6:00 p.m.
Evening:	6:00 p.m. to 10:00 p.m.
Late Evening:	10:00 p.m. to 1:30 a.m.
Weekend:	7:00 a.m. to Midnight

### **Service Frequency**

Scheduled train frequency will be adjusted to meet passenger demand. The maximum policy headway (time between trains) will be 30 minutes on any corridor in the system. The operating guidelines for maximum headway as set forth in the Regional LRT Development and Financial Plan are:

A.M. and P.M. Peak:	10 minutes
Mid-day:	15 minutes
Evening:	30 minutes
Late Evening:	30 minutes

### **Schedule Reliability**

Operating policies will be adopted to assure reliable service. This will include contingency plans for emergencies, training programs for personnel, and maintenance schedules which do not conflict with peak times of operation.

### **Light Rail Vehicle**

It is anticipated that the vehicle will be a double-ended articulated car, high platform, approximately 90 feet long, with four doors on each side. Maximum service speed will be 55 mph. Other specific features will evolve as engineering proceeds.

### **Train Consists**

The maximum train length will be three light rail vehicles. Consists will be lengthened or shortened to meet passenger demand. As a general rule, three car train operation will occur only during peak hours. Single car operation will be more common during off peak times but especially later in the evenings and on weekends and holidays.

### **Through Routing of Trains**

As the system is built and various corridors are placed into operation, certain routes to the downtowns from different directions will be paired to allow through service.

### **Rail/Bus Connections**

The MTC will undertake a general restructuring of those bus services which will be affected by light rail operations. Bus routes with downtown destinations in or paralleling light rail corridors will be evaluated for conversion to LRT feeder services. In most cases, these feeder services will take the

form of timed transfers at designated stations with bus arrivals and departures coinciding with train arrivals and departures. The feeder bus system will follow guidelines that include travel time, route spacing, rail/bus integration, transfer standards and will be designed to enhance overall transit service in the region.

### **Fare Collection**

Fare collection will be barrier free and self-service. Passengers will purchase tickets from vending machines on station platforms. At a minimum, there will be two machines at each station. Fare monitors will make random checks for compliance.

### **Fare Policy**

Fares will be in conformance with adopted RTB/MTC policies and will be consistent with other transit fares in the region.

### **Train Operations**

All trains will be operated by one appropriately trained and qualified person. Applicable wages, hours, working conditions will be negotiated with the ATU.

Trains will be manually operated in conformance with standard procedures as published in the operators rule book. Switches and interlockings will be controlled by the train operator.

Trains will be stored and maintained at the central yard/shop facility. Trains will return to this facility at the end of their runs.

### **Central Control and Supervision**

All train operations will be supervised by radio from a Central Control Center. This control facility will operate 24 hours per day, 7 days per week. An operations manager or a train controller will be on duty at all times and will be responsible for the overall operation of the rail system.

The bus control center will be located in the same building and will share facilities and equipment with the rail center. Personnel in both centers will be cross trained and thoroughly familiar with both rail and bus responsibilities.

## **Communications and Control Systems**

Communications systems will include a multi-channel 800 mhz trunked radio system with a separate emergency channel, a telephone system linking all installations and subway stations with central control, closed circuit television at selected stations, a public address system at all stations.

Automatic block signals with automatic train stop will govern train movements on private right-of-way and in the subway. Busy junctions will use powered interlockings with route requests entered by an operator activated train to wayside communication and control system. Traffic signal systems will be utilized to give LRT priority at selected street crossings.

Highway crossings will be protected by conventional railroad grade crossing gates.

## **Safety and Training**

High standards will be expected of all train operating personnel. A thorough and ongoing training program will be provided. An operations rule book will be prepared prior to the start of operation. It will be the key document in the training and qualifying of rail service personnel. Rail operators will be subject to an annual review of their operating and safety records.

Operators will make a pre-service safety inspection before going into service each day. At the end of service each day the operator will complete a train defect slip.

## **Security**

A system security plan will be prepared with assistance from municipal, county and state public safety agencies. The plan will establish guidelines for responding to incidents in stations, park-and-ride lots, trains or elsewhere in the system. It will also define procedures and tactics for routine security patrols.

All subway stations and other selected stations and park-and-ride lots which are isolated from surrounding neighborhoods will be monitored by closed circuit television and will be regularly patrolled whenever the system is in operation.

Security personnel will be provided under contract with an appropriate security service and supplemented by off duty police officers as required. Fare monitors and supervisors will provide additional security as part of their regular duties.

## **Emergency Plans**

Emergency plans will be prepared with assistance and advice from contractors, equipment suppliers, public safety agencies and other appropriate state, county and metropolitan agencies.

## **MAINTENANCE PLAN**

To assure reliability, minimize expense and promote a high level of passenger satisfaction, a proactive, preventive approach will set the overall theme of the MTC vehicle maintenance program. All inspections and component replacements will be completed in conformance with the guidelines and intervals recommended by the car builder and its component suppliers. Emphasis will be given to those measures which increase vehicle availability and reduce downtime and resulting service interruptions.

### **Vehicle Maintenance**

Inspections--With the exception of the daily safety and service inspection, all vehicle inspections will be scheduled on the basis of accumulated mileage. Inspections, and repairs required as a result of the inspections, will be completed as recommended by the manufacturer or as dictated by warranty guidelines.

An inspection team will be responsible for checking components and subsystems on the vehicles. Written instructions and guidelines will govern their work. Findings will be documented on an inspection report. The inspection report will be reviewed with and verified by a foreman. The vehicle will either be released for service with no defects found, scheduled for needed repairs, or, in the event of service defects, sidelined with a work order for immediate repair. All facts related to the inspection will become a part of the permanent maintenance record for each vehicle. These maintenance records are maintained in a computerized maintenance management information system.

Repairs--Most preventive maintenance repairs involve component changes. Early in the operation of the light rail system these components will be under warranty and will be returned to the manufacturer for repair, exchange or replacement. As vehicle warranties expire, the MTC will have the option of continuing this practice or establishing an in-house rebuilding capability. The decision on this option will be made on a case by case basis and will reflect both economics and MTC's existing capabilities.

Cleaning--Vehicle cleanliness is important in maintaining passenger satisfaction and will have a high overall priority in the preventive maintenance program. Three cleaning levels are proposed: daily, intermediate, and heavy or general cleaning.

Daily cleaning will include exterior washing, vacuuming and dusting of interiors, removal of graffiti, and repair of any damage or vandalism. Daily cleaning will be scheduled during the second shift after the afternoon rush hour.

Intermediate cleaning will occur every other week and will focus on a more thorough interior cleaning. Intermediate cleaning will be scheduled during the mid-day.

General cleaning will be scheduled every 4-5 weeks and will consist of a through soap and water scrubbing and disinfecting of the car interior. General cleaning will be part of the mid-day servicing operations. All interior light lenses and destination sign glass will be cleaned as part of the 24,000 mile inspection.

Shops and Repair Facilities--The maintenance shop will be sized and equipped to accommodate all light rail vehicle maintenance operations. It will be capable of expansion as the regional system grows. A companion storage building will hold out of service light rail vehicles.

Maintenance Vehicles--An on/off track vehicle termed a Unimog will be assigned to the maintenance shop to move inoperable cars within the shop and yard or to retrieve disabled vehicles from elsewhere in the system including underground. The Unimog can operate on streets or freeways and can be converted quickly to a rail vehicle.

Hours of Operation--The Vehicle Maintenance Department will function 24 hours per day, 7 days per week.

#### **Maintenance of Track and Structures**

Maintenance responsibilities for track and structures will include both yard and mainline trackage as well as bridges, subway(s) and highway grade crossings. Other right-of-way structures such as fencing, drainage ditches, sound barriers and retaining walls will also be included in the responsibilities of the track and structures section.

Inspections--All main track will be inspected twice per week by a track inspector. Yard track will be inspected monthly excepting switch leads which will be checked weekly. In addition, emergency inspections will be conducted following severe weather, accidents, or other irregular incidents. All operations and maintenance personnel will be trained and made familiar with the more common and visible types of track defects and will be required to report them.

Repairs--Routine repairs and adjustments will be made on a scheduled basis or in response to defects reported by inspectors or other personnel. The track section will work a basic daytime Monday through Friday schedule but will be subject to call in at any time. Experience on other LRT systems suggests that provisions should be made in the major maintenance plans and budget for track surfacing and aligning within 2-3 years of initial operation to correct for settling or wear-in of the track and supporting grade. Other features of a long term program will include rehabilitation or replacement of structures (bridges, fencing, retaining walls, etc.), grade crossing replacement, rail and tie renewal, and replacement of special work.

Emergency Plans--Contingency plans will be prepared for dealing with emergencies which could range from repairing a broken rail to clearing the line following a major accident. Contingency plans will also be prepared for dealing with a "storm of the century" emergency.

Snow Removal--In most winter storms the frequent passage of cars is sufficient to keep the line clear. In the event of an unusually heavy overnight snowfall, normal procedure would be to run one or two vehicles not in service throughout the late evening and early morning hours to clear snow from the line and overhead wire. Switch heaters will be provided at major junctions and interlockings to eliminate the need for snow removal. Clearing of less frequently used or unheated crossovers and grade crossings would be required.

### **Buildings and Grounds**

It will be MTC policy to ensure that all stations, park-and-ride lots and facilities are free of trash, that surfaces are clean and free of damage or graffiti, and that a safe, comfortable and welcome environment is provided for all users of the system. In addition to its responsibilities for stations, the building and grounds section will maintain all park-and-ride lots and ancillary facilities including the main shops and other structures.

Stations--At a minimum all stations will be cleaned daily. More frequently used stations will be cleaned twice per day. At the downtown, subway stations a roving custodial crew will visit each station on a regular schedule throughout the day. Station cleaning will be ongoing 24 hours per day, 7 days per week.

Grounds--At park-and-ride lots and surface stations, grounds keeping personnel will be responsible for lawn mowing, vegetation control, sweeping and cleaning parking lots and station platforms, and removing snow and ice. Contingency plans will be developed for the clearing of heavy snowfalls from park-and-ride lots and station platforms.

Repairs--A force of building maintenance employees will be assigned to the repair of all buildings and structures. Facilities maintenance will be done during weekday, daytime hours. A facility maintenance person will be on duty or on call 24 hours a day, 7 days a week.

### **Traction Power System**

Regular inspection of the power system with occasional adjustment and repairs to overhead, substations and feeders will be the core of expected maintenance work on the traction electrification system. Emergency services will be provided in the event of power outages caused by broken cables, accidents or storms.

Overhead Maintenance--Monthly and annual inspections will be provided resulting in routine preventive repairs. Operations and maintenance personnel will be trained to watch for defects in the overhead systems and will be expected to report them if observed.

Substation Maintenance--Substations will be given a brief inspection every week with routine cleaning or other minor work done at this time. A more rigorous inspection and thorough cleaning will be done every six months. Any repair requiring the substation to be taken off line will be scheduled at times of low demand or when the system is not in operation. Major failures will require an immediate emergency response.

Ground Return--Inspection of bonds and joints will be a regular part of the twice weekly track inspection to maintain an effective ground return circuit at all time. A more thorough annual inspection will also be scheduled.

Signals and Train Control--These systems, because of their proven nature and long experience, are fail safe and reliable. On-going maintenance is minimal involving inspection and testing and occasional component change. Most repair work will involve grade crossing arm replacements. Weekly maintenance will include safety inspections and grade crossing signal inspections. Other routine inspection and maintenance activities will range from monthly to every five years, depending on the equipment in question.

### **Communication Systems Maintenance**

Communication systems maintenance will include radios, the central control systems, PA systems, telephones, closed circuit television, and special alarm and control systems.

Radio--Maintenance of the radio communications system and the central control center equipment will be the responsibility of the MTC Radio Maintenance Technicians who presently support the bus radio system. Mobile maintenance will be performed on an as needed basis. Contractors will be used for special projects and computer hardware maintenance.

PA Systems--The on train PA systems will be maintained by vehicle maintenance personnel and/or radio maintenance technicians. Station PA systems will be maintained by contractors.

Telephones--Telephone system maintenance will be the responsibility of the equipment supplier or other contractors.

Closed Circuit Television and Special Systems--Maintenance of this equipment will be the responsibility of contractors.

#### **Fare Collection Equipment**

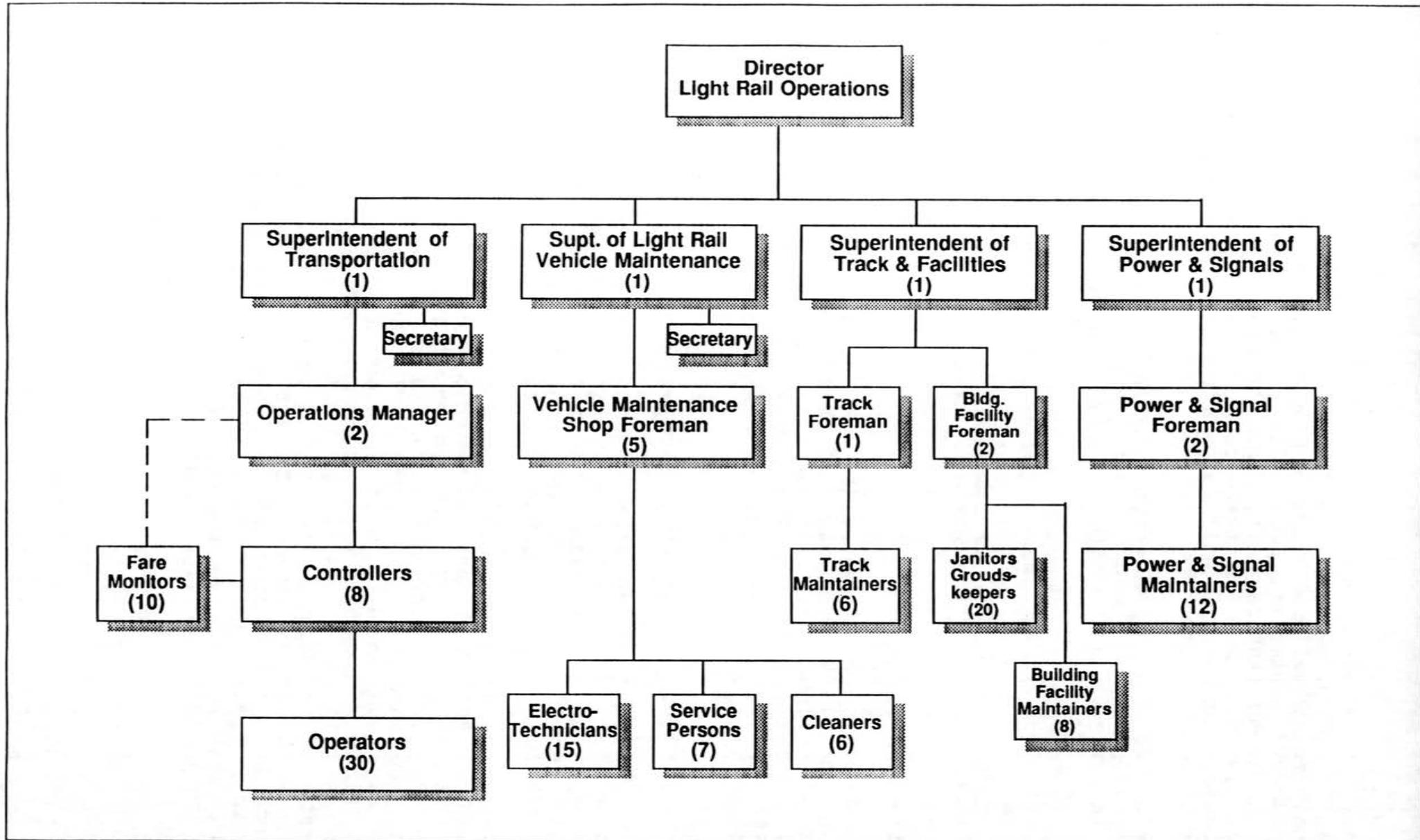
High reliability and passenger convenience are extremely important and will be the major objectives in the fare machine maintenance program. A strong preventive maintenance and inspection schedule will be implemented to ensure that these objectives are met. Most repair work will be confined to component changeouts.

#### **ORGANIZATION FOR LRT OPERATIONS AND MAINTENANCE**

In all of the systems consulted for the MTC's Operations and Maintenance Plan, the light rail operating organizations were separate divisions of the Transit Authority. This self-contained arrangement recognizes the inherent differences between rail and bus technologies. The same approach is recommended for the MTC.

Figure 7-1 shows the proposed structure and staffing of a light rail operating and maintenance division within the Metropolitan Transit Commission. A staffing requirement of 140 people is estimated as shown in Figure 7-1. While this organization, as shown, is separate within the MTC, it is not self-sufficient. Other MTC divisions would be required to provide support services including Finance, Human Resources, Risk Management, etc.

The Operations and Maintenance Plan recommends that MTC staff perform the basic functions of light rail operation and maintenance but that contractors be used to supplement MTC's capabilities, particularly in highly specialized areas. Additional analysis will be needed before a final decision is made on the extent of service contracting.



LIGHT RAIL TRANSIT COORDINATION PLAN

## MTC LIGHT RAIL OPERATING AND MAINTENANCE ORGANIZATION

Source: Metropolitan Transit Commission



FIGURE 7-1

The survey of other LRT systems in North America indicated that planning for operations should begin as early as possible. A core light rail operations group should be involved throughout the design and specification phase of the project as well as during construction. Decisions made at these early stages can have significant implications for the operation and the long term operating costs of the LRT system.

**CHAPTER 8**  
**LRT AND LAND USE COORDINATION**

## CHAPTER 8 LRT AND LAND USE COORDINATION

This chapter of the LRT Coordination Plan summarizes a report on LRT and land use coordination prepared by the Metropolitan Council. The purpose of the report is to provide a planning framework to ensure adequate coordination between the development of an LRT system and land use related activities. The report serves as information and guidance to cities but the activities recommended in the report are not mandatory. Cities will continue to be responsible for land use related decisions.

LRT has the potential to have a long-term impact on urban development. It can encourage new development and redevelopment along corridors, particularly around stations, because it provides increased accessibility. It is important, however, that this development occurs in a manner compatible with the goals of individual cities. It is also important to ensure that neither the physical presence of the LRT, nor the potential land development or redevelopment that might accompany it, create negative impacts on existing neighborhoods.

LRT offers communities a number of opportunities and can be used, among other things:

- o As a development tool, to shape and focus city growth, consuming less land and generating less traffic and pollution.
- o To intensify development around station areas, creating more imaginative and dynamic urban nodes in a more pedestrian-friendly environment, with an active, human character.
- o To upgrade an area through redevelopment of rundown or underutilized properties, revitalizing that portion of the community.
- o As a means to increase a community's property tax base.
- o To provide its businesses and residents with a high quality transportation alternative.
- o To enhance and buffer existing neighborhoods through sensitive design and landscape treatments.

In land use planning for LRT, a sensitive balance needs to be achieved between protection of stable communities and skillful accommodation of an appropriate level of supportive development, while maintaining a high level of service to LRT users. Careful consideration of land use planning in conjunction with LRT development can allow cities to realize desired development opportunities, while preserving the integrity of stable neighborhoods.

## **EXISTING LRT/LAND USE COORDINATION PROCESSES**

The existing regulatory environment provides a number of opportunities for interaction between LRT and land use planning activities. The most significant are:

### **LRT Reviews**

Preliminary design plans and final engineering plans prepared for LRT by the County Regional Railroad Authorities must be reviewed and approved by affected cities, the RTB and the Metropolitan Council. Cities and regional agencies also review and comment on Environmental Assessment Worksheets (EAW) and Environmental Impact Statements (EIS) prepared for LRT corridors. While not required by law, the RRAs have asked cities to participate in the assessment of impacts of proposed LRT alignments and stations on local communities and neighborhoods.

### **Comprehensive Plan Reviews**

Cities are required to prepare land use and comprehensive plans that are consistent with Metropolitan Council policy. Land use and transportation concerns resulting from LRT or related development would be addressed in the comprehensive plan amendment approval process coordinated by the Metropolitan Council. Adjacent cities and counties have the opportunity for review of these plan amendments.

### **Development Reviews**

Proposed new developments that may have an impact on LRT may be subject to regional review under three existing mechanisms: comprehensive plan amendments, EAW's and EIS's, and Indirect Source Permits (ISP's).

### **Roadway Project Reviews**

Major roadway projects, some of which have an LRT proposal, typically require EAW's and EIS's and need to be coordinated between multiple jurisdictions and agencies, including Mn/DOT, cities and counties.

## **LRT/LAND USE PLANNING PROCESS**

The primary purpose of the proposed LRT/Land Use Planning process is to assist cities in planning for land use and zoning changes in conjunction with LRT development and to enhance development and redevelopment opportunities in station areas. LRT station areas are defined generally as the area within a reasonable walking distance (1/4 to 1/2 mile) from an LRT station. The specific objectives of the LRT/Land Use Planning process are:

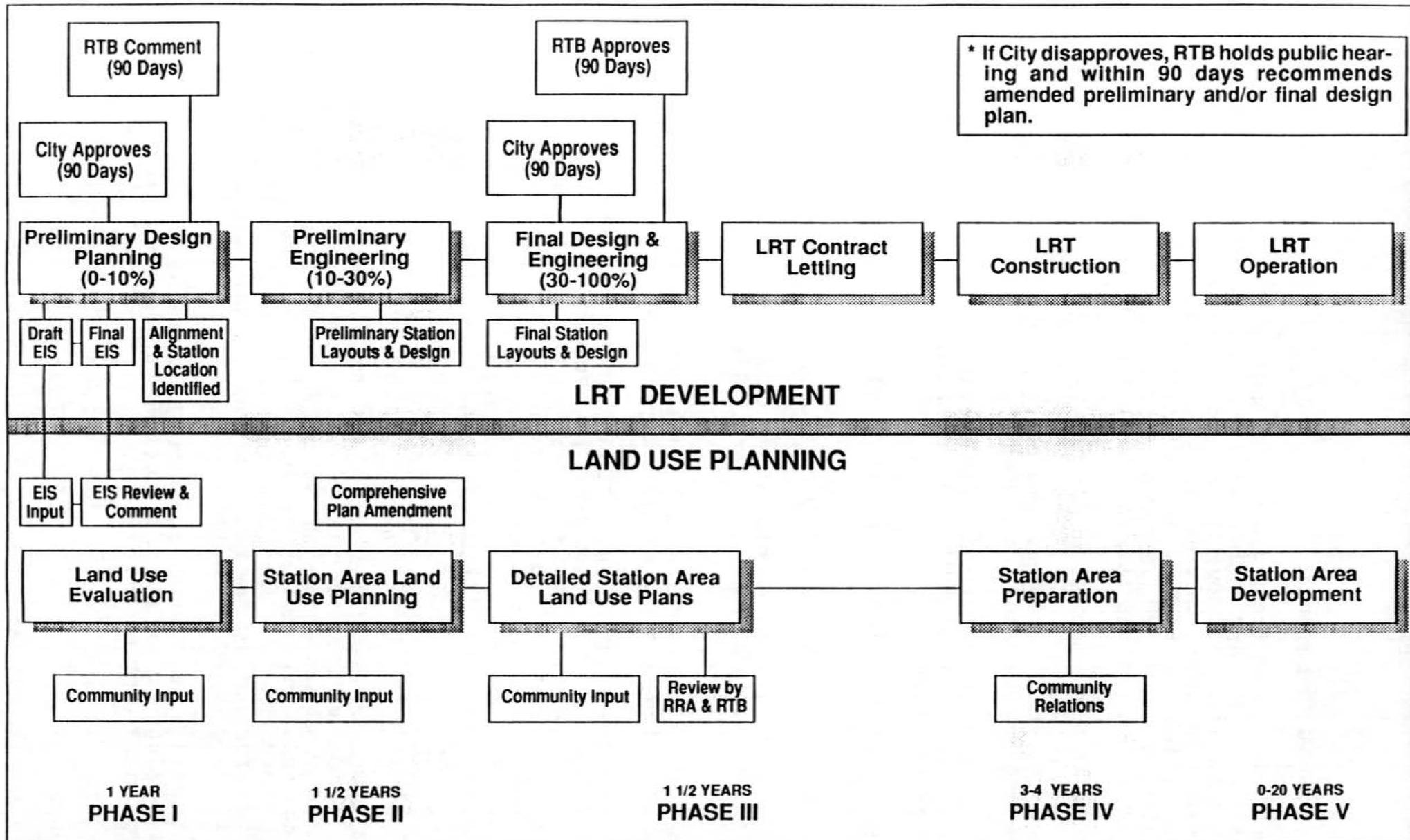
- o Integrate land use decisions with the LRT development process.
- o Maintain the scale, character and quality of well established, stable neighborhoods and businesses.
- o Encourage the preservation, restoration and enhancement of existing stable and attractive structures, particularly those with historic value.
- o Minimize potential disruption associated with LRT construction and operation.
- o Establish a pedestrian friendly environment around stations.
- o Establish land use and development patterns that maximize the benefits of increased transit accessibility and encourage LRT ridership.
- o Develop LRT station area environments that encourage LRT use and minimize the need for single-occupant vehicle use.

The planning process, as shown in Figure 8-1 is divided into five phases: (1) Land use evaluation, (2) Station area land use planning, (3) Detailed station area land use planning, (4) Station area preparation, and (5) Station area development. Each phase is described briefly below. Additional detail is provided in the complete Metropolitan Council report on LRT/Land Use Coordination which is part of the Background Materials notebook.

### **Phase I - Land Use Evaluation**

Where LRT has been identified within the RTB's adopted Regional LRT plan, cities should undertake a general review of city land use and transportation comprehensive plans and policies, zoning, social, economic and physical characteristics, and community features, structures and amenities that lie within 1/4 to 1/2 mile of the proposed alignments. As part of this process, the city should, at a minimum, evaluate:

- o The potential role of each proposed LRT line in achieving the city's development goals and objectives and desirable level of urban growth acceptable to the city.



LIGHT RAIL TRANSIT COORDINATION PLAN



## LRT/LAND USE COORDINATION PROCESS

Source: Metropolitan Council

FIGURE 8-1

- o Comprehensive land use and transportation policies and goals that might require amendment.
- o The potential impacts of the LRT line on the corridor as a whole, valued community amenities that should be preserved, and the issues, impacts and mitigation measures that should be addressed in the EIS process.
- o Accessibility issues as they relate to station location.

Land use evaluation should be an interactive process with LRT preliminary design and environmental reviews and should involve input from property owners. The land use evaluation can be used in the city review of preliminary design plans for the LRT alignment.

### **Phase II - Station Area Land Use Planning**

During the LRT preliminary engineering stage, cities should expand and refine the land use evaluation done during Phase I. Station area land use planning during this phase should involve:

- o Station area land use planning boundary identification.
- o Preliminary station area plans that identify, for each station location, one or two land use concepts that take into account stable neighborhoods, areas requiring redevelopment, and underdeveloped land.
- o Comprehensive land use and transportation amendments that are necessary to support station area land use planning and development.
- o Development/redevelopment opportunities around proposed station locations.
- o Further review of sizing and location of LRT park-and-ride facilities, and associated vehicle access requirements.
- o Valued community amenities that need to be preserved.
- o Issues, potential impacts and possible mitigation measures that should be addressed in final engineering and design.
- o A draft community relations plan.

Station area land use planning should be conducted by the city in an interactive manner with the preparation of the 30 percent level of preliminary engineering for the LRT line. Business and neighborhood input should be used in developing the station area plans and in identifying potential issues, impacts and mitigation.

### **Phase III - Detailed Station Area Land Use Planning**

Phase II would only be necessary when a corridor moves into the final design and engineering stage of LRT development. Detailed station area land use planning should be coordinated closely with the preparation of the final engineering plans for the LRT line. Suggested tasks during Phase III are:

- o A detailed inventory of the existing station area.
- o Identification of potential development opportunities for each station area.
- o Development of revised goals, policies, principles and guidelines for each station area.
- o Definition of the land use capacity of the station area, including land use density limits and land use designations.
- o Preparation of an economic market analysis.
- o Development of final land use goals, land use options, and density ranges based upon capacity and economic market analysis.
- o Development of a final station area land use plan including land use types and intensities, building height restrictions, pedestrian access and amenities, vehicular access, parking controls, treatment of park-and-ride and feeder bus, urban design concept and architectural theme, and community relations plan.
- o Preparation of an implementation plan to include regulatory changes, capital improvements and financial considerations.

### **Phase IV - Station Area Preparation**

Once construction is initiated, the cities will have to address actual implementation of development proposals and define a development strategy in the station area. The key tasks required by either the public sector or through a public/private partnership would be:

- o Acquire land for development and provide relocation assistance
- o Negotiate with developers to obtain commitments for station area development
- o Implement financial plan

- o Implement the community relations plan which should include work with neighborhood businesses and residents to preserve and/or improve the character of the neighborhood by implementing land use preservation, buffering, landscaping, etc.
- o Implement station access improvements.

#### **Phase V - Station Area Development**

Station area development will occur about the time the LRT system begins operation and will continue 10 to 20 years after the system is open.

#### **LAND USE PLANNING GUIDELINES**

The following guidelines are offered as development options for a city to consider if it wishes to develop, redevelop or intensify development in the vicinity of proposed LRT stations (1/4 to 1/2 mile from the station itself). However, down-zoning or preserving existing zoning also may be the result of land use evaluations conducted by cities. Additional information and examples for implementing suggested policies are provided in the Metropolitan Council's report on LRT/Land Use Coordination (see Background Materials notebook).

- o While station area development scale and densities should be premised on available roadway capacity and the proposed LRT capacity, certain types of development are known to have a positive impact on LRT ridership: medium to higher density residential areas anchored at least on one end of the line by higher density employment and/or large educational facility concentrations. For higher transit mode splits to occur, concentrations of higher residential densities should be located reasonably close to and geographically aligned with areas of high employment densities.
- o The most intense uses should be located nearest the stations with intensities diminishing furthest from the stations.
- o Land that is currently underutilized or used for industrial purposes in station areas should be considered for redevelopment, providing an opportunity to upgrade and revitalize that part of the community.
- o Mixes of uses and clustering of these mixed uses are positive and benefit both the city and LRT by adding an active pedestrian environment in these nodes.

- o To implement station area plans, communities have a wide variety of tools to protect existing neighborhoods and to enhance redevelopment where appropriate. Tools include traditional zoning ordinances, innovative zoning, design performance standards, development moratoria, density bonuses, etc.
- o Building design, siting and placement can be key elements in encouraging transit use. Buildings that provide easy access to stations for pedestrians and commuters and provide a pleasant environment within reasonable walking distances encourage pedestrians to use transit.
- o Vehicle access to stations and adjacent development needs to be planned for at least one-half mile from a station. In designing roadways, preference should be given to vehicles that carry multiple passengers including buses, high occupancy vehicles, etc.
- o Bicycle access should be incorporated as part of the urban design in LRT station areas.
- o Transit and pedestrian-oriented uses can be enhanced by providing a pleasant, safe and all-season environment.
- o Cities should develop parking policies which directly encourage use of LRT and should limit parking and therefore commuting as a viable alternative for high density areas such as downtowns.
- o Parks, green spaces, plantings, innovative landscaping and berming can enhance a neighborhood and can buffer different land uses as well as LRT lines in station areas.
- o Mitigation and buffering measures should provide maximum visual separation and noise absorption, and can even enhance the quality of the environment.

**CHAPTER 9**  
**PROCESS FOR UPDATING**  
**THE REGIONAL LRT PLAN**

## **CHAPTER 9 PROCESS FOR UPDATING REGIONAL LRT PLAN**

The regional LRT Plan will be reviewed annually and formally updated every two years as part of RTB's update of the Five Year Transit Plan. Revisions to the plan will encompass a reassessment of LRT corridor priorities, proposed schedules and budgets, suggested funding sources, and any appropriate changes to technical components of the LRT Coordination Plan.

### **CHANGES IN CORRIDOR PRIORITIES**

As part of the Plan updating process, it is expected that the benefits and costs of LRT in each corridor can be better assessed as more detailed information becomes available. As a result, corridor priorities can be further refined based on cost-effectiveness, availability of funds, regional goals and other technical criteria. Changes in corridor priorities will be based on the following conditions as set forth in the LRT Development and Financial Plan:

**Selection of Final Corridor Alignment and Station Locations.** A specific alignment for LRT has not yet been selected in a number of LRT corridors. In addition, the location and number of LRT stations and park/ride facilities may change significantly during preliminary design, preliminary engineering and final design. These changes can have a major effect on costs, ridership and community acceptability. As such, they may result in a change in corridor priorities over time.

**Completion of Environmental Reviews.** None of the proposed LRT corridors have yet completed all environmental reviews and received all environmental approvals. This is a key step in determining readiness for construction. In addition, the environmental review process may identify special steps which must be taken to mitigate environmental impacts of the proposed project. These actions may affect the cost, schedule or local acceptability of the corridor. As such environmental reviews may result in a change in corridor priorities over time.

**Significant Changes in Implementation Costs.** As noted above, changes in alignment or design treatment may significantly affect the capital costs of a LRT corridor. More detailed and more accurate cost estimates will become available as each corridor proceeds through Preliminary Design (10% level of engineering), Preliminary Engineering (30% level of engineering), and Final Design (100% engineering). These changes in cost may affect the relative priority of LRT corridors over time.

**Significant Changes in Patronage Forecasts.** Changes in alignment, operating characteristics of the LRT line, station locations, availability of feeder bus service, park and ride, etc. may change the projected ridership in a given corridor. A new regional travel forecasting model has been developed to better predict transit ridership in the Twin Cities metropolitan area. New ridership forecasts are being developed for all LRT corridors using the regional travel forecasting model. As new ridership projections become available, changes in the relative priority of corridors may occur.

**City and Agency Approvals.** The RTB and the affected cities must approve Preliminary Design (10%) plans and Final Design (100%) plans. Problems encountered in obtaining the necessary plan approvals could change the relative priority of a corridor.

**Readiness for Construction.** All of the above factors are necessary to ensure that a corridor is ready for construction. Other factors which may influence construction readiness are right-of-way availability, utility relocations and related negotiations, and schedules for related highway construction projects.

**Any Other Significant Changes in Projected Performance of the Corridor.** Examples might include changes in operating cost, changes in feeder bus service, enhancements which increase the corridor's cost, etc.

#### **PROCESS FOR UPDATING THE REGIONAL LRT PLAN**

The Regional LRT Plan will be formally updated every two years as part of the update of the regional Five-Year Transit Plan. An updated plan will be submitted to the State Legislature by January 1st of each even-numbered year. The next formal update of the Regional LRT Plan will be January, 1992. The process of updating the plan is expected to take approximately 4-6 months and will involve participation by the Joint LRT Advisory Committee and the Staff Committee. The process will include the following steps.

1. RTB staff prepares a draft workscope, schedule and budget of proposed activities.
2. RTB convenes the Joint LRT Advisory Committee and LRT Staff Committee.
3. The Joint LRT Advisory Committee reviews and approves a list of evaluation factors and an evaluation methodology that will be used to reevaluate regional LRT corridors on a systematic and equitable basis.

4. RTB staff and consultants review, analyze and evaluate updated and refined estimates of LRT ridership, capital costs and operating and maintenance costs, as well as any other pertinent technical evaluation information available from the county regional railroad authorities and the Metropolitan Council.
5. RTB staff and consultants review, analyze and evaluate a number of non-technical criteria, including state-of-readiness, degree of local community support, equity, social and demographic factors, etc.
6. RTB staff and consultants prepare draft report containing preliminary findings and recommendations.
7. Draft report reviewed by LRT Staff Committee.
8. Revised draft report reviewed by Joint LRT Advisory Committee.
9. The Joint LRT Advisory Committee recommends to the RTB an updated Regional LRT Plan for the staging, funding and coordinating of the implementation of a regional light rail transit system.
10. The RTB receives the recommended updated Plan from the Joint LRT Advisory Committee; reviews it; conducts a public hearing; and submits the Plan to the Metropolitan Council and Mn/DOT for their review and comment (30-day review period).
11. The RTB approves and adopts a final version of the updated Regional LRT Plan after receiving input and comments from the Metropolitan Council, Mn/DOT, interested parties and the general public.
12. The RTB publishes the updated Plan and submits it to the state legislature by January 1st of each even-numbered year -i.e., at the beginning of each year that begins a new biennium.

**CHAPTER 10**  
**NEXT STEPS FOR IMPLEMENTING LRT**  
**IN THE TWIN CITIES METROPOLITAN AREA**

## CHAPTER 10 NEXT STEPS TO IMPLEMENT LRT IN THE TWIN CITIES METROPOLITAN AREA

There are many activities currently underway which must be completed and many decisions which must be made before LRT can be successfully implemented in the Twin Cities. The purpose of this chapter is to describe the current status of each corridor in the regional 10-year LRT plan and to identify milestone decisions and general dates for implementation of LRT in the Twin Cities.

### CURRENT STATUS OF PLANNING AND DESIGN FOR LRT CORRIDORS

Preliminary Design (10%) and environmental reviews are underway on all Group A and B corridors as well as three of the five Group C corridors. Preliminary Engineering (30%) has been initiated on the Hiawatha Corridor, the Minneapolis tunnel and the central operations and maintenance facility. The status of each corridor is noted in Figure 10-1 along with the scheduled completion dates for Preliminary Design (10%), Final Environmental Impact Statement, and Preliminary Engineering (30%). The dates noted are based on the current schedules for completion of each corridor.

### MILESTONES FOR IMPLEMENTING GROUP A AND B CORRIDORS

The following are approximate dates for key decisions and milestones in the implementation of Group A and B corridors. As noted in the previous section, many activities may be occurring on Group B and C corridors during this time period which are not noted below. However, the schedule for these activities will vary by corridor depending upon availability of funding and regional priorities for implementation (see Chapter 5 for more information on the 10-year schedule).

- December 1990 - HCRRA makes final alignment and station location decisions on that portion of Group A lying within Hennepin County and the City of Minneapolis.
- RCRRA publishes Draft EIS and indicates its preference for a final alignment and station locations on that portion of Group A lying within Ramsey County and the City of St. Paul.

CORRIDOR	STATUS AS OF NOVEMBER 1990*	Estimated Completion of FEIS/ Preliminary Design (10%)	Estimated Completion of Preliminary Engineering (30%)
<b>Group A Corridors</b>			
Midway Corridor/ Downtown St. Paul	Scoping document completed. Preliminary Design/State DEIS being prepared. Preferred Downtown System (At-Grade) selected by RCRRA. DEIS to be released in December 1990.	5/91-7/91	10/92
University Connector (Oak/Washington)	State DEIS completed and public hearing was held; FEIS is being prepared. Preliminary Design is completed and public hearings have been held. City of Minneapolis has been granted an extension for approval/disapproval to December 31, 1990. Contract for Preliminary Engineering has been awarded; work is on hold until alignment issues have been resolved.	3/91	9/91
Minneapolis Tunnel (Convention Center)	State DEIS completed and public hearing was held; FEIS is being prepared. North end of the tunnel is under location evaluation. Preliminary Design was completed, approved by RCRRA, and is under review by the City; completion expected by December 31, 1990. Preliminary Engineering contract has been awarded, soil borings are underway and work has started in the South end.	3/91	9/91
Central Operations and Maintenance Facility	Preliminary Engineering underway.	3/91	4/91
<b>Group B Corridors</b>			
Minneapolis Northwest (63rd Street)	State DEIS completed and public hearing was held; FEIS is under preparation. Preliminary Design completed and public hearings have been held. The City of Minneapolis has been granted an extension for approval/disapproval to December 31, 1990. City is evaluating alternative alignments. Contract for Preliminary Engineering has been awarded; work is on hold until alignment issues have been resolved.	3/91	9/91
I-35W South (96th Street)	Scoping Document completed. Preliminary Design/Federal DEIS (FHWA) is being prepared. Five Roadway/Transit Alternatives and No Build are being evaluated. DEIS is expected to be available for public review May 1991. Preferred roadway transit alternative is scheduled to be selected by Mn/DOT in September 1991.	12/91	7/92
* DEIS = Draft Environmental Impact Statement FEIS = Final Environmental Impact Statement			

LIGHT RAIL TRANSIT COORDINATION PLAN



**STATUS AND PLANNED ACTIVITIES FOR  
GROUP A, B AND C CORRIDORS**

FIGURE 10-1

CORRIDOR	STATUS AS OF NOVEMBER 1990	Estimated Completion of FEIS/ Preliminary Design (10%)	Estimated Completion of Preliminary Engineering (30%)
<b>Group B Corridors</b>			
Hiawatha (GSA)	State DEIS completed and public hearing has been held. FEIS is being prepared. Preliminary Design (10%) is completed, public hearings have been held, City of Minneapolis has approved the design. Preliminary Engineering has been initiated. Federal (FHWA) EIS was completed for Hiawatha Avenue and LRT in 1985; LRT alignment is in a different location north of Lake Street.	3/91	9/91
Minneapolis Northeast (Northtown)	Scoping Document completed. State DEIS and Preliminary Design being prepared. DEIS will evaluate a single LRT alignment (University/BN) and a No-Build Alternative. Ground control and base mapping have been initiated.	6/91	9/92
St. Paul South (TH 110)	Scoping Process/State DEIS Process initiated in November 1990.	1/92	4/93
Minneapolis Tunnel (Extension to 29th/Portland)	State DEIS completed and public hearing was held. FEIS is being prepared. Preliminary design was completed. Public hearings held and City has approved. Preliminary Engineering contract has been awarded and soil borings are underway.	3/91	9/91
<b>Group C Corridors</b>			
Minneapolis Southwest (TH 169)	State DEIS completed and public hearing was held; FEIS is under preparation. Preliminary Design (10%) is being prepared for St. Louis Park and Hopkins. Preliminary Design is completed for the City of Minneapolis and public hearings have been held; City has approved the design.	3/91	9/91
I-35W Extension to TH 13	Scoping Document completed. Preliminary Design/Federal (FHWA) DEIS is being prepared. DEIS is expected to be available for public review May 1991.	12/91	7/92
St. Paul Northwest (County Road C)	Comprehensive Plan completed.	Not Determined	Not Determined
St. Paul Northeast (I-694)	Alignment study underway.	Not Determined	Not Determined
Hiawatha Extension to Airport	State DEIS completed and public hearing was held; FEIS is under preparation.	3/91	Not Determined

LIGHT RAIL TRANSIT COORDINATION PLAN

**STATUS AND PLANNED ACTIVITIES FOR  
GROUP A, B AND C CORRIDORS**



**FIGURE 10-1**  
(Continued)

- January 1991 - RTB submits LRT Coordination Plan to the Legislature.
- HCRRA resumes Preliminary Engineering (30%) activities on that portion of Group A lying within Hennepin County.
- March 1991 - HCRRA completes Final EIS on that portion of Group A lying within Hennepin County and all corridors in Stage 1 of the Hennepin County system.
- April 1991 - RCRRA makes final alignment and station location decisions on that portion of Group A lying with Ramsey County.
- HCRRA completes Preliminary Engineering (30%) for Central Operations and Maintenance Facility.
- May 1991 - RCRRA initiates Preliminary Engineering (30%) activities on that portion of Group A lying within Ramsey County.
- Mn/DOT completes Draft Federal EIS and Preliminary Design (10%) on the Minneapolis South (I-35W) corridor.
- June 1991 - ACRRA completes Final State EIS and Preliminary Design (10%) on the Minneapolis Northeast corridor.
- July 1991 - RCRRA completes Final EIS and Preliminary Design (10%) on that portion of Group A lying within Ramsey County.
- September 1991 - HCRRA completes Preliminary Engineering (30%) of that portion of Group A lying within Hennepin County and all corridors in Stage 1 of the Hennepin County system.
- Mn/DOT selects preferred alternative for the Minneapolis South (I-35W) corridor.
- December 1991 - Mn/DOT completes Final Federal EIS and Preliminary Design (10%) on the Minneapolis South (I-35W) corridor.

- Early 1992
- RTB submits revised regional LRT plan to the Legislature.
  - Final design could begin on the Central Operations and Maintenance Facility.
  - Light rail vehicles could be ordered; alternatively, contract documents for a turnkey contract could be readied.
  - DCRRA and RCRRA complete Final EIS and Preliminary Design (10%) on the St. Paul South Corridor.
- Late 1992
- RCRRA completes Preliminary Engineering (30%) of that portion of Group A lying within Ramsey County.
  - ACRRA completes Preliminary Engineering (30%) on the Minneapolis Northeast corridor.
  - Mn/DOT completes Preliminary Engineering (30%) on the Minneapolis South (I-35W) corridor.
  - Right-of-way acquisition for Group A begins.
  - Final design is underway on all segments of the Group A and may be underway for some Group B corridors.
  - Construction contract bid documents for Group A being prepared for advertisement and award.
  - If turnkey method, contract bid and awarded for Group A.
- 1993
- Groundbreaking for Group A; construction begins; final design continues.
  - LRT systems contracts prepared for advertisement and award.
  - Final design continues on Group B corridors.
  - DCRRA and RCRRA complete Preliminary Engineering (30%) on St. Paul South Corridor.
- 1994-1995
- Construction underway on Group A and may begin on one Group B corridor.
  - Final design continues on Group B corridors.

- 1996
  - First light rail vehicles arrive.
  - Construction continues on Group A and one or more corridors in Group B.
  - Final design continues on Group B corridors.
- 1996-1997
  - Pre-revenue testing, start-up and commissioning activities on Group A.
  - Construction and final design continues on Group B corridors.
- 1997-1998
  - Group A system opening (may be in phases); revenue operations begin.
- 1998-2000
  - Group B corridors begin to open for revenue operations.
  - Construction continues on Group B corridors.
  - RTB prepares an evaluation of Group A LRT line's costs, ridership and performance.

**OTHER KEY DECISIONS NEEDED TO SUCCESSFULLY IMPLEMENT LRT IN THE TWIN CITIES**

A funding request for LRT will be made to the Minnesota Legislature in the 1991 session. The Legislature's decision regarding funding will be the key determinant in maintaining the above described schedule for implementation of LRT in the Twin Cities. If a new funding mechanism goes into effect in 1991, the Joint Powers Board could be formed in late 1991 and activities could proceed as scheduled.

Several actions have been taken within the past year to secure federal funding for LRT in the Twin Cities. A number of activities will be undertaken during 1991 and the following years to complete the required process for obtaining federal funding for the proposed Twin Cities LRT system.

Finally, RTB will prepare a revised Regional LRT Plan for submittal to the Legislature every two years beginning in January, 1992. This plan will set priorities for implementation and will provide updated information on the status of LRT implementation in the Twin Cities as set forth in the LRT Coordination Plan and required by legislation.

## **APPENDICES**

A. MEMBERS OF THE JOINT LRT ADVISORY COMMITTEE

## APPENDIX A

### Membership of the Regional Transit Board's

#### Joint Light Rail Transit Advisory Committee

John Derus, Committee Chair  
Hennepin County Regional Railroad Authority

Paul McCarron, Committee Vice-Chair  
Anoka County Regional Railroad Authority

Diane Ahrens  
Ramsey County Regional Railroad Authority

Donald Chapdelaine  
Dakota County Regional Railroad Authority

Darryl Durgin  
Minnesota Department of Transportation

Dan Erhart  
Anoka County Regional Railroad Authority

Carole Faricy  
Metropolitan Transit Commission

Earl Gnan  
Carver County Regional Railroad Authority

Ruby Hunt  
Ramsey County Regional Railroad Authority

John Keefe  
Hennepin County Regional Railroad Authority

Bill Koniarski  
Scott County Regional Railroad Authority

Russ Larkin  
Washington County Regional Railroad Authority

Donald Maher  
Dakota County Regional Railroad Authority

Sam Sivanich  
Hennepin County Regional Railroad Authority

Ray Waldron  
Metropolitan Transit Commission

B. MEMBERS OF THE LRT STAFF COMMITTEE

**APPENDIX B**

**Staff Committee  
to the**

**Joint Light Rail Transit Advisory Committee**

Randy Halvorson, Committee Chair  
Minnesota Department of Transportation

Beverly Auld  
Metropolitan Transit Commission

Larry Bousquet  
Washington County Regional Railroad Authority

Jeff Connell  
Dakota County Regional Railroad Authority

Kathryn DeSpiegelaere  
Ramsey County Regional Railroad Authority

John Diers  
Metropolitan Transit Commission

Jim Dunn  
Hennepin County Regional Railroad Authority

Roger Gustafson  
Carver County Regional Railroad Authority

Brad Larson  
Scott County Regional Railroad Authority

Karen Lyons  
Metropolitan Council

David Minister  
Regional Transit Board

Allen Moe  
Dakota County Regional Railroad Authority

Ken Stevens  
Hennepin County Regional Railroad Authority

Tim Yantos  
Anoka County Regional Railroad Authority

**C. MEMBERS OF THE LRT/LAND USE TASK FORCE**

## APPENDIX C

### LRT/Land Use Coordination Task Force

Barbara Dacy  
City of Fridley

Kathryn DeSpiegelaere  
Ramsey County Regional Railroad Authority

Rick Jopke  
City of Roseville

Greg Konat  
City of Burnsville

Karen Lyons, Richard Thompson  
Metropolitan Council

David Minister, Garneth Peterson  
Regional Transit Board

Allen Moe  
Dakota County Regional Railroad Authority

Ann Perry  
City of Minnetonka

Peggy Reichert, Allen Lovejoy, Roger Ryan, Mark Filipi  
City of St. Paul

Ken Stevens  
Hennepin County Regional Railroad Authority

Perry Thorvig  
City of Minneapolis

Byron Wallace  
City of Richfield

Tim Yantos  
Anoka County Regional Railroad Authority

D. MOTIONS OF THE JOINT LRT ADVISORY COMMITTEE  
REGARDING THE LRT COORDINATION PLAN

## APPENDIX D

### MOTIONS OF THE JOINT LRT ADVISORY COMMITTEE REGARDING THE LRT COORDINATION PLAN

#### ORGANIZATIONAL ALTERNATIVES (CHAPTER 3)

**August 8, 1990** - McCarron moved and Maher seconded that: The Joint LRT Advisory Committee receive and file the O'Brien-Kreitzberg & Associates' draft report on Task 1-Implementation Strategy and Task 2-Organizational Plan of the Regional Coordination Plan for LRT. Motion carried unanimously.

**August 8, 1990** - Koniarski moved and Chapdelaine seconded that: The Joint LRT Advisory Committee direct the Joint LRT Staff Committee to analyze the O'Brien-Kreitzberg & Associates' draft report and state in the analysis what would be the pros and the cons of the different items in the report, and present this analysis at the September 5th meeting of the Joint LRT Advisory Committee. Motion carried unanimously.

**August 29, 1990** - Sivanich moved and Chapdelaine seconded that: The Joint LRT Advisory Committee receive and file this report on the status of the evaluation of O'Brien-Kreitzberg's draft report on LRT implementation methods and organizational alternatives by the Staff Committee to the Joint LRT Advisory Committee. Motion carried unanimously.

**September 5, 1990** - Koniarski moved and Hunt seconded that: The Joint LRT Advisory Committee receive and file the reports on organizational alternatives for regional LRT implementation for discussion and recommendation at the next meeting of the committee. Motion carried, four nays (Derus, Keefe, Stevens, Yantos).

**September 19, 1990** - Sivanich moved and Derus seconded that: The Joint LRT Advisory Committee adopt alternative 4B), the County Regional Railroad Authorities Joint Powers Authority, with the considerations outlined by staff including participation by all regional bodies, Mn/DOT, and all seven metropolitan county RRA's if they desire, as the approved organizational alternative for regional LRT implementation. Motion carried; nine ayes (McCarron, Yantos, Chapdelaine, Maher, Stevens, Sivanich, Koniarski, Nawrocki and Derus) and four nays (Ahrens, Hunt, Larkin and Durgin), with one abstention (Faricy).

September 19, 1990 - Sivanich moved and Koniarski seconded that: The Joint LRT Advisory Committee direct the Staff Committee to flesh out the proposal for the County Regional Railroad Authorities Joint Powers Authority as the LRT implementing agency. Motion carried unanimously.

#### IMPLEMENTATION STRATEGIES (CHAPTER 4)

August 8, 1990 - McCarron moved and Maher seconded that: The Joint LRT Advisory Committee receive and file the O'Brien-Kreitzberg & Associates' draft report on Task 1-Implementation Strategy and Task 2-Organizational Plan of the Regional Coordination Plan for LRT. Motion carried unanimously.

August 8, 1990 - Koniarski moved and Chapdelaine seconded that: The Joint LRT Advisory Committee direct the Joint LRT Staff Committee to analyze the O'Brien-Kreitzberg & Associates' draft report and state in the analysis what would be the pros and the cons of the different items in the report, and present this analysis at the September 5th meeting of the Joint LRT Advisory Committee. Motion carried unanimously.

September 19, 1990 - Ahrens moved and Hunt seconded that: The Joint LRT Advisory Committee accept the following recommendations of the Staff Committee for inclusion in the LRT Coordination Plan:

- o All three proposed implementation strategies are potentially suitable for use in implementing LRT in the Twin Cities.
- o The selection of the best implementation strategy is dependent on specific conditions existing within each proposed LRT corridor and the ability of the Owner/Responsible Agency to negotiate an acceptable contract or contracts.
- o Therefore, the selection of a preferred implementation strategy should be made on a corridor-by-corridor basis by the Owner/Responsible Agency.
- o The implementation strategy selected for a specific LRT corridor should be the alternative which best addresses the six recommended selection criteria listed in the staff's report. Motion carried unanimously.

## **10-YEAR MASTER IMPLEMENTATION SCHEDULE (CHAPTER 5)**

**June 20, 1990** - Yantos moved and Erhart seconded that: The consultants include corridors in both Group "A" and Group "B" in preparing the Ten-Year Master Implementation Schedule for the Regional LRT Plan and advise the Joint LRT Advisory Committee at their next meeting which corridors would not fit in the schedule. Motion carried.

**July 11, 1990** - McCarron moved and Chapdelaine seconded that: The Joint LRT Advisory Committee direct the Staff Committee to include compression of the schedule and illustrate an allocation of funds back to counties not receiving initial benefit from the regional light rail system to be presented at the next meeting of the committee. Motion carried.

**July 18, 1990** - Hunt moved and Yantos seconded that: The Joint LRT Advisory Committee accept the Staff Committee recommendation on the revised Ten-Year (1992-2001) LRT Implementation Schedule and Budget dated July 13, 1990. Motion carried unanimously.

**July 18, 1990** - Derus moved and Koniarski seconded that: The Joint LRT Advisory Committee direct the Staff Committee to develop alternative Ten-Year Implementation Schedules and Budgets for the Regional LRT System using a 1/4 t sales tax on a "pay as you go" basis, and a 1/4 cent sales tax with bonding (assuming a AAA rating). Motion carried unanimously.

**August 8, 1990** - Ahrens moved and Hunt seconded that: The consultants develop a general bonding analysis for the Ten-Year Implementation Plan with the following assumptions: 10-year, 1/4 cent sales tax and 30 month start between corridors; 20-year, 1/4 cent sales tax and 24 month start between corridors, add "interest income/interest expense" line in analysis; 7% coupon for 10-year bond; 8% coupon for 20-year bond; bond issue cost of 2%; and, federal share is 20% of the total of all corridors costed. Motion carried unanimously.

**August 29, 1990** - Ahrens moved and Keefe seconded that: The consultants and Staff Committee to the Joint LRT Advisory Committee should examine the total annualized costs of the transit system for the metropolitan area (both capital and operating) to examine of a 1 cent regional sales tax is adequate to meet those needs, and the applicability of the 1/4 cent and 1/2 cent sales tax for capital costs for LRT should be reconsidered by the committee in relation to the entire package of needs and the current property tax subsidy for transit. Motion carried, three naves.

September 19, 1990 - McCarron moved and Sivanich seconded that: The Joint LRT Advisory Committee approve a proposal for a 1 cent regional sales tax for metro area transportation needs with 1/2 cent dedicated to regional LRT construction, with 12 months between corridor starts, for inclusion the Regional LRT Coordination Plan. Motion carried unanimously.

October 17, 1990 - Chapdelaine moved and Maher seconded a motion that: The Joint Light Rail Transit Advisory Committee direct that the Regional LRT Coordination Plan be changed in the amended version of Chapter 1, "Executive Summary", on page 6 bottom paragraph, after fourth line under "Schedule and Budget" add after "to LRT Construction", the following "and a half-cent returned to the municipalities and counties within the seven-county metropolitan area as defined by the statutory definition for transportation purposes." Motion carried unanimously.

#### TWO-YEAR (1990-92) DETAILED MASTER IMPLEMENTATION SCHEDULE (CHAPTER 5)

July 11, 1990 - McCarron moved and Derus seconded that: The Joint LRT Advisory Committee direct the Staff Committee to reevaluate the timeframe for the review process to determine of the schedule could be compressed any further and report back at the next meeting of the committee. Motion carried unanimously.

July 18, 1990 - Hunt moved and Larkin seconded that: The Joint LRT Advisory Committee accept the Staff Committee recommendation on the Two-Year (1991-92) Schedule and Budget assumptions. Motion carried unanimously.

#### OPERATIONS AND MAINTENANCE PLAN (CHAPTER 7)

August 8, 1990 - Chapdelaine moved and McCarron seconded that: The status report on MTC's proposed LRT Operating Philosophy, Operating Plan and Organizational Staffing Plan be laid over to the next meeting of the Joint LRT Advisory Committee. Motion carried unanimously.

August 29, 1990 - Hunt moved and Koniarski seconded that: The Joint LRT Advisory Committee receive and file the MTC's draft LRT Operating Philosophy, Operating Plan and Organizational Staffing Plan. Motion carried unanimously.

September 5, 1990 - McCarron moved and Keefe seconded that: The LRT Operating and Staffing Plan prepared by the Metropolitan Transit Commission should be approved for inclusion in the LRT Regional Coordination Plan. Motion carried unanimously.

#### **LRT/LAND USE COORDINATION ELEMENT (CHAPTER 8)**

July 11, 1990 - McCarron moved and Chapdelaine seconded that: The Joint LRT Advisory Committee recommend that the Metropolitan Council distribute the LRT/Land Use Coordination Element of the Regional Coordination Plan to the cities in the region for their review and comment and forward these comments to the Joint LRT Advisory Committee in the next three weeks. Motion carried unanimously.

August 29, 1990 - Chapdelaine moved and Sivanich seconded that: The LRT/Land Use Coordination Element prepared by the Metropolitan Council staff should be approved for inclusion in the LRT Regional Coordination Plan. Motion carried unanimously.

#### **PROCESS FOR UPDATING THE REGIONAL PLAN (CHAPTER 9)**

July 18, 1990 - Koniarski moved and Keefe seconded that: The Joint LRT Advisory Committee receive and file this information. Motion carried unanimously.

#### **APPROVAL OF DRAFT PLAN**

October 17, 1990 - Sivanich moved and Faricy seconded a motion that: The Joint Light Rail Transit Advisory Committee approve the amended Regional LRT Coordination Plan and forward the amended Plan to the Regional Transit Board. Motion carried unanimously.

Derus moved and Sivanich seconded a motion that: The Joint Light Rail Transit Advisory Committee direct the LRT Staff Committee to revise Chapter 10, "Next Steps for Implementing LRT in the Twin Cities", to include other corridors in addition to the Central Corridor.



**Ramsey County Regional Railroad Authority**  
316 Courthouse, St. Paul, Minnesota 55102 612-298-4145 / FAX 292-6689

**John T. Finley, Chairman**  
District 3  
**Duane W. McCarty, Vice Chairman**  
District 1  
**Warren W. Schaber, Secretary**  
District 6  
**Ruby Hunt, Treasurer**  
District 5  
**Diane Ahrens**  
District 4  
**Hal Norgard**  
District 7  
**Donald Salverda**  
District 2

MEMORANDUM

**TO:** Michael Ehrlichmann, Chairman, Regional Transit Board  
Members of the Regional Transit Board

**FROM:** Commissioner John T. Finley, Chairman,  
Ramsey County Regional Railroad Authority

**SUBJECT:** Draft Light Rail Transit Regional Coordination Plan

**DATE:** December 6, 1990

I would like to make the following amendments to the Light Rail Transit Coordination Plan and they are as follows:

- Approved* ① At page 5, under Organization Plan, we would add a sentence after the fourth sentence after the word "oversight." We would add "That such program management oversight could include final design and construction in alignments that lie within the highway right of way so that highway construction and LRT construction can be provided by the same State agency. (Mn/DOT).
- Approved* ② At page 6, after the second sentence of the second full paragraph, we should insert, "If the alignment lies within the State highway corridor, Mn/DOT shall be the designer and builder for the final design and construction.
- Approved* ③ At page 6, under Schedule and Budget, that we delete the part of the first sentence *which states!!* starting, "~~which would include 1/2 cent dedicated to LRT construction and 1/2 cent returned to counties and municipalities within the seven county metropolitan area~~ for transportation purposes."
- Approved* ④ A new paragraph should be inserted in the Executive Summary and the full report which would call for the Joint Powers Board to consist of members from each of the seven counties in the metropolitan area, the Regional Transit Board, Mn/DOT, the Metropolitan

*Deleted* { ~~The Transit Commission, and Metropolitan Council. The Joint Powers Board should have executive committees overseeing the day-to-day planning, design, and construction of the specific corridors. The Executive Committee should consist of members of the two counties through which a line passes, an MTC representative and an RTB representative. If the line is on a highway corridor, then Mn/DOT shall have a representative on this Executive Committee. Professional staff people from each of the agencies represented on the Executive Committee shall perform the staff function for the Executive Committee with the professional management reporting to the Executive Committee. The Joint Powers Board would have responsibility for overseeing the entire development in the seven county metropolitan area but only those areas which are most directly affected would have the representation at the staff and Executive Committee level. If Mn/DOT had the final design and construction because the alignment is within a highway corridor, the project director would be similar to a general contractor and report to the Executive Committee's professional staff.~~

Joint Powers Board  
Seven Counties  
MTC  
RTB  
Metropolitan Council  
MnDOT

*Deleted* { ~~Executive Committee  
Two Counties  
MTC, RTB and Mn/DOT~~

~~Professional  
Staff~~

~~Final Design  
and  
Contractor~~

## REGIONAL TRANSIT BOARD

Mears Park Centre  
230 East Fifth Street, St. Paul, Minnesota 55101  
612/292-8789

**DATE:** December 4, 1990

**TO:** Chair and Members of the Regional Transit Board

**FROM:**  David Minister, Director of LRT Development

**SUBJECT:** Recommendations-Draft Regional LRT Coordination Plan

### SUMMARY

Action is requested to approve or disapprove the October 17th Draft Regional LRT Coordination Plan as submitted by the Joint Light Rail Transit Advisory Committee (JLRTAC). If the Regional Transit Board (RTB) disapproves of any significant element of the Draft Plan, it should indicate what changes or modifications would cause it to approve the Plan and send it back to the JLRTAC for their consideration.

### DISCUSSION

The 1989 State Legislature directed the RTB's Joint Light Rail Transit Advisory Committee to prepare a Regional Light Rail Transit Coordination Plan and to submit it to the RTB for review and approval/disapproval. On October 17, the JLRTAC completed preparation of the Draft Coordination Plan and submitted it to the RTB. The 1989 Legislature also directed the RTB to submit the Draft Coordination Plan to the Metropolitan Council and the Commissioner of the Minnesota Department of Transportation (Mn/DOT) for review and comment; to conduct a peer review with national LRT experts; and to hold a public hearing. All of these have now been completed. The RTB has received comments and recommendations from the Metropolitan Council, the Commissioner of Mn/DOT, several regional and local units of government, and members of the public (copies were sent to members of the RTB previously under separate cover). Based on all of this information, the RTB must now either approve or disapprove the Draft Coordination Plan as submitted by the JLRTAC. If the RTB disapproves the Plan, legislation stipulates that it is to be returned to the JLRTAC with the modifications that the RTB recommends before it would approve the Plan. The JLRTAC shall take into consideration the RTB's recommendations and resubmit the Plan to the RTB for further review and either approval or disapproval.

The Draft Coordination Plan has been under extensive review by all key stakeholders in the regional LRT system for several months. There are two fundamental policy issues related to governance and funding that form the nucleus of the Coordination Plan. These are the issues related to: 1) the organization that will be in charge of LRT design and construction for the region; and 2) the amount of funding that should be dedicated to regional LRT implementation and how fast should the regional LRT system be built. These appear as Issues #1 and #2 in the next section on "Findings and Conclusions".

Finding acceptable compromise solutions to both of these inter-related issues will form the crux of the RTB's decision to either approve or disapprove the Coordination Plan as presented to the RTB by the JLRTAC.

The remaining Issues #3 through #8 are largely non-controversial and only housekeeping clarifications and modifications are suggested to the recommendations of the JLRTAC.

## FINDINGS AND CONCLUSIONS

### Issue #1 - Organizational Plan

The three organizational alternatives and their supporters are:

- a) Alternative A—County Regional Railroad Authority-Led Joint Powers Authority (JPA)-recommended by the County Regional Railroad Authorities (RRA's) and the JLRTAC.

Key features are shown on pages 26-30 and 41-45 of the Draft Plan. Briefly stated, they are:

- Each of the seven metro area county RRA's would be invited to join the JPA. Each county RRA member would have at least one vote; additional votes would be given to those county RRA's with an LRT line in Final Design or Construction;
- Other state, regional and local agencies would be invited to join the JPA, such as Mn/DOT, RTB, MTC and the cities which had an LRT line under Final Design or Construction. These other agencies may or may not have voting rights.
- The JPA would be given complete power to make final decisions without having to go back to the parent county RRA's.
- The JPA would hire its own Executive Director and technical staff as needed separate from the county RRA's.
- The JPA would be the Overall Program Manager responsible for controlling the project scope, schedule and budget.
- The individual county RRA's would be responsible for developing the LRT corridors up through final environmental clearance, alignment selection and 30% engineering with a firm cost estimate.
- The JPA would be responsible for Final Design Management, with the assistance of Mn/DOT and consultants.
- The JPA would be responsible for Construction Management, with the assistance of Mn/DOT and consultants.
- MTC would be the LRT system operator.

b) Alternative B—Mn/DOT-recommended by the Transportation Study Board.

Key features are shown on pages 30-32 of the Draft Plan and in the Mn/DOT LRT Task Force's September 1990 Draft Report. Briefly stated, they are:

- Mn/DOT would incorporate LRT staffing needs and functions within its existing organizational structure. Mn/DOT would hire a Deputy Division Director to be in charge of Mn/DOT's LRT activities and technical staff as needed.
- Although Mn/DOT did not show it in its organizational plan, there could be a place for a corridor or project advisory committee made up of local elected and appointed officials from the affected cities, county RRA's, MTC and the RTB.
- Mn/DOT would be the Overall Program Manager responsible for controlling the project scope, schedule and budget.
- The individual county RRA's would be responsible for developing the LRT corridors up through final environmental clearance and alignment selection.
- Mn/DOT would be responsible for developing 30% engineering with a firm cost estimate, with the assistance of consultants.
- Mn/DOT would be responsible for Final Design Management, with the assistance of consultants.
- Mn/DOT would be responsible for Construction Management, with the assistance of consultants as needed.
- MTC would be the LRT system operator.

c) Alternative C—RTB-Mn/DOT-recommended by the Metropolitan Council.

Key features are shown on pages 33-35 of the Draft Plan and in the RTB staff's September 1990 Draft Report. Briefly stated, they are:

- RTB would create a new division for LRT design and construction. RTB would hire a Director of LRT Design and Construction and technical staff as needed.
- RTB would appoint a corridor or project advisory committee made up of local elected and appointed officials from the affected cities, county RRA's, MTC and Mn/DOT.
- RTB would be the Overall Program Manager responsible for controlling the project scope, schedule and budget.
- The individual county RRA's would be responsible for developing the LRT corridors up through final environmental clearance and alignment selection.

- RTB and Mn/DOT would jointly share the responsibility of developing 30% engineering and a firm cost estimate with the assistance of consultants. Mn/DOT would be responsible for the civil engineering of the guideway and stations. RTB would be responsible for the systems engineering of the vehicles, track, power, signals, communications, etc.
- RTB and Mn/DOT would jointly share the responsibility for Final Design Management (Mn/DOT for civil works, RTB for LRT systems elements), with the assistance of consultants.
- RTB and Mn/DOT would jointly share the responsibility for Construction Management (Mn/DOT for civil works, RTB for LRT systems elements), with the assistance of consultants as needed.
- MTC would be the LRT system operator.

**Conclusion:** In order to secure the approval of all key stakeholders in the regional LRT program, a carefully crafted compromise organization for LRT implementation will be necessary. The chosen organization must both satisfy the state legislature's concerns regarding accountability and experience in managing multi-hundred million dollar transportation projects and the county regional railroad authorities' lead role in developing plans for a regional LRT system. A hybrid organizational alternative is called for that provides a useful and meaningful role for Mn/DOT, the county RRA's, the RTB, the MTC and the affected cities through which the LRT system will be built and operated. The hybrid organization should be structured to take advantage of each agencies' strengths and to provide clear lines of authority and responsibility. Regardless of which organization is finally chosen, a new staff with the required expertise in LRT engineering and construction will have to be recruited and assembled under one central authority to carry out the project.

The objective here must be to come up with an organizational plan that will be acceptable to the sponsors of impending state legislation that would provide funding for a state-wide package of surface transportation improvements for the next 20 years.

#### **Issue #2 - Schedule and Financing Alternatives**

The two schedule and financing alternatives and their supporters are:

- a) **Alternative A**—1¢ regional sales tax with 1/2 (approximately \$100 million per year) dedicated to LRT implementation and 1/2 dedicated to counties and municipalities in the metro area for other surface transportation needs. Supported by the county RRA's and the Joint LRT Advisory Committee.

Key features of this funding plan and resulting LRT implementation timetable are shown in Figure 5-7 and described on pages 62-77 of the Draft Plan. Briefly summarized, they are:

- In the 10-year period 1992-2001, this level of financing, coupled with anticipated federal and local sources would be sufficient to construct all of Group 'A', all of Group 'B' (5 corridors) and make a start on 2 Group 'C' corridors, for a total of ~57 miles of LRT line in service.

- b) Alternative B-1/2¢ regional sales tax for Metro Area surface transportation needs, including LRT implementation. No fixed percentage or amount would be dedicated to LRT. Rather LRT would compete with other Metro Area transportation needs. Either the legislature or the existing regional transportation funding allocation process (Metropolitan Council/TAB) would set priorities and allocate the available funds accordingly.

Supported by: the Transportation Study Board, the Metropolitan Council and the Transportation Advisory Board.

Key features of this funding plan and resulting LRT implementation timetable may, depending on the amount of funds actually allocated to LRT, approximate the "1/4 cent sales tax," Schedule and budget alternative shown in Figure 5-8 and described on pages 62-77 of the Draft Plan. Briefly summarized, they are:

- In the 10-year period 1992-2001, this level of financing, coupled with anticipated federal and local sources, would be sufficient to construct all of Group "A" and two Group "B" corridors, for a total of 25-30 miles of LRT line in service.

**Conclusion:** In order to secure the approval of all key stakeholders in the regional LRT program, a carefully crafted compromise funding plan for LRT implementation will be necessary. The chosen funding plan must be supported at the state, regional and local levels of government. In order for it to have the best chances for approval, LRT funding needs to be part of a broad-based surface transportation or regional infrastructure funding plan that is fair and equitable to all parts of the metropolitan area over a 20-year period. It also must provide sufficient revenues so as to provide the major share of funding for the Group 'A' Central Corridor LRT starter line and at least one or two Group 'B' LRT corridors in a 10-year timeframe.

The funding plan and the organization plan are closely related issues that are interdependent. The level of government responsible for implementing the major source of LRT funding will also want to assure itself that this funding will be governed and managed by an organization that it has a high degree of confidence in.

The objective here must be to come up with a funding plan that will be acceptable to the sponsors of impending state legislation that would provide funding for a state-wide package of surface transportation improvements for the next 20 years.

### **Issue #3-Implementation Strategies**

Three alternative strategies for the implementation (design and construction) of LRT are considered suitable for use in the Twin Cities Metropolitan Area. These are described in Chapter 4 along with their advantages and disadvantages. They are:

- Current industry practice
- Turnkey
- Hybrid, or a combination of the two above strategies

The selection of the most appropriate implementation strategy will be dependent on the specific conditions existing within each LRT corridor. Therefore, the JLRTAC recommends that the selection of a preferred implementation strategy be made by the organization responsible for LRT implementation on a corridor-by-corridor basis. The implementation strategy selected for a specific corridor should be the one that best addresses the following criteria:

- Impact on project cost
- Impact on project schedule
- Owner risks
- Owner control
- Quality of end product
- Requirements for funding commitments

**Conclusion:** The RTB should adopt the JLRTAC's recommendations on this issue and add the following two additional selection criteria:

1. Level of city and community input desired on design issues;
2. Number and degree of unknowns and uncertainties.

#### **Issue #4-LRT Design Guidelines**

Light rail transit is a mass transportation system that utilizes a steel-wheeled rail vehicle running on a standard-gauge railroad track, powered by electric motors and receiving power through an overhead wire. Vehicles may operate singly or may be trained together. Short trains of up to three light rail vehicles are recommended for the Twin Cities region based on block lengths in the two downtowns. LRT will serve as the backbone of the regional transit system, supported by a bus system, which will be reconfigured to feed the LRT lines.

The LRT system proposed for the Twin Cities region is conceptually a high speed, high capacity, moderate cost, commuter service radiating out from the two metro centers. Travel to and through the metro centers as well as within corridors is expected. To accomplish these objectives, the system will utilize high-platform level boarding, predominantly exclusive (but not necessarily grade-separated) rights-of-way, and stations spaced 1/2 to 1-1/2 miles apart. The system will be fully accessible to persons with disabilities.

The LRT system will utilize conventional "off-the-shelf" technology. Designs and materials will be selected that are attractive but are moderate in cost, easy to install and inexpensive to maintain. Grade separations and tunnels will be provided only where it can be shown that they are needed to address topographic or operational concerns.

The LRT Coordination Plan provides design guidelines for:

- Light rail vehicles
- Stations
- Park-and-ride lots and bus transfer facilities
- Accessibility features for seniors and the disabled
- Track system
- Electrification system
- Train signal system
- Communication system
- Fare collection system
- Operations and maintenance facilities

The following clarifications/modifications are suggested by the Transportation Advisory Board (TAB), the RTB Policy Committee and others to the LRT Design Guidelines contained in Chapter 6:

Design guidelines should incorporate the following points:

1. The "Overall Design Philosophy" for the regional LRT system is meant to be a broad, general description of how the region would like the LRT system taken as a whole to look and operate. It is not meant to say that each LRT line or each segment of the line must conform to this design philosophy in every way. Rather, the LRT design philosophy is meant to be a guiding statement of how the region envisions the overall LRT system should look and operate when it is completed, much like a city's general plan is used to guide the future development of that city. It provides common direction and guidance to the LRT system's policymakers, planners, designers and operators.
2. The characteristic "high speed" means that the LRT system should be designed and built to operate at speeds competitive with the automobile--i.e., top speeds of 50-60 mph and average speeds of 25-30 mph including stops.
3. The characteristic "high capacity" means that the LRT system should be designed and built to carry passenger volumes equivalent to a six to eight lane urban freeway--i.e., 6-8,000 passengers per hour per direction.
4. The characteristic "high platform" means that the LRT system should be designed and built with station platforms level with the car floors and fully accessible to all people desiring to use the system.

5. The characteristic "moderate cost" means that the LRT system should be designed and built for \$20 - \$30 million per mile of route on average system-wide. Some segments are expected to cost more per mile and others less.

Relative to the issue of tunnel construction, the TAB supported the statements on page 81, which says "Grade separation and tunnels will be provided only where it can be shown that they are needed to address topographic or operational concerns. The need for such facilities should be carefully evaluated before a decision is made to design and construct them."

Relative to the issue of station spacing, it is suggested that the text be changed to indicate a range of station spacing is appropriate from 1/2 mile to 1 1/2 miles, with the average station spacing being approximately 1 mile system-wide.

Relative to the issue of allowing concessions to be sold in the LRT station areas, it is suggested that the text be changed to indicate that concessions may be allowed in station areas other than the boarding platforms if deemed appropriate by MTC.

**Conclusion:** The RTB should adopt the recommendations of the JLRTAC on LRT Design Guidelines, as contained in chapter 6, with the addition of the above modifications/clarifications.

#### **Issue #5 - LRT Operations and Maintenance Plan**

The Metropolitan Transit Commission will be the agency responsible for LRT operations and maintenance and has prepared an organization and staffing plan for the provision of these services. The MTC operations and maintenance plan addresses overall operating policies as well as specific operational issues related to security, communications, signalization, dispatching and training. Key operating policies are defined in chapter 7.

- The RTB Policy Committee suggests that the text of chapter 7, p. 102, be augmented to show the frequency of LRT service anticipated on Saturdays and Sundays as well as weekdays.
- The RTB Policy Committee suggests that the text of chapter 7, p. 104, be augmented to indicate that the Metropolitan Council is now studying the region's overall needs for radio communication channels for public agencies.
- **Conclusions:** The RTB should adopt the recommendations of the JLRTAC on the LRT Operations and Maintenance Plan as contained in chapter 7 with the addition of the above modifications/clarifications.

**Issue #6 - LRT and Land Use Coordination**

The Metropolitan Council has prepared a planning framework for coordination between the development of an LRT system and land use-related activities. These guidelines are not mandatory but will serve as information and guidance to cities affected by the implementation of LRT. Cities will continue to be responsible for land use-related decisions. The recommended planning process includes five phases:

- Phase 1--Land Use Evaluation.
- Phase 2--Station Area Land Use Planning
- Phase 3--Detailed Station Area Land Use Planning
- Phase 4--Station Area Preparation
- Phase 5--Station Area Development

The Metropolitan Council, the RTB Policy Committee and others suggest the addition of the following language to further reinforce the need for strong LRT/land use coordination in the corridors proposed for LRT implementation:

1. Land use and development opportunities created with LRT should be seen as a primary objective for the LRT system, rather than as a secondary benefit that may or may not be pursued.
2. Cities should begin comprehensive land use planning for LRT long before construction to ensure that neighborhoods are protected and that development occurs around LRT stations that is supportive of the community's goals and of the region's investment in LRT.

**Conclusions:** The RTB should adopt the recommendations of the JLRTAC on LRT and Land Use Coordination as contained in chapter 8 with the addition of the above modifications/clarifications.

**Issue #7 - Process for Updating the Regional LRT Plan**

The regional LRT plan will be reviewed annually and formally updated every two years. Changes in corridor priorities will be based on the following conditions:

- Selection of final corridor alignment and station locations
- Completion of environmental reviews
- Significant changes in patronage forecasts
- Local and agency plan approvals
- Readiness for construction

- Any other significant changes in projected performances of the corridor

As part of this process, it is expected that the benefits and costs of LRT in each corridor can be better assessed as more detailed information becomes available. As a result, corridor priorities can be further refined based on cost-effectiveness, availability of funds, regional goals and other technical criteria.

**Conclusions:** The RTB should adopt the recommendations of the JLRTAC on the Process for Updating the Regional LRT Plan as contained in chapter 9 and add the following two additional evaluation criteria:

1. Significant changes in capital cost estimates;
2. Funding availability.

#### **Issue #8 - Next Steps for Implementing LRT**

- There are many activities currently underway which must be completed and many decisions which must be made before LRT can successfully be implemented in the Twin Cities metropolitan area. Chapter 10 describes the current status of each corridor in the regional 10-year LRT plan (Groups A, B and C) and identifies milestone decisions and general dates for implementation of LRT in the Twin Cities metropolitan area.
- Preliminary Design (10%) and environmental reviews are underway on all Group A and B corridors as well as three of the five Group C corridors. Preliminary Engineering (30%) has been initiated on the Hiawatha Corridor, the Minneapolis tunnel and the central operations and maintenance facility. The status of each corridor is noted in Figure 10-1 along with the scheduled completion dates for Preliminary Design (10%), Final Environmental Impact Statement, and Preliminary Engineering (30%). The dates noted are based on the current schedules for completion of each corridor.
- A funding request for LRT will be made to the Minnesota Legislature in the 1991 session. The Legislature's decision regarding funding will be the key determinant in maintaining the schedule for implementation of LRT in the Twin Cities region. If a new funding mechanism goes into effect in 1991, the LRT Implementing Organization could be formed in the summer of 1991 and activities could proceed as scheduled.
- Several actions have been taken within the past year to secure federal funding for LRT in the Twin Cities. A number of activities will be undertaken during 1991 and the following years to complete the required processes for obtaining federal funding for the three proposed federally funded corridors in the Twin Cities regional LRT systems. UMTA has indicated that the region can only advance one candidate corridor at a time into the federal alternatives analysis process, and that the region needs to select its priority corridor. The region is in the process of considering UMTA's statement and evaluating the three potential candidate federal corridors (I-35W; Hiawatha; and Minneapolis-Northeast to Northtown).

- Finally, RTB will prepare a revised Regional LRT Plan for submittal to the Legislature every two years beginning in January, 1992. This plan will set priorities for implementation and will provide updated information on the status of LRT implementation in the Twin Cities as set forth in the LRT Coordination Plan and required by Legislation.

**Conclusions:** The RTB should adopt the recommendations of the JLRTAC on the Next Steps for LRT Implementation as contained in chapter 10.

### RECOMMENDATIONS

- A. That the Regional Transit Board approve the "October 17 Draft Regional LRT Coordination Plan" subject to the following modifications and forward it to the Joint LRT Advisory Committee for their review and concurrence:
1. Organizational Alternative A, with the following modifications (if applicable);
  2. Scheduling and Financing Alternative A, with the following modifications (if applicable);
  3. Implementation Strategies as stated in chapter 4 of the October 17 Draft Report with the addition of the modifications recommended;
  4. LRT Design Guidelines as stated in chapter 6 of the October 17 Draft Report and with the addition of the modifications recommended;
  5. LRT Operations and Maintenance Plan as stated in chapter 7 of the October 17 Draft Report, with the addition of the modifications recommended;
  6. LRT and Land Use Coordination as stated in chapter 8 of the October 17 Draft Plan with the addition of the modifications recommended;
  7. Process for Updating the Plan as stated in chapter 9 of the October 17 Draft Plan with the addition of the modifications recommended; and
  8. Next Steps for Implementing LRT as stated in chapter 10 of the October 17 Draft Plan.
- B. That the Regional Transit Board accept all of the comments and suggestions received from the Metropolitan Council, the Minnesota Department of Transportation, the Transportation Advisory Board, the county regional railroad authorities, the cities and other interested organizations and individuals, and incorporate them into the final Regional LRT Coordination Plan as appropriate and where they would not conflict with the meaning or intent of the final Regional LRT Coordination Plan as recommended by the Joint LRT Advisory Committee and adopted by the Regional Transit Board.